

M E M O R A N D U M

TO: Council, SSC, and AP members  
FROM: Jim H. Branson  
Executive Director  
DATE: March 12, 1986  
SUBJECT: Bering Sea/Aleutian Islands Groundfish FMP

ACTION REQUIRED

- (a) (Information only). Status report on regulatory amendment for single species closures.
- (b) Approve Amendment 10 package for public review.
- (c) Status report on NMFS implementation of trawl restrictions in eastern Bering Sea. Reassess February action on Tanner crab bycatch limits.
- (d) Make recommendations to NMFS about when to close directed sablefish fishing in the Bering Sea in order to leave enough for bycatches.

BACKGROUND

D-4(a) Status of single species closure amendment.

At the December meeting the Council received a proposal from the NMFS Regional office to implement a Secretarial regulatory amendment which would allow single species closures in both the Bering Sea and Gulf of Alaska. This will allow the RD to close directed fishing for any species when TAC is reached, but fisheries which take that species as bycatch will be allowed to continue. No retention will be allowed after the directed fisheries are closed. The two amendments will be identical, but the economic and environmental analyses may be quite different. No schedule has been established for completion of the amendment. It will be started as soon as staff time is available.

D-4(b) Amendment 10 package.

In February the Council reviewed proposals that had been submitted for changes to the Bering Sea Groundfish FMP. The Council policy provides for initial review of all proposals at the February meeting and direction to the Plan Team to develop the relevant economic and environmental analyses of the viable proposals for Council and public review. Five issues were approved for review, and alternative management actions have been listed and analyzed.

Initial Council review of the Amendment 10 package and approval for public review are scheduled for this meeting. Item D-4(a) is summary of the issues and alternatives as an introductory document. A combined Draft Environmental Assessment and Draft Regulatory Impact Review/Initial Regulatory Flexibility Analysis will be distributed at the meeting.

A 30-day public comment period is scheduled to begin in late April or early May and end on or before June 1. The revised amendment package will be available for final action at the June meeting. The amendment should be implemented by December 1986.

D-4(c) Status of Bering Sea trawl closure.

At the February meeting the Council spent long hours deliberating over how to control the bycatch of red king crab, Tanner crab and halibut in the joint venture yellowfin sole/flounder fishery. NMFS has been evaluating the Council action in order to implement the emergency rule and several problems have been identified. We have received a letter [D-4(1)] identifying the differences between the motion you approved in February and the proposed emergency rule.

In summary, the emergency rule differs from your February action in the following ways:

- (1) all reference to and requirements for halibut bycatches are omitted;
- (2) only trawl fisheries and Tanner crab fisheries are excluded from the closed area;
- (3) No king crab PSC limit is set for the area north of 58°N and west of 165°W;
- (4) observers on DAP vessels are not required east of 160°W; and
- (5) the Tanner crab PSC limit is held in abeyance until confirmed at this meeting.

You need to take action on at least the Tanner crab PSC limit and it may be appropriate to make additional recommendations to NMFS on other items.

D-4(d) Develop recommendations to NMFS on when to close the directed sablefish fishery.

The DAP sablefish catch as of March 13 was at least 962 mt, over half of the annual DAP of 1,826 mt. If this catch rate continues DAP will be reached by June 1. If the single-species closure amendment has been implemented by that time the Regional Director will be authorized to close the directed fishery. The Council should advise him at what point to close the fishery to ensure that adequate amounts for bycatch remain.

### A Bycatch Quota for C. Bairdi in the Bering Sea

During consideration of a c. bairdi bycatch cap for the DAH yellowfin sole/flounder fisheries of the Bering Sea, the Council received some data on catch composition which subsequently proved to be incorrect. From a review of the tapes of the January Council meeting, it is apparent that the average proportion of the trawl bycatch composed of c. bairdi and that composed of C. opilio were inadvertently transposed. While testimony suggested that 37 percent of the bycatch of Tanner crab was, on average, bairdi, the actual observed proportion of this species has been 63 percent. The difficulty arises because immediately after presentation of this erroneous composition data, one hears on the tape a calculation made employing this misinformation which results in the following. Assuming a 1986 directed DAH flatfish harvest of 287,000 metric tons (mt) of groundfish, and utilizing a three Tanner crab per mt bycatch rate, the estimated interception of Tanners in these fisheries would be approximately 861,000 animals. Given a bairdi composition of 37 percent, this results in an estimated bairdi bycatch of 318,570 crabs in 1986. The suggestion is then made to round this number to 320,000 bairdi and a motion follows to adopt 320,000 as the Bering Sea Aleutian Islands (BS-AI) 1986 bycatch cap.

Had the correct average bairdi composition figure been applied, using the same procedure and rationale, the estimated 1986 bairdi bycatch would have been 542,430 animals. This loss is approximately equal to that observed in the 1985 fishery, and although it represents an improvement in the bycatch rate of bairdi, i.e., 1986 assumes 287,000 mt of directed catch while 1985 directed harvest was on the order of 220,000 mt, the loss of more than one half million bairdi is apparently not consistent with the intent of the Council to significantly reduce the bycatch of this species in 1986.

Had the Council been aware of the actual proportion of the DAH flatfish Tanner bycatch composed of bairdi, it is not certain that they would have drawn the same conclusions regarding the numerical bairdi bycatch cap. This is particularly the case when one examines the economic implications of the action as proposed by the Council. For clarification, the proposed bairdi cap was established at 320,000 crab. Upon attainment of that number of bairdi in the DAH flatfish fisheries of the Bering Sea, all further trawling for flatfishes would be prohibited for the duration of the period governed by the emergency rule. NOAA General Counsel advises that this closure must extend to all flatfish trawling, both foreign and domestic, and per the Council's motion, to all areas of the BSAI management area.

Assuming that 287,000 mt of directed harvest are involved in the 1986 DAH flatfish fishery in BSAI, at an average value of \$133/mt, (as recorded in 1985 in this fishery) the domestic fishery could be worth approximately \$38.2 million, at exvessel. Assuming further that the average rate of Tanner crab bycatch is three crabs per ton and 63 percent are bairdi, this implies that approximately 542,000 bairdi would be lost, if no more restrictive cap were imposed. However, if the 320,000 bairdi cap were adopted and implemented, the potential savings in bairdi would be approximately 222,000 crab. Utilizing a

discounted present value, at exvessel, per crab of between \$.405 and \$.65<sup>1/</sup>, developed from NWAFC catch and revenue data and Reeves and Terry, "A Biological and Economic Analysis of the Bycatch of Prohibited Species in the Bering Sea Area I Joint Venture Flounder Fishery," January 1986, the present value savings would be between \$90,000 and \$144,000, at exvessel. [To the extent that the average bycatch rate were greater than three Tanners/mt, the attributable savings in terms of bairdi from the 320,000 cap would likewise be greater.]

This suggests that the BS-AI DAH flatfish fishery, which has an estimated total exvessel value of \$38.2 million, could be placed in jeopardy in order to obtain \$90,000 to \$144,000 in present value savings in bairdi. This does not include economic impacts imposed as a result of the simultaneous closure of the foreign flatfish fisheries when DAH reaches the bairdi cap, nor does it reflect crab values beyond the exvessel level.<sup>2/</sup>

Clearly, only a portion of the total foreign and DAH flatfish fishery would be potentially at risk of closure when the PSC cap was attained, since some harvest would accompany the bycatch. However, even if only 10 percent of the directed catch in DAH were foregone as a result of attainment of the cap, the exvessel loss would be approximately \$3.8 million. This is not a comprehensive accounting of costs, but simply a reflection of the potential domestic exvessel impact of a 320,000 bairdi cap applied to DAH flatfish fishing BSAI areawide.

<sup>1/</sup> The estimated discounted present value per crab varies, in large part, with the average size, i.e., age, of the bairdi intercepted. c. bairdi are assumed to experience relatively high annual natural mortality rates as they grow toward sexual maturity and recruitment into the directed Tanner fishery. Therefore, the smaller the average bairdi intercepted, the longer the period until potential recruitment, and the greater the probability of loss to natural causes, absent interception. The result is a lower average discounted present value per crab in the bycatch.

<sup>2/</sup> As Dr. Joe Terry, NWAFC-NMFS, pointed out to the Council recently, "The choice between using either the estimated change in value at the exvessel level or the change at the wholesale level as an approximation of bycatch impact cost is not simple. If the problem of bycatch is considered to be one of a cost being imposed on crab and halibut fishermen by flounder fishermen, the problem could be eliminated by having the flounder fishermen bear this cost which is presumably not greater than the change in exvessel value of crab and halibut caused by the bycatch. Similarly, if markets are fairly competitive, we would expect, for example, the price that a halibut fisherman receives to reflect the value of halibut to society beyond the harvesting level. Certainly, if halibut were suddenly perceived to be a much more beneficial (i.e., valuable) product, we would expect its price to increase to reflect that increased value. These arguments suggest that the change in exvessel value is not a bad proxy for the bycatch impact cost if prices are not significantly affected by bycatch.

"The arguments in favor of using the change in wholesale value as a proxy for the bycatch impact cost arise from market imperfections. These might include such things as buyers or sellers who, individually, have control over prices, or a workforce that is relatively immobile. At this time, it is difficult to determine which is the better proxy for impact costs."

Assuming a three crab/mt bycatch rate, as identified by the Council, at the 320,000 bairdi cap the following result can be derived. Given a 287,000 mt directed catch, a three Tanner (or 1.89 bairdi) bycatch rate implies that approximately 169,000 mt of directed catch would be harvested enroute to attainment of the 320,000 bairdi cap. This suggests further that approximately 118,000 mt of DAH flatfish would remain unharvested as a result of the closure provision of this action. The foregone value of this portion of the DAH flatfish fishery would be roughly \$15.7 million. At higher bairdi bycatch rates, and nearly all historically observed DAH rates have been higher, attainment of the bairdi cap would occur even earlier and, therefore, greater quantities of flatfish would go unharvested in the DAH fishery.

Confronted with these results and the fact that the Council had based its original bairdi cap decision upon inadvertently transposed catch composition data, it was suggested that perhaps a modification of the closure provision of the action could achieve the bairdi savings objective with less severe impacts upon foreign and domestic flatfish trawlers. To this end it was proposed that the 320,000 bairdi cap (or some alternative cap selected by the Council based upon the corrected composition data) be placed upon the DAH flatfish fisheries in 1986 within an area bounded on the west by 165°W. longitude and on the north by 58° N. latitude. This area coincides with that governed by the 135,000 red king crab cap, also proposed at the January Council meeting. As with the red king crab cap, at such time as the bairdi cap was attained by domestic yellowfin sole/flounder fishermen within this area, all further flatfish trawling, both foreign and domestic, would be prohibited within this 165°W-58°N zone for the remainder of the effective period of this emergency rule.

The rationale for this alternative proposal was that reducing the geographic scope of the closure would provide protection for c. bairdi stocks, assumed to be present in significant concentrations only east of 165°W, while not seriously affecting the ability of DAH and foreign flatfish trawlers to harvest their allocations. NMFS surveys suggested that concentrations of yellowfin sole and other flatfish were as great or greater outside 165°W-58°N as within, although the more distant concentrations carry with them other costs and restrictions, particularly for the smaller DAH vessels in the fleet. These stock assessment interpretations were subsequently confirmed in a conversation with Richard Bakkala, NWAFC.

However, as the analysis of this alternative proposal proceeded, bycatch data obtained from the Observer Program suggested that the imposition of a bairdi cap limited to 165°W-58°N, in combination with the red king crab cap and closure for the same area, could actually produce the opposite result of that intended by the Council. Assuming both caps apply to all DAH flatfish fishing within 165°W-58°N, with expulsion from this area of all further foreign and DAH flatfish trawling when either cap is exceeded, the following scenario could result.

It seems highly probable that the red king crab cap of 135,000 crabs will be the limiting factor in the DAH flatfish fishery within the 165°W-58°N area.

Based upon the best available bycatch data<sup>3/</sup> for the DAH fisheries within 165°W-58°N, excluding the assumed closed area 160°W-162°W, and information provided to the Council regarding 1985 industry improvements in PSC avoidance, a red king crab bycatch rate of 4 crab/mt of groundfish was assumed. This implies that approximately 33,750 mt of directed catch will be taken by the DAH flatfish fishery inside 165°-58°N before the 135,000 red king crab cap is attained. At that point all further flatfish trawling must occur west and/or north of 165°W-58°N. This suggests that roughly 253,250 mt of the total 287,000 mt DAH target will be forced outside of 165°W-58°N, not because of the bairdi catch, but due to attainment of the red king crab ceiling. Based upon the historic bairdi bycatch rates for foreign and domestic flatfish fisheries outside 165°W-58°N, the expected bairdi bycatch associated with redistribution of domestic effort to extract the remaining 253,250 mt of DAH would be approximately 1.2 million bairdi. Add to this the 152,000 bairdi by-caught within 165°W-58°N in conjunction with attainment of the 135,000 red king crab cap, and the potential total bairdi loss could number in excess of 1.35 million animals,<sup>4/</sup> with an exvessel discounted present value of between \$550,000 and \$880,000.

Attempts to verify these estimates have met with mixed success. NWAFC sources confirm that c. bairdi, particularly females and immature males, exist in relatively high concentrations throughout a large portion of the area west and northwest of 165° W. and therefore are potentially vulnerable to the redistributed effort that would occur following a closure of 165°W-58°N. By-catch rates over the period 1982 through 1984 consistently indicate higher losses of bairdi to the west and north of 165°W-58°N, than to the east and south, excluding 160°W-162°W.

It has been argued that the depressed bairdi populations will prevent losses of the magnitude estimated above from occurring. However, under such stock conditions the relative effect of the redistribution of effort to areas outside 165°W-58°N, in response to the proposed area closures, could be just as detrimental, in terms of delaying or preventing the rebuilding of c. bairdi populations.

The question confronting the Council appears to be, "can the PSC savings objectives of the Council, with regard to red king crab and bairdi, be achieved simultaneously at a cost, as measured in foregone DAH and foreign flatfish harvest, that is justified by the potential benefits to the respective crab resources." If so, what means are available to achieve these ends?

<sup>3/</sup> Complete data on 1985 JVP and foreign flatfish fishery bycatches are not presently available. NMFS Observer Program sources indicate reliable estimates of these data will be available in July 1986. Fragmentary data for 1985 do exist, but are limited to information from a single JV flounder operation and may not be particularly representative of the fishery as a whole. Further, these 1985 catch and PSC data have not as yet been reviewed, analyzed, and edited for consistency by NMFS, as have the 1982 through 1984 data.

<sup>4/</sup> Based upon 1985 NMFS Eastern Bering Sea Trawl Survey data, a large majority of these bairdi crab would be expected to be females, small males, and pre-recruit males.

C. Bairdi By-catch Rates in the JVP and Foreign  
Yellowfin Sole/Flounder Fisheries in BS-AI, 1982-1984 1/

Bairdi per metric ton of Groundfish						
Foreign and Joint-Venture				Joint-Venture only		
Outside 165°W-58°N	Inside 165°W-58°N excluding 160°W-162°W	160°W-162°W south of 58°N	Outside 165°W-58°N	Inside 165°W-58°N excluding 160°W-162°W	160°W-162°W south of 58°N	
1982	2.58	0.54	1.41	-	0.84	1.41
1983	6.26	1.85	6.51	1.86	5.45	6.64
1984	4.90	1.22	2.39	1.98	7.26	2.39
82-83 2/	4.66	1.46	3.99	1.65	3.42	4.00
83-84 2/	5.56	1.48	3.34	1.93	6.20	3.34
82-84 2/	4.75	1.34	2.98	1.82	4.50	2.98

1/ Based upon actual observed interception data, NMFS Observer Program, NWAFC.

2/ Weighted average by-catch.

D-4(c) Tanner Crab Bycatch Limits

The AP deferred action on agenda item D-4(c) to an Industry Committee composed of the following: Larry Cotter, Barry Fisher, Cameron Sharick, Rich White, Terry Baker, Pete Isleib, and Arni Thomson. Subsequent to the appointment of the Committee, Ted Evans replaced Terry Baker and Bill Woods was named to the Committee.

The Committee adopted the following objective:

Objective. To manage fishery activity in the Bering Sea, specifically bottom flatfish<sup>1/</sup> trawling and crab pot fishing, in a manner which emphasizes conservation and rebuilding of the crab resources while, to the extent possible, allowing both bottom flatfish trawling and crab pot fishery activity.

The Committee acknowledges the female bairdi population is extremely low and seeks to protect that population in accordance with our objective. The Committee also recognizes that information of critical importance (e.g. stock recruitment, gear impact, and predator-prey relationships) is insufficient for estimation of impacts of current management decisions on future bairdi populations.

The Committee discussed the possibility of conducting a spring crab fishery but advises against this option for conservation reasons, specifically the danger of mortalities to female red king crab. Additionally, the Committee is concerned with the possibility of poor product quality resulting from the harvest of molting bairdi.

The Committee agrees that a 1986 directed bairdi crab pot fishery should occur, but not prior to November 1, and should only occur in the event the 1986 NMFS summer trawl survey establishes that a crab fishery can be prosecuted. The Committee discussed the possibility of conducting a concurrent king crab and bairdi fishery. While this option provides several

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1/ Yellowfin sole and other flounders.



benefits, most notably the decreased bycatch mortality, there are also disadvantages such as population, difference between king crab and bairdi by various areas, and the difficulty of arranging a concurrent fishery given two separate harvest quotas.

The Committee recognizes that a substantial modification to the January Council decision would require preparation of a new RIR; therefore, the Committee recommends that the bycatch limits and rates enumerated further on in this report be implemented immediately and that upon extension of the emergency rule the Committee's entire recommendations be implemented. This, of course, would still require a modification of the existing RIR; however, this should present no difficulty due to the length of time preceding an emergency rule extension.

The Committee recommends the establishment of three zones in the Eastern Bering Sea (see chartlet on last page) in addition to the area closed to trawl fishing bounded by 160°W, 58°N and 162°W.

Zone 1 would be defined as the area bounded by 165°W long. by 58°N lat. extending east to the shore.

Zone 2 would consist of the area bounded by 165°W long., north to 58°N, then west to the intersection of 58°N and 171°W long., then north to 60°N, then west to 179°E long. diagonally extending on a straight line southeast to the intersection of 167°W long. and 54°30"N lat., and then extending eastward along 54°30"N lat. to land.

Zone 3 shall encompass the remainder of the Eastern Bering Sea.

The Committee established Zone 2 based upon the fact that Zones 1 and 2 encompass 98% of the bairdi females and sublegals.

The Committee recommends that the bairdi bycatch amounts for JVP operations be as follows (see Table 1):

Zone 1 - 80,000 animals (based upon an average of two animals per metric ton and a harvest of 40,000 mt).

Zone 2 - 326,000 animals (based upon an average of 2.25 animals per metric ton and a harvest of 145,000 mt).

Zone 3 - no cap on the number of animals which can be taken.

The Committee also recommends the number of bairdi allowed to be taken by foreign directed fishing operations not exceed 64,000.

In determining the bycatch levels the Committee extrapolated an anticipated number of bairdi animals in the Bering Sea by reducing the 1986 population to 60% of the 1985 population. This extrapolation resulted in an anticipated number of animals in 1986 of approximately 72 million.

Having determined the total number of assumed animals in 1986, the Committee then applied the same bycatch rate in effect in 1985 to the 1986 flatfish allocation in order to determine the total number of animals which could be removed from the fishery without theoretically harming the status of the stock. That number is 1,253,000 animals. The Committee then extrapolated the percentage of the number of animals taken in 1985 by directed foreign fishing operations, joint venture operations, and directed crab fishing operations (see Table 2), as adjusted for the relative decreases of TALFF and the increases of JVP allocations.

It is the expressed intent of the Committee that a 1986 directed crab pot fishery be allowed assuming that the results of the NMFS summer trawl survey establish a bairdi population greater than or equal to the population assumed by the Committee. The Committee recognizes that the number of legal males may need to be viewed as independent of the total population as determined by the summer trawl survey. A fishery may or may not be warranted based upon the number of legal male bairdi in the population.

The following caveats apply to the bycatch amounts recommended for both JVP and TALFF flatfish operations:

- (1) When the total number of animals is reached in Zone 1, all trawling activity for flatfish in that zone will immediately cease. The Committee recognizes that the king crab cap and the bairdi cap stand independently and trawling in Zone 1 ceases immediately if either cap is reached.

This sequence of events also applies to all flatfish trawling activity in Zone 2.

- (2) For JVP operations, the number of animals allowed to be taken by tow will be determined on the basis of the average number of bairdi per metric ton as determined by consecutive tows on a fishing vessel by fishing vessel basis. It is the intention of the Committee that any operation which exceeds the number of animals per ton provided for shall voluntarily move or modify their operations as expeditiously as possible in order to reduce their bycatch level to or below the defined amount. In the event an operation's bycatch rate exceeds the number of allowed animals per metric ton for three consecutive weeks, the operation shall immediately be required to cease its trawling activity in Zones 1 and 2 for the remainder of the year. The bycatch rates will apply to each individual fishing vessel and compositely to each joint venture operation.
- (3) In the event the summer trawl survey establishes a lower number of total bairdi animals than has been assumed by this Committee (72 million), the amount of bycatch provided for both JVP and TALFF operations shall be reduced proportionately to the difference between the Committee's assumption and the survey results.

As regards DAP flatfish trawl operations, the Committee anticipates the harvest levels in Zones 1 and 2 to be diminimous (7,000 mt). The Committee likewise anticipates bycatch amounts to be negligible. However, the Committee expects DAP operations to voluntarily move and/or modify their operations in the event their activity results in bycatch rates greater than those applicable for JVP operations in that particular zone. The Committee recommends DAP

flatfish trawl operations be monitored closely to ensure compliance and that necessary action be taken in the event they fail to adhere to this agreement. The Committee recognizes that DAP operations are new to this fishery and may encounter start-up difficulties.

In conclusion, the Committee recommends that it be reconvened at the September Council meeting and that it be provided the necessary scientific support to allow it to review the results of the NMFS summer trawl survey and the performance of the fisheries to date.

The Committee has reached this recommendation unanimously.

TABLE 1. 1986 RECOMMENDED BAIRDI CATCH AMOUNTS (IN ANIMALS)

Directed Pot Fishery	783,000 <sup>1/</sup>
DAP - Trawl	
JVP - Trawl	406,000 <sup>2/</sup>
TALFF - Trawl	<u>64,000</u>
TOTAL	1,253,000

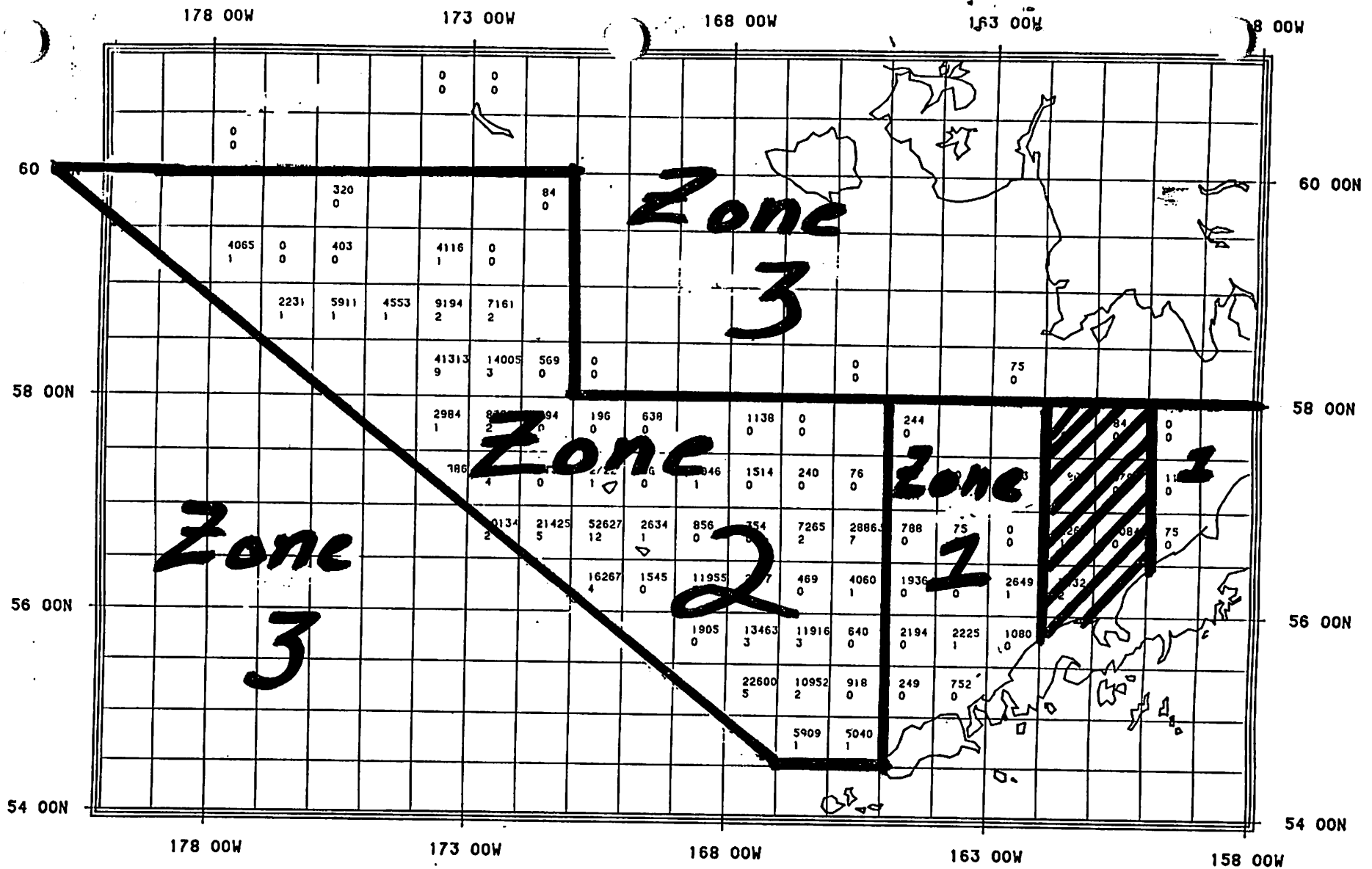
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TABLE 2. 1985 BAIRDI CATCH AMOUNTS (IN ANIMALS)

Directed Pot Fishery	1,283,000
DAP - Trawl	?
JVP - Trawl	522,000
TALFF - Trawl	<u>287,000</u>
TOTAL	2,092,000

<sup>1/</sup> Assumes 1986 NMFS Summer Trawl Survey is 72 million animals.

<sup>2/</sup> The JVP bycatch breakdown is 80,000 animals in Zone 1 and 326,000 animals in Zone 2.



84 BAIRDI FEMALES (NO.S PER SQUARE MILE)

NORTH PACIFIC FISHERY MANAGEMENT COUNCIL  
FISHERY MANAGEMENT PLAN FOR GROUND FISH  
OF THE BERING SEA AND ALEUTIAN ISLANDS

AMENDMENT 10 SUMMARY

The North Pacific Fishery Management Council has directed the Bering Sea Plan Team to prepare an amendment (No. 10) and supporting documentation for management of the Bering Sea/Aleutian Islands groundfish fisheries. The Council has identified the issues and problems to be addressed by Amendment 10 but has not yet chosen preferred solutions. The Plan Team and Council staff have reviewed the issues and identified and analyzed the biological, socioeconomic and management impacts of various alternative solutions for public and Council consideration. These issues and alternative solutions are listed and briefly described below. A combined Draft Environmental Assessment (EA) and Regulatory Impact Review/Initial Regulatory Flexibility Analysis (RIR/IRFA) will be reviewed by the Council at their March 19-22 meeting and will be approved for public review. Public comment on these documents and issues will be accepted for approximately 30 days. At their June meeting the Council will make their final decisions and submit the amendment and supporting documentation to the Secretary of Commerce for implementation.

This statement of issues and possible solutions as well as the draft EA/RIR/IRFA are intended to provide information to the fishing community so they can provide meaningful testimony to the Council in their deliberations. Any comments or data which might affect the biological or socioeconomic analyses in the EA and RIR should be submitted to the Council in written form during the 30-day comment period. Although the Council will accept oral testimony at the June meeting, such testimony should be limited to clarification of earlier written comments rather than submission of new information.

ISSUES AND ALTERNATIVE MANAGEMENT SOLUTIONS

- A. Rule 1: Authorize the Regional Director to reallocate to JVP any portion of the DAP which he determines will not be harvested during the fishing year.

Alternative 1: Status quo.

Currently the FMP and regulations address reallocation of DAP to TALFF but not to JVP. Although NMFS has on occasion reallocated to JVP, this procedure may not withstand legal challenge.

Alternative 2: Allow the reallocation of unneeded DAP to JVP.

The proposed action would clarify the intent of the Council and Magnuson Act and would remove any susceptibility to legal challenge.

*DAH? Gloss phrase "DAH"*

- B. Rule 2: Authorize the Secretary of Commerce to adjust harvest levels and seasons for conservation reasons through time and area closures (formerly known as Field Order authority). *now called rule-related notices*

Alternative 1: Status Quo.

The FMP and implementing regulations do not allow for rule-related notices of closure. Under the status quo inseason closures cannot be implemented for conservation reasons.

Alternative 2: Provide the Secretary with authority to issue rule-related notices of closure.

This alternative would authorize the Regional Director to issue rule-related notices of closure if, during the fishing year, he determined that a stock was in danger of being overfished or otherwise detrimentally impacted by further fishing. He would be authorized to implement time/area closures to protect any species in need of conservation or protection from fishery-related mortality.

- C. Rule 3: Establish measures to limit bycatches of prohibited species by U.S. fishermen.

Alternative 1: Status quo. No PSC limits will be set for the DAP and JVP fisheries. PSC limits for foreign fisheries shall be as specified in Amendment 3 to the Bering Sea Groundfish Management Plan.

Alternative 2: Establish PSC limits for halibut, king crab, Tanner crab, and salmon in the DAP and JVP fisheries.

PSC limits could be established by various methods such as specification of (1) an absolute number; (2) a number computed from a specified bycatch rate; (3) a number from an allowable range; (4) a number computed from a rate which declines at a specified annual rate; and (5) a number derived from a fully frameworked approach.

Alternative 3: Establish harvest limits for halibut, king crab, Tanner crab, and salmon in the DAP and JVP fisheries. Retention of the catch is permitted. The harvester of the regulated species may be assessed a fee which is related to the value of the retained species.

Alternative 4: Establish harvest limits for halibut, king crab, Tanner crab, and salmon in the DAP and JVP fisheries. Fish could be retained and an individual retention quota could be assigned to each vessel (or company). The retention quota would be transferable between vessels (or companies).

Alternative 5: Use time/area closures to limit the incidental harvest of halibut, king crab, Tanner crab, and salmon.

Alternative 6: Use gear restrictions to limit the harvest of halibut, king crab, Tanner crab, and salmon.



D. Rule 4: Establish Measures to limit bycatches of fully U.S.-utilized species.

Alternative 1: Status quo.

Retainable bycatch allowances are currently provided to JVP and TALFF. Without these bycatch allowances a JVP or TALFF fishery would not be allowed to fish if it were likely to take even one fish of the species in question. Upon reaching a TAC, all fisheries that take that species as bycatch must cease.

Alternative 2: Authorize the Secretary of Commerce to make single species closures and allow directed fishing for other species to continue. The single species would become a prohibited species at that time.

This is the regulatory amendment currently being prepared by the Regional Office. It will authorize closing directed fishing and make that species a prohibited species for the remainder of the year in all other fisheries.

Alternative 3: Establish PSC limits for all fully U.S.-utilized species for all fisheries.

This alternative would establish PSC limits for those species fully utilized by U.S. harvesters delivering to U.S. processors. PSC limits would be established for JVP, TALFF, and for DAP fisheries which do not target on the fully utilized species.

Alternative 4: Establish harvest limits for fully U.S.-utilized species in the JVP, TALFF, and DAP fisheries. Catches of those fully utilized species would be retainable.

This alternative permits retention of the allocated amount of the fully utilized species. The Regional Director may control targeting by (1) prohibiting any directed fishing for the species when some specified portion of the TAC is taken (e.g. 80%); (2) prohibiting, by specified gear groups, any directed fishing for the species at any time. A directed fishery for a species is said to occur when the landings of the species constitute 20% or more of the total landings (by weight).

Alternative 5: Establish harvest limits for fully U.S.-utilized species in the JVP, TALFF, and DAP fisheries. Catches of these fully utilized species would be retainable, assigned to individual vessels or companies, and would be transferable.

Alternative 6: Establish harvest limits for fully U.S.-utilized species in the JVP, TALFF, and DAP fisheries. Catches of these fully utilized species would be retainable but the vessel would be assessed a fee in proportion to the value of the fish harvested.

E. Rule 5: Establish priority access to important stocks for U.S. fish processors through the use of time and area closures.

Alternative 1: Status quo.

DAP fisheries have priority under the Magnuson Act and the FMP. No specific measures to reduce foreign competition in the Pacific cod market have been implemented.

Alternative 2: Establish a new FMP management objective to make Pacific cod the next fully U.S.-utilized species in the Bering Sea/Aleutians.

Alternative 3: Allow only DAP fishing for cod during January, February, and March.

Pacific cod would be a prohibited species for the three months for all but DAP fishermen.

Alternative 4: Close Unimak Pass and other areas of high fish abundance to all but DAP fishermen.

This would be a total closure similar to the FDZ proposal in Amendment 6, but would exclude JVP as well as TALFF fishermen.

Alternative 5: Close Unimak Pass and other areas of high fish abundance to all but DAP fishermen from January 1 through June 30.

This is the same as Alternative 4 but for only the first six months of the year.

Alternative 6: Close the area within some specified distance of any shorebased processing plant to all but DAP fishing.

This would close the area within some specified distance of Dutch Harbor, Akutan, and Port Moller to all but DAP vessels. The analysis addresses a 100-mile radius but it can be done for any smaller (or larger) area requested.

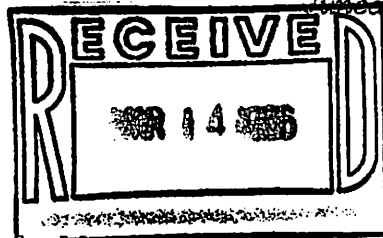


MARCH 1986

**UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration***National Marine Fisheries Service*

P.O. Box 1668

Juneau, Alaska 99802



March 12, 1986

Mr. James O. Campbell, Chairman  
North Pacific Fishery Management  
Council  
P.O. Box 103136  
Anchorage, Alaska 99510

Dear Jim:

We have submitted an emergency rule and supporting documents to our Washington, D.C., office that closes an area of the Bering Sea to commercial trawl fishing and establishes certain prohibited species catch (PSC) limits. This emergency rule, when effective, will implement most of the management recommendations approved by the Council at its January 1986 meeting and outlined in Jim Branson's letter dated January 29, 1986.

The emergency rule will:

1. Prohibit domestic and foreign trawl fishing in the exclusive economic zone (EEZ) north of the Alaska Peninsula, south of 58° N. latitude, west of 160° W. longitude, and east of 162° W. longitude, except that fishing for Pacific cod by domestic trawl fishing vessels is permitted in this area south of a line between 56° N. latitude, 162° W. longitude, and 56°43' N. latitude and 160° W. longitude providing:

a. these vessels voluntarily accommodate onboard NMFS-approved observers to monitor all catches, and

b. incidental catches of red king crab do not exceed 12,000 crabs.

2. Establish a PSC limit of 135,000 red king crabs in the EEZ north of the Alaska Peninsula, south of 58° N. latitude, and east of 165° W. longitude applicable to the DAH fishery for yellowfin sole and other flatfish.

3. Establish a PSC limit of [number to be confirmed at March Council meeting] C. bairdi crabs in the EEZ [area to be confirmed at March Council meeting] applicable to the DAH fishery for yellowfin sole and other flatfish.

4. Prohibit fishing by the DAH fishery for yellowfin sole and other flatfish in any area in which this fishery has



achieved a PSC limit and prohibit foreign directed fishing for these species in any area closed to DAH fishing due to achievement of a PSC limit.

Differences between this emergency rule and the Council's recommendations, and reasons for these differences follow.

1. Area closure: The area closure is applicable to all fishing with trawl gear and not all commercial fishing. The longline fisheries, which take few king or Tanner crabs, are expected to harvest mainly sablefish in waters deeper than the closed area. We have closed the area south of 58° N. latitude and east of 164° W. longitude to fishing for Tanner crabs under the authority of the Tanner crab FMP. To take a similar action with respect to a directed fishery for king crabs within the area closed by the emergency rule would be premature at this time. We could consider such action only if necessary following the Board of Fisheries' actions and the 1986 NMFS summer trawl survey.

Two other changes pertinent to the area closure relate to the exception for the DAH cod fishery. First, this fishery will be allowed to operate in the otherwise closed area south of a straight line connecting two coordinates instead of waters shallower than 25 fathoms. Defining the excepted area in terms of an isobath is difficult to enforce. Instead, the chosen coordinates define a straight line that approximates the 25 fathom isobath in the closed area nearest the Alaska Peninsula. Second, a PSC limit for red king crab is specified instead of a rate scale of "two red king crabs per ton of fish caught." We consider a rate too difficult to enforce without further definition of the specific point at which the fishery would be closed. The specified PSC limit is derived, however, from an estimate of the amount of groundfish, in metric tons, likely to be taken from the excepted area multiplied times two crabs per ton. This estimate is based on the amount of groundfish caught by the DAP cod fishery in the closed area in 1985.

2. PSC limits: The PSC limits for red king crab implemented by this action are as recommended by the Council with one exception. These PSC limits apply equally to JVP and DAP fisheries because the Council stated its intention for such regulatory measures to apply similarly to both fisheries (paragraph (g) of the January 29 letter).

The one exception is the recommended rate of one red or blue king crab in the area north of 58° N. latitude and west of 165° W. longitude (second part of paragraph (c) of the January 29 letter). Again, we consider a rate too difficult to enforce without a more specific closure mechanism. Because we have no way to estimate the amount of yellowfin sole and other flatfish that will be taken in this area, we were unable to calculate a numerical PSC limit.

The Council's recommendation for halibut PSC limits (paragraph (b) of the January 29 letter) is not included in this action because the current biological status of halibut stock in the Bering Sea does not warrant emergency action under Section 305 (e) of the Magnuson Act. This omission does not deny the concern that uncontrolled incidental catches of halibut by the growing JVP and DAP fishing fleets could result in decreased halibut quotas in the future. In the absence of a well documented resource emergency involving halibut, the question of halibut PSC limits should bear the analysis and discussion of a regular amendment to the FMP.

The Council's recommended PSC limit for C. bairdi Tanner crab is being held in abeyance pending reconsideration at the Council's March 1986 meeting. There is no question that a PSC limit for C. bairdi crabs is necessary and appropriate. However, we understand that the Council was given incorrect information on which to base its decision on this PSC limit. Consequently, there is a question as to what the PSC limit should be and to what area it should apply. We have been assured by our Washington, D.C. office that temporarily withholding the C. bairdi PSC limit and applicable area will not delay the effective date of this emergency rule. If this PSC limit becomes a problem and places implementation of the other measures at risk, we are prepared to delete it and substitute a separate emergency rule to establish a PSC limit for C bairdi.

3. Fishery closure due to a PSC limit: The emergency rule provides for closure of the DAH fisheries in any area in which an applicable PSC limit is achieved. This appears to differ with the Council's recommendation (in paragraph (e) of your letter) to make the PSC limits apply to the JVP fishery but is consistent with the Council's recommendation (in paragraph (g) of your letter) that measures as similar as possible as those applying to the JVP fishery apply also to the DAP fishery. We believe that the emergency rule is essentially consistent with the Council's recommendations on this point. However, we have added the provision to also close the foreign fishery for yellowfin sole and other flatfish in an area in which an applicable PSC limit on DAH fishing is achieved. The reason for this is that the foreign PSC limits for red king and Tanner crabs appear to be more liberal than those recommended for DAH fisheries. Closure of only a DAH fishery in a specific area due to a PSC limit would, in effect, give the foreign fishery, for the same species and in the same area, preferential treatment which is inconsistent with the Magnuson Act and U.S. fishery policy.

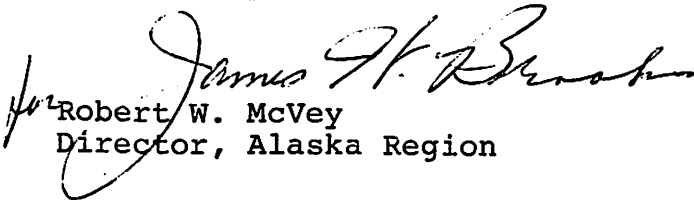
The Regional Director is given authority, in the emergency rule, to allow certain vessels to continue fishing in certain areas that would be otherwise closed due to a PSC limit. The Council was silent on this point. However, we believe it is necessary to allow fishing for yellowfin sole to continue when a

clear finding can be made that to do so would not significantly cause harm to king and Tanner crab stocks. The language for this measure is based on that which implements a similar provision in Amendment 14 to the Gulf of Alaska groundfish fishery management plan with respect to halibut (50 CFR §672.20 (e)). In authorizing continued fishing after a PSC limit is achieved, the Regional Director will be required to take into account specific considerations and report relevant findings in a Federal Register notice.

4. Observers: Certain difficulties are to be expected with implementing an observer program on domestic fishing vessels. We agree that observers in the excepted area for cod fishing will be necessary to monitor incidental catches of red king crab. The emergency rule is consistent with the Council's recommendation on this point. The emergency rule does not include a requirement to carry observers on all DAH vessels east of 160° W. longitude. The purpose of observers in this area was apparently to monitor incidental catches of halibut. This observer provision was not included because we deleted the recommended halibut PSC limit.

Finally, we intend to have this emergency rule made effective no later than April 10, 1986. Under Sec. 305(e)(3) of the Magnuson Act, emergency rules cannot remain effective for more than 180 days. Hence, this emergency rule will not be effective for one year as recommended by the Council (paragraph (f) of the January 29 letter). However, we believe that the 180-day effective period will encompass a time span during which most of the fishing effort for yellowfin sole and other flatfish will occur and give red king and Tanner crab species the greatest possible interim protection from incidental catch mortality. We look forward to working with the Council on Amendment 10 which should provide a more permanent solution to this incidental catch problem.

Sincerely yours,

  
for Robert W. McVey  
Director, Alaska Region

## DRAFT MINUTES

Meeting of the Fully Utilized Species Subcommittee  
February 28, 1986  
Northwest & Alaska Fisheries Center  
Sand Point, Seattle

The Fully Utilized Species Subcommittee (FUSS) convened at 1:30 p.m. at the Northwest & Alaska Fisheries Center at Sand Point, Seattle. Those present were Sara Hemphill, Don Bevan, Nancy Munro, Lee Alverson as members of the subcommittee. The other Council committee member, Henry Mitchell, was ill and unable to attend. Others in attendance were Thorn Smith, Ron Berg, Rich Marasco, Fred Gaffney, Steve Dickinson, Loh Lee Low and Jim Branson.

There was no agenda. This was the first meeting of this newly-organized group and was convened primarily to outline the problem and discuss short-term solutions and a pattern for long-term study. Dr. Bevan suggested that greater scope should be allowed the group to develop long-term solutions to the problem of closing fisheries because relatively small bycatch of species that may be in short supply are taken by that fishery. He suggested that the group should resolve the near-term problems however before getting into long range planning.

Ron Berg had brought two scenarios from the Regional Office outlining the problems of apportioning reserves in the Bering Sea to the smaller stocks of fish (Attachment 1).

The first problem considered by the group was how much of the general floating reserve, as used in the Bering Sea, could be allocated to various fisheries, recognizing that appropriating large portions of the general reserve to relatively small stocks of fish could be very damaging to those stocks. It

# DRAFT

was apparent that some limits should be established on the amount of reserve that could be apportioned to a particular stock depending on the condition of the particular stock and whether or not the Council had determined that it was to be rebuilt, held in status quo, or allowed to decrease. The group recognized that the costs of maintaining some stocks might be excessive if it was necessary to curtail other fisheries for other stocks or species.

This initiated an extended discussion on the definition of overfishing with general agreement that while a definition is badly needed the group was not prepared to develop one at this time.

Lee Alverson suggested that the problem could be greatly simplified if the stocks were broken into two complexes, one for the species and stocks that generally inhabit the slope of the Continental Shelf and the second the species and stocks generally found and caught on the Shelf itself. Modelling the stocks on that basis and dividing the reserves appropriately between them would reduce the problem of reserve releases.

Alverson also pointed out that there were different accounting systems for different fisheries, that trawl fisheries were charged for all of the fish taken whether retained or not, while longliners were charged only for the fish they landed. He maintained that this led to faulty accounting and was also unfair and a source of considerable dissatisfaction among the trawl community.

A number of options to consider for a long-term solution to the bycatch problem were discussed, including division by groups, species complex, and area with corresponding divisions of TAC and reserve; shorter or split seasons. All options are intended to allow a fishery to continue without



# DRAFT

being closed because a single species had been fully utilized. At worst, the group believed that a fishery should be closed for only a relatively small area or time or single species rather than for all or most of the Bering Sea for all species.

## Recommendations

The subcommittee asked the Bering Sea Groundfish Plan Team to look at breaking the stocks of the Bering Sea into to slope and shelf complexes and other possible divisions that would increase management efficiency. They also asked the Team to look at an appropriate figure for closing the current directed sablefish fishery that will leave enough sablefish for the needed bycatch for other fisheries through the rest of 1986.

The subcommittee agreed that the prohibited species concept was going to be necessary, at least in the short term, although they did not believe that it should be used as a permanent solution. Some way should be found to use all of the saleable fish taken in any fishery.

The subcommittee agreed on the need to advise the Regional Director on the level of fishing on various species or complexes and furnish some direction on the amount of fish needed or the level of fishing that could be permitted to allow rebuilding.

They asked that an item be included on the March Council agenda to develop a cut-off date for the Bering Sea sablefish directed fishery as a recommendation to the Regional Director.

Summary

**DRAFT**

The subcommittee concentrated on short-term problems and short-term solutions and gave some attention to options for long-term solutions. They are studying all options and have asked the Plan Team to develop some material for them on the feasibility of separating stocks by complex, area, time or other divisions.

No date was set for a future meeting but the expectation is that this will be an active workgroup through the next several months.



**UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration**

*National Marine Fisheries Service*

*P.O. Box 1668*

*Juneau, Alaska 99802*

February 20, 1986

Jim H. Branson, Executive Director  
North Pacific Fishery Management Council  
P.O. Box 103136  
Anchorage, Alaska 99510

Dear Jim:

At the December 1985 meeting of the North Pacific Fishery Management Council, the issue was raised concerning inseason management of fully utilized species such as sablefish, Pacific ocean perch (POP), and rockfish in the Bering Sea/Aleutian Islands groundfish fishery. Jim Campbell decided at that meeting to establish a workgroup to consider what actions we should take when the catch of a fully utilized species approaches the harvest limit. At the January 1986 meeting, the Council appointed members to that workgroup. You asked us to develop management scenarios for the workgroup's consideration. Attached to this letter is a discussion paper that contains two examples of scenarios. For the workgroup's benefit, we have provided in the discussion paper a brief discussion of the issue.

We look forward to working with the Council's workgroup on this inseason management issue. Its advice on amounts of reserve that could be apportioned to a species' current TAC without causing overfishing or confounding the Council's intentions for longterm management would be most helpful.

Sincerely,

Robert W. McVey  
Director, Alaska Region



Fishery Management Operations Division  
NMFS, Alaska Region  
Juneau, Alaska  
February 24, 1986

INSEASON MANAGEMENT OF GROUND FISH  
IN THE BERING SEA/ALEUTIANS ISLANDS AREA

ISSUE

The Scientific and Statistical Committee first raised the issue of the use of the nonspecific operational reserve to supplement individual species Total Allowable Catches (TACs) as provided for by Amendment 1 to the Fishery Management Plan for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area. This provision stipulates that fifteen percent of the total allowable catch (TAC) for each target species and the "other species" category is automatically placed in a reserve at the beginning of the year. The reserve is not designated by species or species group and any amount of the reserve may be apportioned to the TAC of a target species or the "other species" category provided that (1) such apportionments do not result in overfishing of a target species or the "other species" category, and (2) they are consistent with two additional provisions. First, they must be consistent with information on the biological condition of groundfish stocks as set forth in the resource assessment documents prepared annually for the Council. Second, they must be consistent with socioeconomic considerations, which in turn must be consistent with the goals of the FMP. These socioeconomic considerations, which are listed in the regulations, are: (a) the need to promote efficiency in the utilization of fishery resources; (b) the need to manage for the optimum marketable size of a species; (c) the impact of groundfish harvests on prohibited species and the domestic target fisheries which utilize these species; (d) the desire to enhance depleted stocks; (e) the seasonal access to the groundfish fishery by domestic fishing vessels; (f) the commercial importance of a fishery to local communities; (g) the importance of a fishery to subsistence users; and (h) the need to promote utilization of certain species.

Because the reserve is not species specific, the entire amount could theoretically be used to supplement a single species TAC. We cannot, however, apportion so much of the reserve to the TAC of a species that overfishing would result. Accordingly, we have considered the equilibrium yield (EY) for each species as a guide in our determinations as to how much reserve can appropriately be apportioned. We recognize that EY would be inappropriate when a population is declining even though large harvests may still be supportable. Also guiding our determinations, of course, are the socioeconomic considerations listed above.

Some concern has been expressed that NMFS has not been managing fully utilized species under Amendment 1 as intended by the Council when it developed this amendment. Much of the concern centered around our management of sablefish in the Bering Sea management area in 1985. After determining that the total allowable catch (TAC) of sablefish of 2,625 mt had been reached, we issued a closure that prohibited all fishing in the Bering Sea subarea (north of the Aleutian chain east of 170°W., and north of 55°N. west of 170°W.) in waters deeper than 200 fathoms. We were required by regulation to prohibit all fishing that involved the taking of sablefish. In delimiting the closure area above, we made the finding that those fisheries operating in depths of less than 200 fathoms do not involve the taking of sablefish.

Prior to deciding on the closure, we considered whether we should supplement the sablefish TAC from the operational reserve. The best available information on the status of sablefish at the time was the Center's RAD document prepared for the 1985 fishery. The RAD document indicated that sablefish stocks remained depressed and that EY should be 2,600 mt, or 25 mt less than TAC. We were forecasting the achievement of TAC by September 4 on the basis of incomplete fish ticket data, and, therefore, we were concerned that the actual catch might be greater than TAC, possibly as high as 3,000 mt. Because the sablefish TAC was already higher than EY, and because we feared the actual catch might have significantly exceeded this level, we were especially concerned that further harvests could adversely impact the sablefish stock. Because sablefish is an important domestic target fishery, we decided not to increase TAC from the operational reserve. We considered our decision to be consistent with the regulation that requires us to consider socioeconomic impacts on domestic target fisheries for both sablefish and other groundfish species.

When the Center's RAD document prepared for the 1986 fishery became available, it showed that, although stocks were still substantially below historical levels, the abundance of sablefish had increased due to the strong 1977 year class, resulting in a new EY of 3,000 mt. In addition, we determined that the actual catch was about 2,560 mt, less than was originally forecast. On this basis, we decided that an increase in the sablefish TAC was justified. Accordingly, we reapportioned 200 mt of the nonspecific reserve to the sablefish TAC, increasing it to 2,825 mt, thereby providing an adequate bycatch to all gear types to support target fisheries for the remainder of the fishing year. Because the sablefish TAC had been increased, the previously issued notice of closure was rescinded.

#### SCENARIOS

We have developed two hypothetical scenarios pertaining to possible management of Bering Sea groundfish, using Pacific ocean perch as an example. The condition of POP remains stable, although depressed in both the Bering Sea and the Aleutians Island area,

after intensive fisheries reduced the population to low levels in the 1960's. The EY for POP in the Bering Sea is 1,100 mt. To promote rebuilding, the Secretary implemented the Council's recommendations for apportioning the available POP as follows:

EY = 1,100 mt  
TAC = 875 mt (75% of EY for rebuilding)  
ITAC = 744 mt (85% of TAC)  
DAP = 495 mt  
JVP = 194 mt  
TALFF = 55 mt.

These scenarios are realistic in that they could occur this year. Each is discussed as follows:

Scenario A - On June 1, the catch is projected to be 875 mt, which was caught by the user groups as follows:

DAP = 745 mt (exceeded the DAP specification and therefore fished into the specifications for JVP and TALFF.

JVP = 100 mt  
TALFF = 30 mt

---

total catch = 875 mt

We have already increased the 744 mt-ITAC from the operational reserve by 131 mt, increasing the DAP to 626 mt, and resulting in a "current" TAC of 875 mt. We are now faced with two management options. The first option is to close the fishery at the current TAC of 875 mt, which would preserve the Council's rebuilding schedule. This would result in closure of JVP and TALFF fisheries before bycatch allocations are reached, and closure of any DAP fishery that would take POP. The second option is to increase TAC from the operational reserve, which sacrifices the Council's rebuilding schedule, but allows the DAP, JVP, and TALFF fisheries to continue.

Scenario B - Assuming option 2 from Scenario A is chosen, and assuming 215 mt of operational reserve is reapportioned to DAP, these new specifications would result:

EY = 1,100 mt  
TAC = 1,100 mt  
DAP = 851 mt  
JVP = 194 mt  
TALFF = 55 mt.

On September 1, the catch is projected to be:

DAP = 930 mt

JVP = 130 mt

TALFF = 40 mt

---

total catch = 1,100 mt

Now, our management options are: (1) Close all DAP, JVP, and TALFF fisheries as required by current regulations, which also prevents the EY from being exceeded, or (2) again increase the TAC from the operational reserve, thereby exceeding EY. The latter option brings into focus the question of whether EY is a realistic benchmark beyond which the TAC should not be augmented for fear of overfishing.

The above scenarios are based on the regulatory status quo. The Council voted at its January 1986, meeting to recommend that the Secretary promulgate a regulatory amendment that would allow treatment of a species for which its specified TAC had been reached as a prohibited species. Once this regulatory amendment is in effect, we will have a third option for inseason management in the Bering Sea and Aleutian Islands area.

**DRAFT**

DRAFT  
ENVIRONMENTAL ASSESSMENT  
AND  
REGULATORY IMPACT REVIEW/INITIAL REGULATORY FLEXIBILITY ANALYSIS  
FOR AMENDMENT 10  
TO THE FISHERY MANAGEMENT PLAN FOR THE  
GROUNDFISH FISHERY OF THE BERING SEA AND ALEUTIAN ISLANDS AREA

ADOPTED BY  
THE NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

PREPARED BY THE PLAN TEAM FOR THE  
GROUNDFISH FISHERY OF THE BERING SEA AND ALEUTIAN ISLANDS AREA  
AND THE STAFF OF THE  
NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

MARCH 13, 1986



## TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION.....	1
1.1 Environmental Assessment.....	1
1.2 Regulatory Impact Review/Initial Regulatory Flexibility Analysis.....	2
1.3 Description of and the Need for the Management Measures.....	3
1.3.1 Rule 1: Authorize reallocation within the domestic annual harvest (DAH).....	3
1.3.2 Rule 2: Authorize the Secretary of Commerce to adjust harvest levels and seasons for conservation reasons through time and area closures by rule-related notice .....	4
1.3.3 Rule 3: Establish measures to limit bycatches of prohibited species by U.S. fishermen.....	5
1.3.4 Rule 4: Establish measures to limit bycatches of fully U.S.-utilized species .....	5
1.3.5 Rule 5: Establish priority access to important stocks for U.S. fish processors through the use of time and area closures.....	6
1.4 Management Objectives and Provisions of the FMP.....	6
1.5 Alternative Management Measures Including Those Proposed.....	7
2.0 ENVIRONMENTAL AND REGULATORY ANALYSIS OF RULE 1.....	10
2.1 Introduction.....	10
2.2 Environmental Impacts.....	10
2.3 Regulatory Impacts.....	11
2.3.1 Fishery costs and benefits.....	11
2.3.2 Reporting costs.....	11
2.3.3 Administrative, enforcement and information costs and benefits.....	11
2.3.4 Impacts on consumers.....	11
2.3.5 Redistribution of costs and benefits.....	12
2.3.6 Benefit-cost conclusion.....	12
2.4 Other E.O. 12291 Requirements.....	**
2.5 Impacts of the Rule Relative to the Regulatory Flexibility Act.....	**
3.0 ENVIRONMENTAL AND REGULATORY ANALYSIS OF RULE 2.....	13
3.1 Introduction.....	13
3.2 Environmental Impacts.....	13a
3.3 Regulatory Impacts.....	13a
3.3.1 Fishery costs and benefits.....	13a
3.3.2 Reporting costs.....	14
3.3.3 Administrative, enforcement and information costs and benefits.....	14

\*\*Sections to be included later.

	<u>Page</u>
3.3.4 Impacts on consumers.....	14
3.3.5 Redistribution of costs and benefits.....	14
3.3.6 Benefit-cost conclusion.....	14
3.4 Other E.O. 12291 Requirements.....	**
3.5 Impacts of the Rule Relative to the Regulatory Flexibility Act.....	**
4.0 ENVIRONMENTAL AND REGULATORY ANALYSIS OF RULE 3.....	15
4.1 Introduction.....	15
4.2 Environmental Impacts.....	19
4.3 Regulatory Impacts.....	20
4.3.1 Fishery costs and benefits.....	20
4.3.2 Reporting costs.....	39
4.3.3 Administrative, enforcement and information costs and benefits.....	40
4.3.4 Costs and benefits to consumers.....	43
4.3.5 Redistribution of costs and benefits.....	44
4.3.6 Benefit-cost conclusion.....	45
4.4 Other E.O. 12291 Requirements.....	45a**
4.5 Impacts of the Rule Relative to the Regulatory Flexibility Act.....	45a**
5.0 ENVIRONMENTAL AND REGULATORY ANALYSIS OF RULE 4.....	46
5.1 Introduction.....	46
5.2 Environmental Impacts.....	49
5.3 Regulatory Impacts.....	49
5.3.1 Fishery costs and benefits.....	49
5.3.2 Reporting costs.....	57
5.3.3 Administrative, enforcement and information costs and benefits.....	57
5.3.4 Costs and benefits to consumers.....	58
5.3.5 Redistribution of costs and benefits.....	58
5.3.6 Benefit-cost conclusion.....	60
5.4 Other E.O. 12291 Requirements.....	60**
5.5 Impacts of the Rule Relative to the Regulatory Flexibility Act.....	60**
6.0 ENVIRONMENTAL AND REGULATORY ANALYSIS OF RULE 5.....	61
6.1 Introduction.....	61**
6.2 Environmental Impacts.....	61**
6.3 Regulatory Impacts.....	**
6.3.1 Fishery costs and benefits.....	**
6.3.2 Reporting costs.....	**
6.3.3 Administrative, enforcement and information costs and benefits.....	**
6.3.4 Impacts on consumers.....	**
6.3.5 Redistribution of costs and benefits.....	**
6.3.6 Benefit-cost conclusion.....	**

\*\*Sections to be included later.

	<u>Page</u>
6.4 Other E.O. 12291 Requirements.....	**
6.5 Impacts of the Rule Relative to the Regulatory Flexibility Act.....	**
7.0 SUMMARY OF ENVIRONMENTAL IMPACTS.....	62
8.0 EXECUTIVE ORDER 12291 SUMMARY.....	62
9.0 REGULATORY FLEXIBILITY ACT SUMMARY.....	62
10.0 ENVIRONMENTAL EFFECTS ON ENDANGERED SPECIES AND ON THE ALASKA COASTAL ZONE.....	62
11.0 FINDINGS OF NO SIGNIFICANT ENVIRONMENTAL IMPACT.....	62
12.0 COORDINATION WITH OTHERS.....	63
13.0 LIST OF PREPARERS.....	63
14.0 LITERATURE CITED.....	64
15.0 APPENDICES.....	64

\*\*Sections to be included later.

DRAFT  
ENVIRONMENTAL ASSESSMENT FOR AMENDMENT 10  
TO THE FISHERY MANAGEMENT PLAN FOR THE  
GROUNDFISH FISHERY OF THE BERING SEA AND ALEUTIAN ISLANDS AREA

## 1.0 INTRODUCTION

### 1.1 Environmental Assessment

In 1977, under the authority of the Magnuson Fishery Conservation and Management Act (Magnuson Act), the Secretary of Commerce assumed management jurisdiction over foreign fishing for Bering Sea and Aleutian Islands area groundfish in the 3- to 200-mile Fishery Conservation Zone (FCZ) by promulgating the Trawl Fisheries and Herring Gillnet Fisheries of the Eastern Bering Sea and Northeast Pacific Preliminary Management Plan (PMP). The PMP was published in the Federal Register (43 FR 9298) on February 15, 1977, and implemented March 1, 1977. It regulated foreign fishing through 1981. The Council developed a Fishery Management Plan for the Groundfish Fishery of the Bering Sea and Aleutian Island Area (FMP) and submitted it in 1979 to the Assistant Administrator for approval and implementation under the Magnuson Act. The FMP was approved by the Assistant Administrator for Fisheries, NOAA (Assistant Administrator), and implemented by a final rule on January 1, 1982 (46 FR 63295, December 31, 1981). A final environmental impact statement was prepared for the FMP and is on file with the Environmental Protection Agency. Since that time, the Council has adopted nine amendments to the FMP, although not all recommendations made by the Council have been approved and implemented. The subject of this action is DRAFT Amendment 10 which contains five proposals described below.

Prior to 1984, the Council would receive amendment proposals during any of its scheduled meetings. At its April 1984 meeting, the Council adopted a policy whereby proposals for amendments would be received only once each year. Proposals contained in Amendment 10 were requested by the Council in September 1985 with a deadline set at December 14, 1985. The Council then instructed its Plan Team to review and rank each proposal that was received. At its January 1985 meeting, the Council reviewed the recommendations of the Plan Team, Scientific and Statistical Committee, and Advisory Panel, and selected four proposals for inclusion in Amendment 10. A fifth proposal was included to implement by FMP amendment an emergency action initiated by the Council at the January 1986 meeting.

This document analyzes the impacts of five rules proposed by the North Pacific Council for amending the Fishery Management Plan for Groundfish in the Bering Sea/Aleutian Islands. Each of these proposed rules will be presented as chapters of this document.

1. The first rule would authorize the Secretary of Commerce to reallocate any unneeded part of the Total Allowable Catch (TAC) which has been apportioned to domestic processors (DAP) to joint ventures (JVP).
2. The second rule would authorize the Secretary of Commerce to adjust harvest levels and seasons for conservation reasons through time and area closures by rule-related notice.

3. The third rule would establish measures to limit bycatches of prohibited species by U.S. fishermen.
4. The fourth rule would establish measures to limit bycatches of fully U.S.-utilized species by U.S. groundfish fishermen.
5. The fifth rule would establish priority access to important stocks for U.S. processors, primarily Pacific cod, through the use of time and area closures.

This environmental assessment is prepared under Section 102(2)(C) of the National Environmental Policy Act (NEPA) and its implementing regulations.

## 1.2 Regulatory Impact Review/Initial Regulatory Flexibility Analysis

The Administration's policy on the development and issuance of regulations is established by Executive Order 12291. The main objectives of that policy are to reduce the burdens imposed by existing and future regulations, to increase agency accountability for regulatory actions, and to provide for Presidential oversight of the regulatory process, minimize duplication and conflict of regulations, and ensure well-reasoned regulations. Under these guidelines each agency, to the extent permitted by law, is expected to comply with the following requirements:

1. Administrative decisions shall be based on adequate information concerning the need for and consequences of proposed government action.
2. Regulatory action shall not be undertaken unless the potential benefits to society from the regulation outweigh the potential costs to society.
3. Regulatory objectives shall be chosen to maximize the net benefits to society.
4. Among alternative approaches to any given regulatory objective, the alternative involving the least net cost to society shall be chosen.
5. Agencies shall set regulatory priorities with the aim of maximizing the aggregate net benefit to society, taking into account the condition of the particular industries affected by regulations, the condition of the national economy, and other regulatory actions contemplated for the future.

In compliance with Executive Order 12291, the National Marine Fisheries Service (NMFS) requires the preparation of a Regulatory Impact Review (RIR) for all regulatory actions which either implement a new fishery management plan (FMP) or significantly amend an existing FMP, or may be significant in that they affect important DOC/NOAA policy concerns and are the object of public interest. The RIR: (1) provides a comprehensive review of the level and incidence of impact associated with the proposed or final regulatory actions; (2) provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problems; and (3) ensures that the regulatory

agency or council systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether the proposed regulations implementing the FMP or amendment are "major" under criteria provided in Executive Order 12291 (described above), whether or not the proposed regulations will have a "significant economic impact on a substantial number of small entities" under the Regulatory Flexibility Act (P.L.96-354), and whether or not the Paperwork Reduction Act of 1980 (P.L. 96-511) applies. The primary purpose of the Regulatory Flexibility Act is to relieve small businesses, small organizations and small governmental jurisdictions (collectively, "small entities") from burdensome regulatory and recordkeeping requirements. This Act requires that if regulatory and recordkeeping requirements are not burdensome then the head of an agency must certify that the requirement, if promulgated, will not have a significant effect on a substantial number of small entities.

The purpose of the Paperwork Reduction Act, in part, is to minimize the federal paperwork burden for individuals, small businesses, state and local governments and other persons. This Act requires each agency to ensure its information systems do not overlap each other or duplicate the systems of other agencies.

### 1.3 Description of and the Need for the Management Measures

#### 1.3.1 Rule 1: Authorize reallocation within the domestic annual harvest (DAH).

U.S. groundfish fishing and processing companies operating in the Bering Sea and Aleutian Islands have expanded dramatically in recent years, and in 1986 are expected to take well over half of the groundfish Optimum Yield (OY). This rapid growth has led to the full utilization of several groundfish species by U.S. fishermen and the nearly full utilization of others. Although this full utilization was anticipated when the FMP was originally drafted, management measures focused primarily on the foreign fisheries operating at the time. As the fishery has become more and more American new problems have arisen or become more important. This includes both problems that have already occurred and those that are likely to occur in the near future. One such problem deals with the phenomenal growth of the joint venture segment of the industry and the lack of specific FMP guidance on reallocating unharvested fish to this industry during the fishing year.

The FMP specifies that NMFS will conduct a survey of the U.S. fishing industry each year to determine the intent and capacity to harvest each groundfish species. The survey is designed to predict the needs of both the U.S. processing sector, i.e. the Domestic Annual Production (DAP), and the joint venture processing sector, i.e. Joint Venture Production (JVP), for every species throughout the management area. The Council and NMFS submit the results to public review and comment, and at their December meeting each year the Council approves its best estimate of the DAP and JVP needs for the upcoming year. The preseason estimates have overestimated the DAP requirements each year although the DAP fisheries have been expanding rapidly.

It is apparent that until U.S. fishing and processing capacities have stabilized it will be difficult for the industry to accurately predict their actual needs even a few months in advance. The FMP anticipated this problem and made provision for reallocating unneeded DAP to the foreign fisheries later in the year when it became obvious that the U.S. industry would not meet its goals. Until recently there was no need to address reallocation to JVP because that fishery had not yet developed sufficiently and usually other management mechanisms would suffice. Now it is likely that all or part of this excess allocation can be absorbed by joint venture fishermen. Currently the FMP and regulations specifically address only reallocation to the Total Allowable Level of Foreign Fishing (TALFF). Although reallocations of unneeded DAP to JVP have been made on occasion, this procedure might not withstand legal challenge. Therefore the Council desires to clarify its intent and the intent of the Magnuson Act by specifically addressing this reallocation in both the FMP and implementing regulations.

1.3.2 Rule 2: Authorize the Secretary of Commerce to adjust harvest levels and seasons for conservation reasons through time and area closures by rule-related notice.

The FMP and regulations allow for a great deal of flexibility in adjusting harvest levels for all species in the Bering Sea and Aleutian Islands management area. However once the fishing year begins the flexibility to adjust the Total Allowable Catches (TACs) is more limited. TACs can be adjusted upwards inseason through Reserve releases and if the Regional Director determines that a stock is in danger of being overfished or otherwise detrimentally affected by continued fishing, he can adjust a TAC downward by withholding Reserves, recommending delayed or withheld allocations, and by emergency regulation. Only an emergency rule can stop fishing all activities immediately, and this procedure cannot be used on a regular basis. The proposed rule would authorize the Secretary to reduce the allowable harvest of any species by issuing a rule-related notice of closure, which is a method by which he can respond rapidly to conservation problems that might arise. He would be authorized to implement time/area closures to protect any species in need of conservation or protection from fishery-related mortality, including any species taken incidentally in the course of normal groundfish fishing operations.

When the FMP was first drafted, this authority was withheld because there was no anticipated need for it. The FMP is based on an ecosystem concept which recognizes that stocks may go up and down from year to year, but that no permanent harm to any stock is likely to occur within any given year. Any serious problems could be handled by merely closing the entire fishery. This action may be too drastic and a means for fine tuning the management system should be developed so that U.S. groundfish fishermen will not be needlessly restricted. This situation was recognized by the Council in 1981 and they included such authority (at that time known as Field Order Authority) in Amendment 4. However, at that time the Secretary of Commerce disapproved the provision because he felt the limitations of the authority were not clearly defined and left too much to the discretion of the Regional Director. The authority proposed in this amendment is clearly specified and will improve management efficiency by allowing closure of specific trouble areas while leaving fisheries in other areas unhampered.

### 1.3.3 Rule 3: Establish measures to limit bycatches of prohibited species by U.S. fishermen.

Prohibited species are defined in the FMP as "those species groups the harvest of which must be avoided and which must be immediately returned to the sea when caught and brought aboard, except when their retention by foreign vessels is authorized under other FMPs or PMPs, or their retention by United States vessels is not prohibited under other FMPs or Federal regulations. These include halibut, herring, salmonids, shrimps, scallops, snails, king crab, Tanner crab, Dungeness crab, corals, surf clams, horsehair crab, lyre crab." Although prohibited species are defined in the FMP and although the FMP specifically states that U.S. fishermen must avoid these species, there are currently no regulations specifically limiting bycatches of prohibited species in the domestic fisheries.

Amendment 3 to the FMP (July 1983) addressed procedures for reducing the incidental harvest of prohibited species by foreign fisheries and established a policy for DAP and JVP fishermen (see Section 1.4 below). In 1983 and 1984 there was a substantial increase in the bycatch of chum salmon by joint venture operations North of Unimak Pass. At that time the Council considered amending the FMP to place prohibited species bycatch limits on domestic trawlers but instead approved voluntary measures recommended by the industry. In 1985 there was a large increase in the bycatch of red king crab by the joint venture flounder fishery and in January 1986 the Council approved an emergency regulation to limit crab bycatches (see Section 1.4 below).

Emergency regulations only remain in effect a maximum of 180 days and thus any longer term solution to the problem of bycatch of prohibited species requires plan amendment. The Council would prefer a framework type amendment which would establish prohibited species catch (PSC) limits annually without requiring annual plan amendment. This framework might also be designed so as to close certain areas of the Bering Sea/Aleutian Islands to fishing at certain times of the year. Such time/area closures would be designed to protect prohibited species at particularly critical times of the year or in particularly critical regions of the BSAI.

There are currently no PSC limits for that portion of the harvest taken by the DAP fishery nor is there any mechanism for monitoring those limits should they be established.

### 1.3.4 Rule 4: Establish measures to limit bycatches of fully U.S.-utilized species.

The current implementing regulations of the Bering Sea FMP do not allow single species closures or mechanisms to prevent one fishery from causing the closure of other fisheries in the management area. This problem is being addressed by a Secretarial regulatory amendment (in preparation) which will allow the Regional Director to close directed fishing within an area on a species by species basis. This regulatory amendment will be used as a flexible basis for regulatory action regarding target species and for management of the DAP fisheries. However, a procedure must be established to account for fully utilized species caught incidentally in other target fisheries.



### 1.3.5 Rule 5: Establish priority access to important stocks for U.S. fish processors through the use of time and area closures.

Under the MFCMA, U.S. fish processors are given the highest priority to the fishery resources of the FCZ. Although the Council has intended to accomplish this in the FMP, some U.S. fishermen and processors feel that this goal has not been achieved and have asked that time and area closures be used along with other measures. The Council attempted to comply with this request in Amendment 6 which would have established a Fishery Development Zone (FDZ) and Amendment 9 which would have eliminated foreign trawling within 20 miles of the Aleutian Islands. Both proposals were disapproved by the Secretary of Commerce. The Council is continuing to explore possible measures to achieve the goal of full utilization of fishery resources by U.S. processors. U.S. processors are most interested in Pacific cod at this time and the Council is considering approval of an FMP management objective to foster domestic development and full U.S. utilization of Pacific cod as a highest priority.

### 1.4 Management Objectives and Provisions of the FMP

Current management plan objectives of the FMP are as follows:

#### Primary Plan Objectives:

1. Promote conservation while providing for optimum yield.
2. Promote efficient use of fishery resources but not solely for economic purposes.
3. Promote fair resource allocation without allowing excessive privileges.
4. Use best scientific data available.

#### Secondary Plan Objectives:

1. Conservation and management measures must be flexible enough to account for unpredictable variations in resource and industry.
2. Manage stocks throughout their range.
3. Promote rebuilding if stocks are less than Maximum Sustainable Yield.
4. Promote efficiency while avoiding disruption of existing social and economic structures.
5. Management measures should contain a safety margin in setting Acceptable Biological Catch using questionable data.
6. Minimize impacts of fishing strategies on other fisheries and environment.

#### Management Objectives:

1. Rational and optimal biological and socioeconomic use of resource.
2. Minimize impact on prohibited species and rebuild halibut stocks.
3. Provide for the orderly development of domestic groundfish fisheries consistent with objectives 1 and 2 at expense of foreign participation.
4. Provide for foreign fisheries consistent with objectives 1, 2 and 3.
5. Seek to maintain the productive capacity of the habitat required to support the groundfish fishery.

A summary of the regulations and provisions of the FMP is provided as Appendix 1.

## 1.5 Alternative Management Measures Including Those Proposed

1.5.1 Rule 1: Authorize the Regional Director to reallocate to JVP any portion of the DAP which he determines will not be harvested during the fishing year.

Alternative 1: Status quo.

Currently the FMP and regulations address reallocation of DAP to TALFF but not to JVP. Although NMFS has on occasion reallocated to JVP, this procedure may not withstand legal challenge.

Alternative 2: Allow the reallocation of unneeded DAP to JVP.

The proposed action would clarify the intent of the Council and Magnuson Act and would remove any susceptibility to legal challenge.

1.5.2 Rule 2: Authorize the Secretary of Commerce to adjust harvest levels and seasons for conservation reasons through time and area closures (formerly known as Field Order authority).

Alternative 1: Status Quo.

The FMP and implementing regulations do not allow for rule-related notices of closure. Under the status quo inseason closures cannot be implemented for conservation reasons.

Alternative 2: Provide the Secretary with authority to issue rule-related notices of closure.

This alternative would authorize the Regional Director to issue rule-related notices of closure if, during the fishing year, he determined that a stock was in danger of being overfished or otherwise detrimentally impacted by further fishing. He would be authorized to implement time/area closures to protect any species in need of conservation or protection from fishery-related mortality.

1.5.3 Rule 3: Establish measures to limit bycatches of prohibited species by U.S. fishermen.

Alternative 1: Status quo. No PSC limits will be set for the DAP and JVP fisheries. PSC limits for foreign fisheries shall be as specified in Amendment 3 to the Bering Sea Groundfish Management Plan.

Alternative 2: Establish PSC limits for halibut, king crab, Tanner crab, and salmon in the DAP and JVP fisheries.

PSC limits could be established by various methods such as specification of (1) a fixed number; (2) a number computed from a specified bycatch rate; (3) a number from an allowable range; (4) a number computed from a rate which declines at a specified annual rate; and (5) a number derived from a fully frameworked approach.

Alternative 3: Establish harvest limits for halibut, king crab, Tanner crab, and salmon in the DAP and JVP fisheries. Retention of the catch is permitted. The harvester of the regulated species may be assessed a fee which is related to the value of the retained species.

Alternative 4: Establish harvest limits for halibut, king crab, Tanner crab, and salmon in the DAP and JVP fisheries. Fish could be retained and an individual retention quota could be assigned to each vessel (or company). The retention quota would be transferable between vessels (or companies).

Alternative 5: Use time/area closures to limit the incidental harvest of halibut, king crab, Tanner crab, and salmon.

Alternative 6: Use gear restrictions to limit the harvest of halibut, king crab, Tanner crab, and salmon.

#### 1.5.4 Rule 4: Establish Measures to limit bycatches of fully U.S.-utilized species.

Alternative 1: Status quo.

Retainable bycatch allowances are currently provided to JVP and TALFF. Without these bycatch allowances a JVP or TALFF fishery would not be allowed to fish if it were likely to take even one fish of the species in question. Upon reaching a TAC, all fisheries that take that species as bycatch must cease.

Alternative 2: Authorize the Secretary of Commerce to make single species closures and allow directed fishing for other species to continue. The single species would become a prohibited species at that time.

This is the regulatory amendment currently being prepared by the Regional Office. It will allow closure of directed fishing and make that species a prohibited species for the remainder of the year.

Alternative 3: Establish PSC limits for all fully U.S.-utilized species for all fisheries.

This alternative would establish PSC limits for those species fully utilized by U.S. harvesters delivering to U.S. processors. PSC limits would be established for JVP, TALFF, and for DAP fisheries which do not target on the fully utilized species.

Alternative 4: Establish harvest limits for fully U.S.-utilized species in the JVP, TALFF, and DAP fisheries. Catches of those fully utilized species would be retainable.

This alternative permits retention of the allocated amount of the fully utilized species. The Regional Director may control targeting by (1) prohibiting any directed fishing for the species when some specified portion of the TAC is taken (e.g. 80%); (2) prohibiting, by specified gear groups, any directed fishing for the species at any time. A directed fishery for a species is said to occur when the landings of the species constitute 20% or more of the total landings (by weight).

Alternative 5: Establish harvest limits for fully U.S.-utilized species in the JVP, TALFF, and DAP fisheries. Catches of these fully utilized species would be retainable, assigned to individual vessels or companies, and would be transferable.

Alternative 6: Establish harvest limits for fully U.S.-utilized species in the JVP, TALFF, and DAP fisheries. Catches of these fully utilized species would be retainable but the vessel would be assessed a fee in proportion to the value of the fish harvested.

1.5.5 Rule 5: Establish priority access to important stocks for U.S. fish processors through the use of time and area closures.

Alternative 1: Status quo.

DAP fisheries have priority under the Magnuson Act and the FMP. No specific measures to reduce foreign competition in the Pacific cod market have been implemented.

Alternative 2: Establish a new FMP management objective to make Pacific cod the next fully U.S.-utilized species in the Bering Sea/Aleutians.

Alternative 3: Allow only DAP fishing for cod during January, February, and March.

Pacific cod would be a prohibited species for the three months for all but DAP fishermen.

Alternative 4: Close Unimak Pass and other areas of high fish abundance to all but DAP fishermen.

This would be a total closure similar to the FDZ proposal in Amendment 6, but would exclude JVP as well as TALFF fishermen.

Alternative 5: Close Unimak Pass and other areas of high fish abundance to all but DAP fishermen from January 1 through June 30.

This is the same as Alternative 4 but for only the first six months of the year.

Alternative 6: Close the area within 100 miles of any shorebased processing plant to all but DAP fishing.

This would close the area within roughly 100 miles of Dutch Harbor, Akutan, and Port Moller to all but DAP vessels.

## 2.0 ENVIRONMENTAL AND REGULATORY ANALYSIS OF RULE 1: AUTHORIZE REALLOCATON WITHIN THE DOMESTIC ANNUAL HARVEST (DAH).

### 2.1 Introduction

Currently the FMP and regulations authorize the Regional Director to periodically reassess DAP during the year and determine if the initial DAP apportionment accurately reflects the intent and capacity of the DAP fishery. If more fish are needed he may increase the DAP apportionment by transferring fish from the Reserve, or he may reduce DAP if any amounts would go unharvested. The FMP states that any portion of the DAP which would go unharvested may be transferred to TALFF, but the regulations and FMP are silent on transfers to JVP. The Magnuson Act and Council policy give JVP precedence over TALFF and the Council may wish to clear up any questions about transfers of unneeded DAP directly to JVP instead of to TALFF.

#### Alternative 1: (Status Quo)

Reapportionments within DAH have been made in the past even though not specifically authorized by the FMP and regulations. This proposal would continue to follow this procedure without explicit authorization, which could lead to legal challenge or potential closure of a JVP fishery.

#### Alternative 2: (Proposed) Authorize the reallocation within DAH.

This alternative would amend the FMP and regulations to include a new section. The proposed text follows:

#### Section 11.6 Reapportionment of DAP to JVP and JVP to DAP

If, after apportioning the maximum allowable amount from the reserve to JVP, the Regional Director finds that JVP fisheries will be closed prior to the end of the fishing year, he may reapportion to JVP any portion of the DAP that he determines will not be harvested by DAP fishermen. If a DAP fishery requires additional fish in order to avoid closure, JVP and TALFF amounts are available without any action by the Regional Director.

These reapportionments from DAP to JVP may be made at any time deemed appropriate by the Regional Director. If he determines that immediate action is necessary to increase a JVP amount, he may decide that such an adjustment is to be made without affording a prior opportunity for public comment. Public comments on the necessity for, and the extent of the reapportionment, shall then be submitted to the Regional Director for a period of 15 days after the effective date of such action.

### 2.2 Environmental Impacts

The environmental impacts of reallocating fish from domestic fish processors to foreign processors are expected to be negligible. No increased direct stress to marine mammals and birds is expected. No changes in the effects on endangered species or the coastal zone are expected. This issue is primarily allocational in nature and the impacts are considered in greater detail in the Regulatory Impact section below.

## 2.3 Regulatory Impacts

Under the Magnuson Act, domestic fishermen have priority over foreign fishermen and a domestic fishery for a species may not be shut down until all foreign fishing for that species has been terminated. By specifying that unused DAP may be transferred directly to JVP the FMP will prevent joint venture fishermen from having to compete with foreign fishermen for the remaining allowable catch. This will more accurately reflect the intent of the Council and the Magnuson Act.

### 2.3.1 Fishery costs and benefits.

Fishery costs associated with Alternative 2 (the proposed rule) are limited to reduction in fishing opportunity for foreign fishermen as their portion of the TAC is reduced. Under the status quo there will be costs to American fishermen participating in joint ventures in loss of fish which the industry has the desire and capability to harvest. These costs are related to the annual overestimation of DAP but would be offset by the amount of fish U.S. fishermen could catch before the adjusted TALFF was reached. In some years there may be no impact on joint ventures because the joint venture capacity or intent to harvest the species in question may be very limited. When joint venture fishermen are interested and able to catch those species, however, the economic impact could amount to the total reallocated portion of the TAC. This would be the case when joint venture fishermen are primarily interested in harvesting during the latter part of the year and foreign fishermen are active earlier.

### 2.3.2 Reporting costs.

There are no additional reporting costs or paperwork burdens to U.S. fishermen or processors associated with either of the alternatives.

### 2.3.3 Administrative, enforcement and information costs and benefits.

The Secretary of Commerce will reallocate unneeded DAP when it becomes apparent that U.S. processors will not take the full amount of their apportionment. There may be minor additional administrative costs associated with determining the ability and intent of joint venture fishermen to take any portion of the unused DAP, but since joint ventures are closely monitored those additional costs (if any) may be small. The amount of bookkeeping and information gathering and analysis by administrative agencies should not change significantly from the status quo.

If the current process of reallocating unused DAP to JVP were challenged in court, there would be a significant cost to the administration for legal defense regardless of the outcome of the litigation.

### 2.3.4 Impacts on consumers.

Costs and supply to consumers should not be affected by the proposed rule because the entire reapportioned DAP will be processed by foreign processors regardless of who actually catches the fish. Markets and costs for foreign-caught fish which are exported to the United States may differ from

joint venture processed fish, but no information is available to evaluate any differences in economic impact on U.S. consumers.

### 2.3.5 Redistribution of costs and benefits.

Costs to U.S. fishermen associated with the status quo will be redistributed to foreign fishermen if the proposed rule is approved and implemented. Benefits will accrue to U.S. joint venture fishermen in proportion to the amount of fish reallocated specifically to JVP. There are no expected redistributive effects within the U.S. industry.

### 2.3.6 Benefit-cost conclusion.

Approval and implementation of the proposed rule will result in some benefit (possibly zero) to joint venture fishermen. The benefit received will depend on their ability to utilize reapportioned DAP. Retention of the status quo would result in some net loss to United States fishermen depending on the degree to which joint venture fishermen are restricted. The status quo could also result in costs to the U.S. government depending on involvement in any litigation over current allocation methods.

3.0 ENVIRONMENTAL AND REGULATORY ANALYSIS OF RULE 2: AUTHORIZE THE SECRETARY OF COMMERCE (SECRETARY) TO ADJUST HARVEST LEVELS AND SEASONS FOR CONSERVATION REASONS THROUGH TIME AND AREA CLOSURES BY RULE-RELATED NOTICE.

3.1 Introduction

Rule-related notices of closure are a mechanism by which the Secretary of Commerce, through the Regional Director, may take inseason conservation actions to protect a species, species group, or stock of fish from overharvest or a dangerous level of fishing mortality. Currently the FMP states that directed fishing will close when TAC is reached, and bycatch fisheries will also be closed throughout all or part of the management area. Closures to protect nongroundfish species are not specifically addressed, and closures prior to reaching TAC for groundfish species can be implemented only through emergency rule. The Council may wish to streamline the process for making conservation closures during the season.

Alternative 1: (Status Quo) Do not authorize the Secretary to adjust harvest levels and seasons.

The FMP and implementing regulations do not allow for rule-related notices of closure. Under the status quo alternative, inseason closures cannot be implemented for conservation reasons.

Alternative 2: (Proposed) Provide the Secretary with authority to issue rule-related notices of closure.

This alternative would authorize the Secretary to issue rule-related notices of closure if, during the fishing year, he determined that a stock was in danger of being overfished or otherwise detrimentally affected by continued fishing. He would be authorized to implement time/area closures to protect any species in need of conservation or protection from fishery-related mortality. Specifically, the regulation would state that "The Regional Director may at any time, following consultation with the ADF&G, adjust the harvest levels and the season opening and closing dates for any species of groundfish in any portion of the Bering Sea/Aleutian Islands during the fishing year. Any adjustments under this section shall be based on a determination by the Regional Director that such adjustment is necessary in light of his consideration of one or more of the following factors:

- (a) The effect of overall fishing effort within an area.
- (b) Catch per unit of effort and rate of harvest.
- (c) The effect of fishing effort by a particular gear type on the environment or fishery resource.
- (d) Relative abundance of stocks within the area.
- (e) Amount of halibut, salmon, king crab, Tanner crab or other prohibited species being taken.
- (f) Condition and distribution of stocks (including both groundfish and prohibited species) within the area.
- (g) Any other factors relevant to the conservation and management of the groundfish, salmon, halibut, or crab resource.



Rule-related notices of closure issued by the Regional Director shall include the following information:

- (a) A description of the area to be affected by the management action;
- (b) A definition of the gear types affected.
- (c) The effective date and any termination date of the management action.
- (d) The reason for the management action.

No such notice shall be effective until:

- (a) It is filed for publication in the Federal Register.
- (b) It has been posted and otherwise made available to the public, in accordance with procedures customarily used by the ADF&G for the posting and publicizing of similar notices of closure, for 48 hours prior to its effective date.
- (c) It has been broadcast at those time intervals, channels and frequencies customarily used by the ADF&G or NMFS to broadcast similar notices of closure, for 48 hours prior to its effective date.

The specific uses of this generic authority are described in more detail in various alternatives discussed under the remaining rules addressed in this document.

### 3.2 Environmental Impacts

The primary biological effect of this authorization would be to allow the Regional Director to take quick conservation action when biological problems arise. It would not result in increased stress to marine mammals and birds nor to endangered species. No changes in the effects on the coastal zone are expected. The protection for depressed or declining stocks would be improved.

### 3.3 Regulatory Impacts

#### 3.3.1 Fishery costs and benefits.

The specific level of economic cost cannot be estimated because of the wide variety of situations for which this rule could be applied. It is not possible to determine which species may require this type of conservation action, nor the extent of time/area closure required to protect the species of concern. For example, it is possible (although extremely unlikely) that protection of some species would necessitate closure of the entire management area for the entire year. Thus, all revenues would be lost. On the other hand, many conservation actions would have little or no impact on the groundfish fisheries because catches could be made up elsewhere at no additional cost. This rule is intended to authorize the Regional Director to close any fishery when conservation criteria are triggered during the season. The Regional Director will consider both biological and socioeconomic factors in weighing the need for and extent of closures and seek to minimize the economic impacts for all parties.

The proposed rule would improve management by reducing the risk of overfishing or of reducing the reproductive potential of all species which could occur

through the lack of timely management action. This would result in the long-term maximization of the harvest potential associated with each stock or species. Short term costs in terms of reduced harvest or harvest opportunity may increase due to limitation of fishing effort, but the intent of such management action would be to maximize the long term economic yield.

Currently, many of the costs are borne by traditional domestic fisheries which target only on the nongroundfish species involved. Timely inseason management of the groundfish fisheries would tend to limit the impact on these traditional fisheries.

### 3.3.2 Reporting costs.

There are no additional reporting costs or paperwork burdens to U.S. fishermen or processors associated with either of the alternatives.

### 3.3.3 Administrative, enforcement and information costs and benefits.

Administrative costs will be reduced because the rule-related notice procedure is greatly streamlined compared to the emergency regulation option available under the status quo. No change in enforcement or information costs are expected.

### 3.3.4 Impacts on consumers.

Short-term impacts on consumers cannot be quantified for the same reasons expressed in 3.3.1 above. When supplies of fishery products are reduced due to conservation measures there may be price fluctuations depending on the market structure and the availability of substitute products. The long-term effect should be increased supplies of the species which triggered the conservation action and a return to normal supply of products from bycatch fisheries which were affected by closures.

### 3.3.5 Redistribution of costs and benefits.

Redistribution of costs from the traditional target fisheries to the groundfish bycatch fisheries whenever a closure is associated with a prohibited species which requires conservation action. This may tend to more equitably distribute the costs to the various user groups.

In the case of fully U.S.-utilized groundfish species there would be no redistribution of costs among user groups but there may be a redistribution of costs to the same users over time.

### 3.3.6 Benefit-cost conclusion.

The proposed rule is intended as to authorize conservation measures during the fishing year on an "as needed" basis. Although the potential short-term costs to the groundfish industry may be substantial, the benefits of preventing overfishing will outweigh potential costs. And since the Regional Director will take economic factors into consideration when determining the need for closures, the costs will be held to the minimum for an acceptable level of conservation protection.

#### 4.0 ENVIRONMENTAL AND REGULATORY ANALYSIS OF RULE 3: ESTABLISH MEASURES TO LIMIT BYCATCHES OF PROHIBITED SPECIES BY U.S. FISHERMEN

##### 4.1 Introduction

###### BACKGROUND

Prohibited species are defined in the FMP as "those species groups the harvest of which must be avoided and which must be immediately returned to the sea when caught and brought aboard, except when their retention by foreign vessels is authorized under other FMPs or PMPs, or their retention by United States vessels is not prohibited under other FMPs or Federal regulations. These include halibut, herring, salmonids, shrimps, scallops, snails, king crab, Tanner crab, Dungeness crab, corals, surf clams, horsehair crab, and lyre crab." Although prohibited species are defined in the FMP and although the FMP specifically states that U.S. fishermen must avoid these species, there are currently no regulations specifically limiting bycatches of prohibited species in the domestic fisheries.

Identifying a catch as prohibited (nonretainable) is one approach to managing the incidental harvest of fully U.S. utilized species. Other general management approaches include: (1) retention, with or without specified limits and with or without an assessment (penalty) for that retention; (2) retention, within specified limits, with the vessel (or company) assigned a transferrable retention quota; (3) time/area closures so as to reduce incidental catch of the prohibited species; and (4) gear restrictions so as to reduce incidental catch.

Of the five approaches, the PSC solution has been the most often applied. Time/area closures and gear restrictions have also been used to manage the catch of prohibited species in some fisheries. Retention avoids the waste inherent in any PSC management measure, but is an unattractive option with respect to foreign fisheries in that the U.S. receives no compensation for the loss in value caused by the incidental harvest of the prohibited species. Retention without penalty may also be undesirable in the domestic fisheries in that there is no compensation paid to the direct harvesters of the regulated species.

Retention with assessment penalties has not, to our knowledge, been adopted by any management agency. This alternative might be appropriate in the regulation of fisheries where covert targeting on incidentally caught species may occur. An alternative to assessment of fines is the allocation of a retainable amount for each regulated species to each vessel (or company) where the transfer of that retention quota between vessels (or companies) is allowed. Thus a vessel who has taken its annual retention quota for a species would be able to purchase rights to a further retention amount from another vessel and, conversely, a vessel with a retention quota in excess of its needs would be able to sell that portion of the retention quota to another vessel.

The experience in the North Pacific has been that the prohibited species catch problem has been addressed primarily through the setting of PSC limits and secondarily through time/area closures. All such regulations for groundfish fisheries have been applied to only the foreign fisheries.

Amendment 3 to the Bering Sea Groundfish FMP (July 1983) established PSC limits for the foreign fleet. Limits for the 1986 fishing year are summarized in Table 4.1.

Table 4.1 Prohibited Species Catch Limits (PSCs) for Foreign Groundfish Trawlers in the Bering Sea, 1986

Species	Bycatch Rate	PSC
Halibut	.12 %	1,396 mt
King Crab	.53 crab/mt	86,705 crabs
Tanner Crab	9.22 crab/mt	10,728,345 crabs
Chinook Salmon		16,250 fish
Total Salmon		17,473 fish

Actual performance of the joint venture and foreign fisheries with regard to the catch of prohibited species for the years 1984 and 1985 is given in Table 4.2. Foreign harvest of prohibited species declined in 1985 relative to 1984 while the prohibited species catch for joint venture operations increased from 1984 to 1985. This is consistent with the decline in the relative share of the total Bering Sea groundfish allocated to TALFF and with the relative increase in the joint venture share of the total allocation.

Table 4.2 Joint Venture and Foreign Harvest of Prohibited Species in the Bering Sea, 1984 and 1985

Species	Prohibited Species Catch, mt			
	Joint Venture		Foreign	
	1984	1985	1984	1985
Halibut	617	1151	2093	1933
Salmon	160	25	47	33
King Crab	283	838	289	209
Tanner Crab	169	204	537	393

Source: Report of observer activities for December, 1985, NMFS, NWAFC

Although there are currently no PSC limits for that portion of the harvest taken by the DAH fishery the North Pacific Fishery Management Council (Council) established a policy on the catch of prohibited species in Amendment 3 to the FMP (see Appendix 1).

The unregulated catch of prohibited species in the domestic fisheries (DAP and JVP) has been the cause of recent concern. In 1983 and 1984 there was a substantial increase in the bycatch of chum salmon by joint venture operations north of Unimak Pass. At that time the Council considered amending the FMP to place prohibited species bycatch limits on domestic trawlers but instead approved voluntary measures recommended by the industry. In 1985 there was a

large increase in the bycatch of red king crab by the joint venture flounder fishery and in January 1986 the Council approved an emergency regulation to limit crab bycatches (see Appendix 1).

Emergency regulations remain in effect a maximum of 180 days and thus any longer term solution to the problem of bycatch of prohibited species requires plan amendment. The Council would prefer a framework type amendment which would establish prohibited species catch (PSC) limits annually without requiring annual plan amendment. This framework might also be designed so as to close certain areas of the Bering Sea/Aleutian Islands (BSAI) to fishing at certain times of the year. Such time/area closures would be designed to protect prohibited species at particularly critical times of the year or in particularly critical regions of the BSAI.

## ALTERNATIVES

Alternative 1: (Status Quo) Continue the policy of having no prohibited species catch limits for domestic fishermen.

The status quo maintains the policy for establishing limits on the harvest of prohibited species as established by Amendment 3 to the FMP. In particular, there are no PSC limits established for that portion of the catch taken by either DAP or JVP. Policy for the DAP harvest of prohibited species is assumed to be as specified in Amendment 3 and discussed above.

PSC limits are established for TALFF as in Section 14.5.2 of the FMP. The bycatch rates for prohibited species in the foreign trawl fisheries (Table 4.1). The Council intended the 1986 rates to continue beyond 1986 although this is not specifically stated in the FMP. It is the interpretation of NOAA General Counsel that, barring amendment, the 1986 bycatch rates for halibut, king crab, and Tanner crab and the bycatch amounts for chinook salmon and total salmon will remain in effect indefinitely. Thus; under the status quo, the 1987 PSC limits for chinook and total salmon in the foreign trawl fishery will be as shown in Table 4.1. The 1987 foreign trawl PSC limits for halibut, king crab, and Tanner crab will be calculated using the bycatch rates shown in Table 4.1 and the 1987 TALFF. Nation by nation PSC limits will be established according to the rules established in Section 14.5.2 C of the FMP.

Alternative 2: Establish PSC limits for halibut, king crab, Tanner crab, and salmon in the DAP and JVP fisheries.

This alternative would continue the status quo for TALFF fisheries and establish PSC limits for halibut, king crab, Tanner crab, and salmon in the DAP fisheries. Each species limit would be specified as an amount of acceptable harvest in either numbers or weight.

There is considerable latitude in how the PSC limits might be determined. The following are five possibilities.

PSC limits could be set by:

- (1) Establishing constant harvest limits.

- (2) Establishing constant bycatch rates for the prohibited species in each directed fishery which incidentally harvests the prohibited species and then calculating the PSC by multiplying the bycatch rate by the directed fishery's tonnage allocation.
- (3) Establishing a base bycatch rate which would be annually adjusted according to a fixed timetable. Limits would be determined as in (2). (This was the method used in Amendment 3 to set limits for the foreign trawl fisheries.)
- (4) Establishing a range (minimum and maximum) for the PSC limit. The actual limit would fall within the specified range and be determined annually from relevant, biological and economic information.
- (5) Establishing an annual limit by a frameworked procedure. This alternative differs from the previous four in that the annual PSC limit is established via a procedure which would use recent and historical data on harvests of prohibited species by JVP and DAP, recent and historical data on rates of bycatch in the DAP and JVP fisheries, exvessel price, biological health indices for the prohibited species and other relevant information in establishing the appropriate balance between the desire to allow development of non fully U.S. utilized fisheries and the desire to protect the established directed fisheries for halibut, king crab, Tanner crab, and salmon.

Frameworking procedures may include a calculation procedure which predicts, for the groundfish fleet, bycatches of prohibited species. The procedure may also calculate the value of the prohibited species (to the legal harvesters of the prohibited species) in relation to the value of the targeted groundfish. Methods of calculation of annual PSCs may include optimization schemes based on maximum revenue, maximum profits or minimum costs. All such numerical procedures shall be used only to calculate a set of PSCs which the Council shall use as a starting point for deliberation in the annual setting of prohibited species catch limits.

Alternative 3: Establish harvest limits for halibut, king crab, Tanner crab, and salmon in the DAP and JVP fisheries. Retention of the catch is allowed. The harvester of the regulated species may be assessed a fee where the amount of the penalty would be related to the value of the retained species. The fee may be required whether catch is retained or not. This would require amendment of the relevant FMPs and approval of the IPHC.

This alternative differs from alternative 2 in that the catch of the regulated species may be retained. Harvest limits could be set using any of the approaches outlined in alternative 2. This alternative avoids the problem of waste inherent in any prohibited species catch regulation but may encourage covert targeting on high valued species. Limits could be set quite low so as to limit the gains from targeting on the regulated species. Additionally, it would be possible under this alternative to assess the harvesting vessel according to the amount of halibut, king crab, Tanner crab, and salmon

harvested. Fees could be based on exvessel domestic or foreign values, domestic wholesale values, or on some total value measure which would include all values foregone by the harvester, processor and consumer.

Alternative 4: Establish harvest limits for halibut, king crab, Tanner crab, and salmon in the DAP and JVP fisheries. Fish could be retained and an individual retention quota could be assigned to each vessel (or company). The retention quota would be transferrable between vessels (or companies).

This alternative is identical to alternative 2 except that rights to retainable amounts of halibut, king crab, Tanner crab, and salmon are assigned to an individual vessel, or to a company. These rights are transferrable which means that the retention quotas may be bought and sold by individual operations. Thus, if a vessel harvests its retention quota of a species it may purchase the rights to harvest additional amounts by purchasing some portion of another vessels' quota. Conversely, a vessel which has a retainable quota in excess of its projected needs may sell some portion of that quota to another vessel. Since DAP vessels will not be shut down while TAC remains the retention quotas for JVP may not be protected.

Alternative 5: Use time/area closures to limit the incidental harvest of halibut, king crab, Tanner crab, and salmon.

This alternative regulates the harvest of the halibut, king crab, Tanner crab, and salmon through time and/or area closures. The approach allows for the protection of a stock, or portion of a stock (e.g. juveniles) during a particularly vulnerable period of the fishing year (e.g. spawning) or in a particularly sensitive area (e.g. a nursery area). Harvest limits for the prohibited species are not necessary although PSC limits could be used in conjunction with time/area closures (e.g. the emergency rule to regulate the harvest of prohibited species by the joint venture yellowfin/sole fishery described above).

Alternative 6: Use gear restrictions to limit the incidental harvest of halibut, king crab, Tanner crab, and salmon.

This alternative uses gear limitations to control the harvest of halibut, king crab, Tanner crab, and salmon by the Bering Sea groundfish fisheries. Gear restrictions may include mesh size regulations for trawlers, limitations on legal hooks in the longline fisheries, or escapement devices in the pot fisheries. Harvest limits for the prohibited species are not necessary although PSC limits could be combined with gear restrictions and time/area restrictions.

## 4.2 Environmental Impacts

Under current regulations, U.S. groundfish fishermen may catch unlimited numbers of prohibited species, even in situations where conservation problems exist with a species. Thus, the current regulations in some circumstances could fail to prevent overfishing with respect to nongroundfish species which are not managed by the FMP.

The total directed catch of each prohibited species is controlled by other FMPs or state regulations, but conservation actions in groundfish fisheries cannot be implemented under those FMPs or regulations. This is most noticeably the case where all directed fisheries have been totally closed in the area, such as occurred with the 1986 Bristol Bay crab fisheries. The proposed amendment would provide the authority to implement restrictions where biologically or ecologically prudent.

Alternatives 2, 3, and 4 would establish specific catch limits and, therefore, provide for determining in advance the maximum mortality allowed. Indirect measures such as time/area closures and gear restrictions (alternatives 5 and 6) may or may not effectively control fishing mortality; the results are unpredictable. Unless the species lies completely or at least primarily within the time/area closure, it is even possible that the total bycatch could be increased by foreign vessels into areas of higher bycatch rate.

Alternatives which specifically require bycatches to be returned immediately to the sea (e.g. alternatives 1 and 2) would tend to cause a reduced mortality in that some individuals would likely survive the capture experience. However, mortality rates in joint venture catches approach 100% due to the time to transport and transfer codends to the processing vessel.

The environmental impacts of limiting bycatches of prohibited species by fisheries targeting on other species are expected to be positive. No increased direct stress to marine mammals and birds is expected. No changes in the effects on endangered species or the coastal zone are expected.

#### 4.3 Regulatory Impacts

##### 4.3.1 Fishery costs and benefits.

To prevent misunderstanding it will be useful to define the terms used in this section. "Costs" and "benefits" will be defined according to common usage. Thus a cost is a loss whether it is due to increased costs or from decreased profits and conversely a benefit is a gain whether it stems from decreased costs or from some other change. This subsection examines fishery costs and benefits where fishery includes all but the final consumption sector, that is, harvesting, processing, distributing, wholesaling, and retailing. Generally the discussion will focus on the first two market levels, harvesting and processing. However, costs and benefits in the other sectors will be discussed should the situation require a more detailed market analysis.

There are two possible approaches to cost-benefit analysis of management alternatives. For the first we would compute the status quo costs and benefits, the costs and benefits given the new management strategy, and compare the two. In the second approach we would examine only the change between the status quo and the new regime.

The second approach will be used here for two reasons. Firstly, examining relative changes is all that's necessary in evaluating each alternative against the status quo alternative. Secondly, data limitations may often preclude a full accounting of costs and benefits in a particular sector while relative changes may be more easily quantified.



This subsection and all succeeding are organized as follows: for each alternative the relative change in, (1) costs, and (2) benefits (where relevant) for DAP, JVP and TALFF (where relevant) in each marketing area will be examined. Section 4.3.5 will examine possible redistribution of those costs and benefits and Section 4.3.6 will summarize the analysis for all alternatives considered.

## Alternative 2: Establish PSCs.

This alternative would continue the status quo in the TALFF fisheries. Thus the appropriate limits for the foreign trawl fleet would be determined as described in 4.1.

In Section 4.1, the presentation of alternatives, five methods of calculation were introduced. The five methods all calculate a set of prohibited species catch limits and it is the catch limit not the method of calculation that impacts the fishery. In that sense, therefore, we present an analysis of the impact of various levels of PSCs without regard to the five methods of number generation. The scenarios presented use a range of likely PSC limits so as to provide a feel for the sensitivity of the impacts to the prohibited species catch levels.

The five calculation methods, however, are very different in philosophical approach. The first three methods of PSC determination are essentially number setting exercises in that some desirable set of numbers is specified. However, for method 4 and especially method 5, tradeoffs are examined, and the "best" solution is sought.

This is an information extensive exercise. The gain is an increased ability to choose a set of PSCs which balances the costs and benefits resulting from establishing harvest limits. As such the method of calculation will critically affect the costs and benefits to the harvesting, processing, wholesale and retail sectors. Since we have none of these PSC setting models in place we can only analyze the impacts on the industry given various specifications for prohibited species catch limits.

## GROUND FISH HARVESTERS AND PROCESSORS COSTS

Costs to JVP and DAP groundfish harvesters - operational. Determination of the cost to harvesters of an imposition of PSC limits depends critically on the level of the harvest limit. Since the imposition of limits allows the harvester complete latitude in the selection of strategies to minimize the harvest of the prohibited species, i.e. gear changes, relocation of effort in time and/or space, it is difficult to predict the effect of such a limit on the vessels' operational costs. Presumably, costs will increase, because of any or all of the following: unproductive fishing time due to exploratory fishing; investment in new gear; increased running time to the new fishing grounds; lower CPUE due to fishing poorer (relative to the target species) areas; and increased expenditures on safety related equipment to compensate for additional time at sea, or for fishing in more distant and less protected waters.

Without individual vessel cost data or industry cost information we are unable to estimate a vessel or industry cost function, hence, we are unable to quantify how operational costs might increase given the imposition of prohibited species catch limits. If there is any displacement of the fleet due to the imposition of the catch limits and if the fleet is currently efficient, that is, is fishing in a way which minimizes their costs, then logic dictates that operational costs must increase.

What is necessary for further analysis is the cost relations in the affected fleet, that is, a functional relationship between the displacement or changes in operational procedures brought about by the PSC limit and the costs of operation.

Costs to JVP harvesters of groundfish - revenue. If the prohibited species catch limits are constraining, that is, if the imposition of the PSC results in less groundfish harvested than would have been landed under the status quo the harvesting sector will experience decreased exvessel revenue. This is a cost under the definitions given above. Quantification of this cost involves determining how the newly imposed limit would affect the ability to harvest the target species. Since it is impossible to predict how the affected fleet would shift effort we can only define "worst case scenarios" that is, scenarios where the groundfish harvesters are assumed unable to adjust effort.

Obviously, the harvesters will be able to adjust their fishing patterns and/or the gear they are using so as to maximize their catch of target species while minimizing their catch of the prohibited species. If they are "perfect" in their adjustment they will experience no loss in revenue. If they are unable to adjust their effort or technology in any way whatsoever the historical pattern of fishing and the PSC limits will determine the length of their fishing year. Reality will lie somewhere between these extreme cases.

Since they will be shut down when the most constraining PSC is reached we can examine the "worst case" situation by observing the pattern of harvest of groundfish and of prohibited species over the last several years. We explore this polar scenario by reviewing recent bycatch information and suggesting some likely approaches to establishing PSC limits.

The landings of groundfish and the amount of the prohibited species catch are presented in Table 4.3. Data are presented for only the joint venture fisheries for the years 1983 - 1985. Foreign fisheries are omitted as they remain unaffected by alternative 2. DAP fisheries are omitted as there are no data on the harvest of prohibited species by this portion of the fleet. The amounts of groundfish and prohibited species can be converted from weights to values given price information. Values for the joint venture groundfish harvest and for the prohibited species taken in that fishery are presented in Table 4.5. A mortality rate of 100% is assumed for all incidentally caught fish. Groundfish prices are taken from the NMFS survey of joint venture landings and value (1983 - NMFS Statistics; 1984, 1985 - Janet Smoker, AK Region, NMFS, pers. comm.).

The values for the prohibited species require further explanation. Per unit exvessel values for king crab, Tanner crab, and halibut were taken from Reeves and Terry (1986). The numbers are calculated as present values of a fish which would be recruited to the future fishery. The halibut landed by the groundfish

Table 4.3 Prohibited Species and Groundfish Catch (mt), Joint Venture Operations, Bering Sea/Aleutian Islands, 1983-85.

<u>Species or Species Group</u>	<u>Year</u>		
	<u>1983</u>	<u>1984</u>	<u>1985</u>
<u>Prohibited Species</u>			
Salmon	58	160	25
King Crab	338	283	838
Tanner Crab	173	119	204
Halibut	<u>438</u>	<u>617</u>	<u>1,151</u>
TOTAL	1,007	1,179	2,218
<u>Groundfish</u>			
Pollock	149,014	237,008	375,922
Atka Mackerel	10,512	35,943	37,766
Pacific Cod	14,362	30,771	40,840
Yellowfin Sole	22,529	32,764	125,902
Turbot	84	256	444
Flounder	11,694	17,151	45,474
Rockfish	8	43	17
POP Group	136	578	446
Sablefish	<u>114</u>	<u>348</u>	<u>105</u>
TOTAL	208,453	354,862	626,916

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Source: Observer database, NWAFC, NMFS.

fleet are smaller fish (about age 5 on average) while the fish landed by the halibut fleet are larger (about age 11). To account for the time lag between the taking of the young fish and the harvesting of the fish 6 years later by the halibut fleet several calculations are performed. The value used accounts for the weight growth of the fish over this period, natural mortality, and the price received by the halibut fisherman. Since this "price" is some 6 years in the future it is converted to present value (today's value) by discounting back to the present. A 5% discount rate was used.

King crab and Tanner crab values were computed in essentially the same way. For king and Tanner crab where the legal catch is male crab the effect of the present mortality on female crab in the groundfish fishery was used to predict the future loss of recruitable male crab using fecundity, natural mortality and growth relations.

We have no similar data available for salmon. The necessary calculation could be performed as follows: (1) determine the distribution of bycatch by species [We have this - in the 1985 joint venture fisheries it is 21.4% chinook; 76.9% chum; 1.7% other species, by number.]; (2) determine the growth, mortality and recruitment relations for at least the two important species [This is probably known at least in a general way]; (3) determine the origin and age of the fish taken in the joint venture fisheries [This is an extremely difficult task.]; (4) predict the effect of the removal of a fish today on the future harvest in the river of origin; (5) compute the present value of that fish.

In the interim, current exvessel values to the harvesters of salmon are presented. This will underestimate or overestimate the present value of the future harvest according to the origin of the incidentally caught fish. For example, if the chum salmon taken in the joint venture fisheries are all of Asian origin then the true values in Table 4.4 would be zero. If they were all of U.S. origin and were to be recruited into the legal salmon fishery in three years time the values in the table would, under most circumstances, understate the true values.

The harvest of prohibited species has ranged from \$4.2 million in 1983 to \$10.1 million in 1985. There is a trend of increasing catches of the prohibited species and of the catch in the targeted species which is consistent with the expansion of the joint venture fleet. Groundfish exvessel values have increased from \$23.1 million in 1983 to \$75.4 million in 1985. Thus, the value of groundfish taken in the joint venture fisheries is at least 6 to 7 times the value of the prohibited species caught (and killed) as bycatch.

We consider three scenarios for setting a set of PSC limits in the joint venture groundfish fisheries. The first assumes that the PSC limits in the joint venture fisheries were established using the bycatch rates established by Amendment 3 for the foreign trawl fishery and that the 1986 harvest pattern (in space and time) is the same as occurred in 1985. The second scenario makes the assumption that the Council desires to reduce the 1985 bycatch amounts by half and that the 1986 joint venture fishery harvests groundfish as in 1985. The third scenario assumes that the Council desires to reduce the 1985 bycatch rates by half and that the 1986 joint venture fishery is prosecuted in the same way as in 1985.

Table 4.4 Prohibited Species Present Value and Groundfish Exvessel Value (\$1,000s), Joint Venture Operations, Bering Sea/Aleutian Islands, 1983-85.

<u>Species or Species Group</u>	<u>Year</u>		
	<u>1983</u>	<u>1984</u>	<u>1985</u>
<u>Prohibited Species</u>			
Salmon	66	190	28
King Crab	2,144	1,795	5,315
Tanner Crab	260	179	306
Halibut	<u>1,708</u>	<u>2,406</u>	<u>4,489</u>
TOTAL	4,178	4,570	10,138
<u>Groundfish</u>			
Pollock	13,709	22,042	36,840
Atka Mackerel	1,409	5,535	5,778
Pacific Cod	3,029	6,677	8,862
Flounders	4,906	6,974	23,711
Rockfish	2	11	3
Pacific Ocean Perch Group	40	153	89
Sablefish	<u>44</u>	<u>111</u>	<u>132</u>
TOTAL	23,139	41,503	75,415

Notes: Landings were converted to exvessel values in the following way:

Prohibited Species - Salmon (1983-Alaska 1983 Catch and Production: Commercial Fishery Statistics, Statistical Leaflet No. 36; 1984-ASMI, FY85 Annual Report; 1985-Mike Dean, ADF&G, personal communication.)

King crab, Tanner crab, halibut (all years - Reeves, J. and J. Terry, 1986. A biological and economic analysis of the bycatch of prohibited species in the Bering Sea Area I joint venture flounder fishery, NWAFC, NMFS).

Groundfish - All species (1983-Fisheries of the United States, 1983 Joint Venture Catches - all of U.S.; 1984-85, Janet Smoker, Alaska Region, NMFS, personal communication; 1985 sablefish price is domestic as no joint venture harvest price is available.)

Predicted bycatch limits (PSCs) for halibut, king crab, Tanner crab, and salmon are given in Table 4.5 using 1986 foreign rates and 1986 joint venture allocations. Under this scenario the king crab bycatch would constrain the fishery. If, in 1986, the joint venture fisheries were prosecuted exactly as in 1985 a bycatch limit of 563,000 king crab would occur around the first week in June. At that point the joint venture fishery would have taken 372,000 mt of groundfish. Given a total allocation of 1,065,000 tons this represents a shortfall of 693,000 mt of groundfish. If overall exvessel price is \$120/mt, as in 1985, this represents a loss in exvessel revenue of about \$83 million. [This is a rough way of calculating the effect of the scenario. A more accurate approach would be to look at each directed fishery on a month by month basis, examining that fishery's direct harvest against the harvest of prohibited species. Any directed fishery which reaches one of its PSC limits could potentially close down all other JV (and TALFF) fisheries.]

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 Table 4.5 Bycatch scenario 1: 1986 foreign bycatch rates used to establish PSCs in 1986 JV fishery

<u>Species</u>	<u>PSC Limit</u>	<u>1985 JV Harvest</u>
Salmon	29,680	10,500 fish
Halibut	1,279	1,151 mt
King crab	563,000	969,800 crabs
Tanner crab	9,824,000	828,400 crabs

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If 50% of the 1985 joint venture catches of prohibited species were used to establish 1986 PSC limits (Table 4.6) the king crab cap would again be constraining. Using 1985 harvesting patterns and 1986 allocations the 485,000 king crab would be taken by the end of May, about one week earlier than under scenario 1 (the fleet would be taking some 87,000 king crab a week at that time of year). At that point some 344,000 mt of groundfish would have been taken. The shortfall in groundfish harvest would cost the joint venture fleet some \$87 million in exvessel revenues.

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 Table 4.6 Bycatch scenario 2: 1985 joint venture bycatch amounts reduced by 50%.

<u>Species</u>	<u>PSC Limit</u>
Salmon	5,250 fish
Halibut	576 mt
King crab	485,000 crabs
Tanner crab	414,000 crabs

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If the observed 1985 bycatch rates were reduced by 50% in 1986 PSC limits would be as shown in Table 4.7. The king crab cap of 818,000 crab would be reached around the end of June, the groundfish harvest would be about 455,000 mt and the loss in revenue would be about \$73 million.

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 Table 4.7 Bycatch scenario 3: 1985 joint venture bycatch rates reduced by 50%.  
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<u>Species</u>	<u>PSC Limit</u>
Salmon	8,500 fish
Halibut	970 mt
King crab	818,000 crabs
Tanner crab	699,000 crabs

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These three scenarios describe worst case situations - situations where the joint venture harvesters make no attempt whatsoever to alter their 1985 harvest pattern in light of 1986 PSC limits. The exvessel revenue losses therefore overstate the cost to the joint venture fleet.

There may be an additional cost to the joint venture harvesters. This is an indirect cost caused by a change in the exvessel price. If groundfish harvests decline because of binding PSC limits the retraction in supply may lead to an increase in the exvessel price. In some circumstances this price increase would lead to an increase in revenues and in other circumstances the price increase would lead to a decrease in revenues. Which situation occurs depends on the way price responds to changes in demand. The percentage change in quantity given a percentage change in price is known as price elasticity. The demand curve is said to be (price) elastic if the percentage response in the quantity is demanded is greater than the percentage change in price and inelastic if the percentage response in quantity is less than the percentage change in price. If a demand curve is elastic [properly, if the quantity demanded falls in the elastic portion of the curve] then a increase in price will lead to a loss of revenue. This is hence a secondary, indirect loss due to the loss of groundfish harvest.

Benefits to JVP groundfish harvesters. There are no direct benefits accruing to the joint venture fleet if the PSC limit restricts the harvest of groundfish. There exists the possibility of an indirect benefit due to increased revenues caused by an exvessel price increase. The exvessel price may increase in response to the decreased supply of groundfish and the revenue received by the fleet may increase if exvessel demand is inelastic.

Costs to DAP groundfish harvesters - revenue. Without having onboard observers setting and enforcing PSC limits for DAP harvesters is quite problematical. Firstly, without observers and without logbooks there is no prohibited species catch information for the domestic fleet delivering to domestic processors. Secondly, without observers there is no way to enforce any kind of harvest limit which depends on throwing fish over the side.

In the absence of observers two approaches seem possible. The first is to set the PSC limits so as not to constrain the predicted DAP harvest. The second would be to set the TAC for DAP according to a predetermined PSC limit and a bycatch rate for that species. A simple example may serve to illustrate the approach. Suppose a PSC limit of 1,000 salmon is set for the DAP fishery and suppose the bycatch rate for salmon in that fishery is 1 fish per 100 tons of

groundfish. The 1,000 salmon PSC would be taken, therefore, when 100,000 mt of groundfish were harvested. Accordingly, the groundfish TAC would be set at 100,000 tons.

Obviously, in only the second case will DAP exvessel revenues be effected. Quantification of the impact would be possible if the PSC limits and the bycatch rates were known. The limits could be set by the Council while the bycatch rates could come from observer or logbook data. Since the necessary data are lacking and since the Council and NMFS may be unwilling to constrain the DAP fishery because of a predicted PSC the second approach will not be pursued at this time.

As argued above for joint ventures, there may be an additional indirect cost to DAP harvesters if exvessel price increases and if revenues fall because of an elastic demand curve.

Benefits to DAP groundfish harvesters. There are no direct benefits to domestic harvesters delivering to domestic processors if the PSC limit imposed results in less groundfish harvested than under the status quo. There may be an indirect benefit in that reduction in harvest may lead to an exvessel price increase and hence, a change in revenue. If the exvessel demand is inelastic then revenues will increase.

Costs to U.S. groundfish processors. If the PSC limits imposed on the DAP fishery limit the harvest of groundfish supplied to processors, and therefore to wholesalers and retailers, then exvessel, wholesale and retail prices will increase, at least in the short run, unless sector demands are perfectly elastic. Retail price effects will be discussed in 4.3.4. The processing, and wholesale sectors will experience a decrease (increase) in short term revenues (and hence profits) if the amount demanded falls in the elastic (inelastic) portion of the demand for the output of the sector. We currently have no information which would allow estimation of the relationships between the amount of fish demanded by processors or wholesalers, and the price of the species. Without such relationships we can only speculate as to the effect of price increase (should one occur at all). If the price effect of a quota reduction is small or zero than the other market effects would be small or nil. A small or zero price effect would be expected where the reduction in quota is small relative to the total supply, where demand price is very unresponsive to quantity changes, and where there are good substitutes for the effected species. [What is needed are estimates of the demand for a species in the harvesting, processing, and wholesale markets. Accomplishing this will involve a major data collection and estimation effort.]

Fish harvested by joint ventures are, by definition, processed by foreign nations, therefore, given the perspective of the MFCMA, there are no relevant direct costs or benefits to be considered for the category of nondomestic processors. There may be indirect costs to domestic processors, however, from a change in harvesting in the joint venture fleet. If a species of fish is processed by domestic operations and then exported to foreign nations (e.g. salmon, sablefish) the amount taken by JVP could affect the price received by the U.S. exporters. Whether this effect occurs, and if so, its importance, will depend on the kind of markets for the species of interest. As above, without models of demand we can provide little quantitative information as to the magnitude of this cross market effect.



Benefits to U.S. groundfish processors. A reduction in the harvest of groundfish should result in no direct benefit to domestic processors. The possibility exists, however, that there may be an indirect benefit due to increased revenues. This would occur if there were an increase in wholesale price due to the retraction in supply and if the demand from wholesalers is price inelastic.

HALIBUT, KING CRAB, TANNER CRAB AND SALMON HARVESTERS AND PROCESSORS

Costs to harvesters - operational. Imposition of PSC limits for the JVP and/or the DAP fisheries should not raise the operating costs for the harvesters of halibut, king crab, Tanner crab, and salmon. If those PSC limits are constraining to the regulated fisheries such that the amount of halibut, king crab, Tanner crab, and salmon available to the traditional fisheries increases in the future than one might expect operational costs to decrease because of an increase in CPUE.

Costs to harvesters - revenue. As in the preceding section, if PSC limits for halibut, king crab, Tanner crab, and salmon are put in place and if those limits are effective, that is, result in less harvest of the prohibited species than under the status quo there should be no exvessel revenue lost in the traditional fisheries.

Benefits to harvesters. An effective PSC limit in the DAP and JVP fisheries will result in a greater future harvest of halibut, king crab, Tanner crab, and salmon. The per unit values (prices) of this increased harvest (Table 4.8) were determined as described for Table 4.2. The total value of this increased harvest may be calculated by predicting the increase in available halibut, king crab, Tanner crab, and salmon commensurate with a reduction in the DAP and/or JVP harvest.

Such predictions are subject to the same caveats as the prediction of groundfish harvests. That is, since the groundfish fleet will adjust their operations so as to minimize their catch of prohibited species and since their adjustment is unknown, we can only predict the "best case" scenario. The extreme assumption is therefore that the groundfish fleet will be unable to adjust in any way whatsoever to the setting of restrictive PSCs. This implies that all the "saved" PSC will be available to the traditional fleets. In reality the groundfish fleet will move their operations in space and/or time and therefore will harvest some prohibited species in the new location or during the revised season. The amount taken is unknown but will depend on the new pattern of fishing in time and space and on the distribution of the prohibited species in those areas or at those times of year.

The groundfish fleet may also invest in gear which reduces their harvest of the prohibited species. This adjustment will result in a greater savings of prohibited species than would have occurred under the status quo. It is impossible to quantitatively assess this effect without detailed knowledge of the substitution in fishing gear and its ability to avoid the prohibited species.

In sum, the ignoring of the amounts of prohibited species taken by the displaced groundfish fleet will overstate the benefits to the traditional harvesters of halibut, king crab, Tanner crab, and salmon and the ignoring of

the reduction in the amounts of prohibited species taken because of investments in "cleaner" fishing gear will understate the benefits to the traditional fleet. Best case scenarios using the set of PSCs used in evaluating the costs to the joint venture fleet are presented in Table 4.9.

Table 4.8 Per unit exvessel prices for prohibited species

<u>Species</u>	<u>Present Exvessel Price</u>
Salmon	\$0.51 per pound
Halibut	\$ 3,900 per mt
King crab	\$ 6,343 per mt
Tanner crab	\$ 1,500 per mt

Source: Reeves and Terry, 1986, op. cit.

Table 4.9 Weights and exvessel values for prohibited species "saved" by reduction in the joint venture groundfish harvest under three scenarios.<sup>1/</sup>

<u>Species</u>	<u>Scenario 1</u>		<u>Scenario 2</u>		<u>Scenario 3</u>	
	Amount (mt)	Value (\$1,000s)	Amount (mt)	Value (\$1,000s)	Amount (mt)	Value (\$1,000s)
Salmon	24	27	24	27	23	26
Halibut	603	2,352	686	2,675	354	1,381
King crab	351	2,229	419	2,657	131	833
Tanner crab	122	183	137	205	79	118
TOTAL		4,791		5,564		2,358

<sup>1/</sup> 1986 hypothetical prohibited species catches under three different approaches to setting PSCs as given in Tables 4.3-4.5 were converted to metric tons using 1985 observer data (Nelson, 1986) and converted to value using the prices given in Table 4.8. It is assumed that the JV fleet is unable to adjust their operations.

Costs to processors. If the groundfish fisheries take less of the prohibited species under PSC limits than under the status quo then presumably more of the species halibut, king crab, Tanner crab, and salmon will be available to domestic processors. If demand remains unchanged than increased supply will result in lower prices (for a less than perfectly elastic demand). Whether the decrease in price will result in greater or less revenue depends, as argued above, on the demand elasticities. We are presently unable to quantitatively assess this effect.

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Benefits to processors. Presumably a reduction in the harvest of halibut, king crab, Tanner crab, and salmon today will result in greater availability to the future harvesters of the species. The same holds true for the processing sector. If processors, wholesalers, and retailers are able to market increased product at the current price they will realize an increase in revenues. If costs increase less than proportionately profits will increase. If price should fall due to the increased availability of product then revenues will still increase unless demand is inelastic.

Alternative 3: Establish harvest limits for halibut, king crab, Tanner crab, and salmon in the DAP and JVP groundfish fisheries with retention allowed and the harvester assessed a fee.

This alternative establishes harvest limits for halibut, king crab, Tanner crab, and salmon as does alternative 2. However, under alternative 3 the species are no longer prohibited. To prevent targeting the harvester is assessed a fee which is related to the value of the species.

The prohibited species approach to fisheries management is a wasteful and inefficient strategy in that marketable fish are thrown overboard. There is additional biological waste as a large proportion (approaching 100% in some fisheries) die. Retention seems a viable alternative if the amount of bycatch can be limited. Retention quotas may be set, as in the PSC approach, to provide a cap on harvesting. Alternatively, the landing of the incidentally caught species can be made less profitable by assessing the harvester a per unit fee. The fee can be set at any level. Very high fees (in excess of the fisherman's opportunity costs) may lead to dumping fish overboard. Very low fees may be ineffective in preventing targeting. A combination of fees and retention quotas may be a practical approach, at least until the "correct" fee can be ascertained.

The retention of halibut, king crab, Tanner crab, and salmon presents problems, however. There is a legal difficulty with retention of these species by domestic harvesters. Firstly, the species are defined in the plan as "unallocated" which are, by definition, those species not managed under the BSAI FMP. Since the fish are unallocated there is no TAC for these species in the groundfish fisheries. Since there is no allocation the species are not retainable. Therefore the plan would need to be amended to change the list of species which are unallocated. Secondly, the FMPs for salmon, king crab, and Tanner crab would have to be amended to allow allocations of the managed species to the Bering Seas groundfish fisheries. There is an additional difficulty in that the fish harvested may not be legally retainable under the halibut, king crab, Tanner crab, and salmon management plans. The halibut caught in the trawl fisheries, for example, are on average smaller than the legal limit of 32". Female king and Tanner crab are illegal catches under the crab FMPs and many of the males taken by the groundfish fisheries are below legal size. If retention of these previously illegal fish is permitted it will be necessary to amend the appropriate FMPs.

It also follows that if certain sizes or sexes of the previously prohibited species remain illegal, unmarketable, or unprofitable there will be a tendency to throw this component overboard. If this occurs it may be necessary to assess all catches, retained or discarded. This will require observers on DAP as well as JVP vessels. An alternative to assessing all harvested species

would be to assess the retainable component and to set a PSC for the nonretainable portion, effectively managing under alternatives 2 and 3 jointly.

There is an additional legal difficulty with retainable harvest amounts in the JVP fishery. NOAA General Counsel suggests that a DAP fishery cannot be shut down while some TAC remains. This implies that if a domestic fishery should exceed that portion of the TAC allocated to DAP it may fish on the JVP retention quota. When this quota is taken the JVP fishery is shut down. Thus, the retainable quota given to JVP under this alternative may not be protected should DAP need that allocation for continued fishing.

There may also be difficulties with the distribution of the landings fees collected under such a program. It is the current interpretation of NOAA General Counsel that all such amounts collected would go to the general fund. This would preclude any reimbursement to the traditional harvesters of halibut, king crab, Tanner crab, and salmon and would not allow an agency such as NMFS to use the funds to defray expenses or conduct research. If this interpretation is correct this alternative may be less attractive.

Beyond the legal difficulties is the challenge of determining the level of assessment for possession of halibut, king crab, Tanner crab, and salmon. If the Council desires to reimburse the traditional harvesters for foregone exvessel value fees equal to the exvessel value might be appropriate. If the strategy is to account for all value lost to harvesters, processors, wholesalers and consumers higher fees would be appropriate. If the goal is prevention of targeting on these species then fees should be set high enough to remove any potential profit from their retention.

There are therefore important legal and philosophical questions about retention of formerly prohibited species that must be answered before quantitative analysis can proceed.

This alternative has two parts: (1) the setting of retention quotas; and (2) the setting of per unit species assessments. The setting of quotas is conceptually no different than the setting of PSCs, although the level of the quota may depend critically on the philosophy of assessment and the level of the fee. The difficulty in determining the appropriate level for landings assessments has been discussed above. It is appropriate, therefore, in the following analytical section to focus on only the differences between alternative 3 and alternative 2 and to discuss the fee level in general terms.

#### GROUND FISH HARVESTERS AND PROCESSORS

Costs to DAP and JVP groundfish harvesters - operational. With retention allowed operational costs will increase if there are additional costs associated with locating and delivering to a buyer for the previously prohibited fish. Other operational cost changes appropriate to the level of the retention quota are as described for alternative 2. If certain sizes or sexes of the previously prohibited species are illegal or not marketable than handling costs may increase.

Costs to DAP and JVP groundfish harvesters - revenue. Decreased revenues (relative to the status quo) will generally be as described for alternative 2. The amount of revenue lost (if any) will be determined by the level of the retention quota and the level of the landings fee. If those quotas are the same as the PSCs described in scenarios 1 through 3 than the exvessel revenue losses will be as shown in Tables 4.2-4.4.

Benefits. Changes in benefits in this sector will be as described in alternative 2 with the following exceptions. If handling (sorting and storing) the previously prohibited species is cheaper than sorting and throwing over the side operational costs will decrease. Secondly, the level of the landings fee and the exvessel price for the formerly prohibited species may be such that the harvester will receive an additional profit above and beyond that previously received.

Costs of processing. If a processor has not previously marketed halibut, king crab, Tanner crab, and salmon there may be a startup cost associated with handling the new species. Additionally, if the fish handled were previously illegal under the status quo costs may be incurred in establishing markets for the new sizes and/or sexes. If the total of groundfish and formerly prohibited species handled increases then costs will increase.

Benefits of processing. Processors, wholesalers, and retailers will all experience increased revenues relative to alternative 2 given that the retention quota is set at the level indicated in that alternative. If exvessel or wholesale price should decline revenues will still increase if demand is elastic.

#### HALIBUT, KING CRAB, TANNER CRAB AND SALMON HARVESTERS AND PROCESSORS

Costs to harvesters - operational. There should be no increase in operational costs for harvesters of halibut, king crab, Tanner crab, and salmon unless the amount allocated to the groundfish fisheries is substantial enough to reduce the availability of future stocks thereby increasing costs through decreased CPUE.

Costs to harvesters - revenue. As above, if the allocations of these species to the groundfish fisheries is such that catches in the traditional fisheries decline, exvessel revenues will decrease. Additionally, if an overall increase in supply results in a price decline this sector will experience a revenue loss if demand is inelastic.

Benefits to harvesters - revenue. If the assessment fees are transferred (in whole or in part) to the traditional harvesters exvessel revenue will increase. If the assessment fees and/or retention quotas are such that less of halibut, king crab, Tanner crab, and salmon are killed than under the status quo the sector may experience future increases in harvests, prices, or both.

Costs and benefits to processors. If the amount of halibut, king crab, Tanner crab, and salmon handled increases under this management alternative costs will increase. Presumably, increased revenues will more than cover these costs.

Alternative 4: Establish harvest limits for halibut, king crab, Tanner crab, and salmon in the DAP and JVP groundfish fisheries with retention allowed. The retention quotas would be granted to the harvester on a company by company basis and would be transferrable.

This alternative differs from alternative 3 in that the amount which may be retained is not pooled but instead is granted to an individual company. The company then has rights to that retention quota. This implies that quota may be transferred between companies in free market transactions. Thus, a company which finds itself with an excess of retainable amounts of halibut, king crab, Tanner crab, and salmon may sell the right to harvest the fish to another company. Alternatively, a company may take its allocation of halibut, king crab, Tanner crab, and salmon as bycatch in the harvesting of groundfish and thus shut itself down. Under this alternative this company may purchase the rights to an additional retention quota from a company who will not need all of the allocated amount.

The retention part of alternative 4 has all the advantages and disadvantages of retention as described above for alternative 3. Difficulties include legal problems with retention and legal restrictions on the size or sex of the animal retained. We therefore will not discuss that part of alternative 4. The relevant distinction between alternative 4 and alternative 3 is the difference between transferable retention quotas and assessments (penalties) for retaining certain species of fish.

Assigning the rights to retain previously prohibited species to the DAP and JVP groundfish fisheries represents one answer to the philosophical question raised during the discussion of alternative 3. Such assignment implies that some of the benefits (revenues) of harvesting halibut, king crab, Tanner crab, and salmon will go to groundfish harvesters. Assignment of rights also implies that the traditional harvesters of halibut, king crab, Tanner crab, and salmon are not reimbursed in any way for a foregone harvest. Exvessel benefits of harvesting the previously prohibited species are therefore transferred from the traditional harvesters to the groundfish harvesters.

There is an additional important distinction between alternative 4 and 3 in that alternative 4 establishes no penalties for harvesting halibut, king crab, Tanner crab, and salmon. Recall that one of the main difficulties with the fee question was determining the "correct" level of fee. Assignable, transferrable rights will allow the free market system to determine the appropriate value of the trade off between allowing development of a groundfish fishery and allowing the harvest of species traditionally allocated to other fisheries.

The harvesting and processing impacts of alternative 4 will be analyzed as above with the discussion of only relative differences between the status quo, alternative 2, or alternative 3.

#### GROUND FISH HARVESTERS AND PROCESSORS

Costs and benefits to DAP and JVP groundfish harvesters. Since retention quotas are assigned the relative costs and benefits of setting particular catch limits will, in general be as described in the analysis of alternative 2. Transferrable retention quotas will result in additional costs and benefits (relative to that alternative) where additional costs will be

to predict the appropriate area and/or seasonal window to be closed so as to afford some previously determined level of protection for the species. This is a roundabout way of setting that level of protection since if a harvest limit is desired it is easier for all concerned to simply set that limit directly.

From the harvesting perspective using indirect harvest controls limits the ability for the fishing vessel to use the best available measures for controlling bycatch. For example, if a PSC limit for halibut is set at 1000 mt the groundfish harvester can move his fishing to a different area, restrict operations in a certain area during a certain time of year, use gear which catches less halibut, vary the length of tow, etc. The essential point is that the harvester may use all available means to control the take of halibut. The rational fisherman will therefore choose that combination of measures which maximizes the groundfish harvest while minimizing the harvest of halibut. This will be the "best" solution at the individual vessel level. Time/area closures, on the other hand, give the individual vessel no latitude in operations, therefore, the harvesting pattern under time/area closure management must be less than optimal.

Time/area closures are also disadvantageous if species shift concentrations in either time or in space. Note also that catch rates or abundance data may not always be available for areas outside the closed area.

Time/area management may have utility in certain cases, however. Should it be desirable to protect a certain stock or a portion of a stock which is known to congregate in certain areas at certain times of the year the most effective management approach may be to close that area at that time of year to any fisheries which may impose additional mortality on the stocks. Thus, if managers wished to protect, for example, juvenile halibut or spawning adults and if these fish tend to aggregate at certain times of the year they might close the aggregation area to all bottom trawling during the relevant season.

Management by time/area closure may also be advantageous if there is significant mortality on halibut, king crab, Tanner crab, and salmon from operation of the groundfish fishing gear. This kind of mortality is not observed in the catch statistics. The magnitude of trawl induced mortality remains unknown. Hopefully, the NMFS research program to be undertaken this summer will begin to assess the significance of the damage caused by hard-onbottom gear to the resident fish and crab populations.

To manage by time/area closure two steps are necessary. Step 1 is exactly the same as required in establishing a PSC, that is, the allowable level of harvest for the prohibited species should be determined. As in alternative 1, there are at least five ways of determining those limits. Only the limits themselves and not the determination mechanism are relevant for the fisheries sector. Step 2 examines the population distribution and perhaps, population or ecosystem modeling to determine the most effective area, season, or area/season combination to close. In sum, first one determines the desired harvest limits and then one determines which areas and/or seasons should be closed. It follows that the number setting part of the approach is no different than that analyzed under alternative 1. For that reason the discussion that follows will emphasize the distinctions between management by time/area closure and management by setting PSC limits (alternative 2).

wings or in the cod end might be specified. Separate or combined with mesh restrictions, modifications to foot ropes, mud lines, tickler chains or doors might be specified. Gear restrictions related to mesh size could also be employed in the midwater trawl fisheries so as to afford protection to chum salmon.

Unfortunately, little is known about the effectiveness of such gear modifications in reducing the bycatch of prohibited species. [If this alternative is pursued we ought to review the literature for research on the effectiveness of gear modification.] Obviously, mesh size regulations are only effective if the species to be protected is smaller than the target species. It is unlikely that this is the case for any of the species harvested in the Bering Sea. Mesh size restrictions may be useful in protecting juveniles, however. Thus, mesh size regulations could be used as an alternative to or in conjunction with time/area closures in the case where protection of young fish is important.

The analysis of the separate sector impacts that follows is briefer than that for the other alternatives in that most of the ground has already been covered. As in earlier sections the sector impact analysis will focus on only the distinctions in costs and benefits relative to management alternatives already analyzed.

#### GROUND FISH HARVESTERS AND PROCESSORS

Costs and benefits to harvesters. Operational costs for harvesters will increase since gear restrictions will involve purchase of new equipment, operational adjustments, or relocation of fishing areas. Costs will also increase should the restriction result in gear which is easily damaged on the traditional grounds. Since the individual fisherman is not allowed to adjust operations so as to minimize the harvest of prohibited species while maximizing the harvest of groundfish groundfish revenue is likely to fall relative to the situation where PSC limits are imposed. Uncertainty may also raise costs and lead to gains or shortfalls in predicted revenues.

Costs and benefits to processors. The same discussion as used for alternative 5 is applicable to this alternative with the exception that mesh size restrictions and other gear restriction approaches could result in a different size distribution for fish delivered to processors. If mesh regulations are ineffective because all fish are roughly the same size and if other approaches to gear restriction management don't materially affect the size distribution of landings this will not be an important factor.

#### HALIBUT, KING CRAB, TANNER CRAB AND SALMON HARVESTERS AND PROCESSORS

Costs and benefits to harvesters. If the gear restrictions are effective in reducing the catch of halibut, king crab, Tanner crab, and salmon or are effective in reducing mortality of species on the bottom but not picked up by the trawl then future revenues should increase. The gains due to reduced catch will not differ from that described in alternative 2 except in the sense that the predictions vary from reality. If gear restrictions result in reduced mortalities to halibut, king and Tanner crab passed over but not picked up by



bottom trawls than additional gains will be realized by the harvesters of the traditional fisheries. Quantification will involve further research on the relation between gear modifications and mortality.

Costs and benefits to processors. Unless the size distribution of halibut, king crab, Tanner crab, and salmon is effected by gear restrictions such as minimum mesh size regulations this sector will experience no impacts that differ from those described in alternative 2.

#### 4.3.2 Reporting costs.

This section presents the reporting requirements (if any) of the five management alternatives presented in section 5.3.1. The purpose of the section is to highlight any differences in reporting costs among the alternatives.

Reporting requirements under the Bering Sea Aleutian Islands groundfish FMP are discussed in section 14.4.5 of the plan and in the implementing regulations (50 CFR 675.5). In brief, all harvesters are required to report to the Alaska Department of Fish and Game on a regular basis. Information is collected via the fish ticket procedure. These regulations apply to all vessels which operate in the North Pacific region regardless of the state of landing. Additionally, catcher/processors and mothership/processors which are at sea for more than 14 days at a time are required to notify the U.S. Coast Guard when stopping or starting fishing in any area and when shifting operations between areas. The catcher/processors mothership/processors are also required to report round weights of all species retained, discarded, or off-loaded.

None of the alternatives proposed in the preceding section specifically modify these reporting requirements. Therefore, there are no additional reporting costs associated with the adoption of any of the five alternatives.

There may be, however, some additional reporting requirements implied by the adoption of certain of the alternatives. Under alternatives 2, 3, and 4, either prohibited species catch limits or retention quotas are specified. If these quotas are to be applied to the DAP groundfish fisheries in such a way that the harvest limit for halibut, king crab, Tanner crab, and salmon is potentially limiting then some method of monitoring and regulating the harvest of these species will be necessary. Two possible approaches are (1) requiring the keeping of log books, and (2) requiring observers on board all operating fishing vessels, catcher/processors, or mothership/processors. In either case it may be necessary to require that additional reporting take place.

Secondly, with regard to the alternative of using time/area closures to regulate the harvest of prohibited species, it may be necessary to require that fishing vessels report out of an area upon its closure and into an area upon its opening. More generally, if time/area closures are used throughout the management area and throughout the year it may be advantageous to require that all vessels report their location on a regular basis.

#### 4.3.3 Administrative, enforcement and information costs and benefits.

This section discusses other costs associated with adoption of any one of the alternative management strategies for regulating the harvest of halibut, king crab, Tanner crab, and salmon in the North Pacific groundfish fisheries. Costs highlighted are those relating to administration, enforcement and information. The section is organized into three cost subsections each of which discusses the relative (to the status quo and/or to other alternatives) changes in the relevant cost category brought about by the adoption of one of the five management approaches.

##### Administrative costs

Administrative costs are those costs engendered by the administration of the MFCMA. The costs include administrative expenses for Council, Council staff, Council family, NMFS regional, NMFS central office and ADF&G activities. Of the five management alternatives outlined: setting PSCs (alternative 2), retention quotas with fees (alternative 3), transferable retention quotas (alternative 4), time/area closures (alternative 5), and gear restrictions (alternative 6); alternatives 2, 3, and 4 may involve additional administrative costs beyond the present level of expenditures. The setting of PSCs may not impose an administrative burden much in excess of the present costs, nevertheless, some administrative overhead for establishing, and monitoring those limits will be necessary.

Alternatives 3 and 4 may have substantial administrative costs beyond the status quo. Under alternative 3 some mechanism for establishing and monitoring limits would be necessary as in alternative 2. Additionally, alternative 3 will require the setting and collection of fees from groundfish harvesters. It may be possible to dovetail this additional administrative effort with the existing foreign fee collection system, nevertheless, administrative costs could be substantial under this alternative. Alternative 4 which allows retention of the regulated species and transfer of the retention quotas between vessels or companies will require that some permit system (for retainable amounts) be established and administered (or at least monitored) should the vessels or companies establish their own share quota system. Any revisions of the relevant FMPs could also add considerable administrative expense.

Alternative 2, which makes the species prohibited, requires some type of observer program for enforcement, either via on board observers or by periodic boarding and inspection. The cost of an observer program could be substantial. The RIR for Amendment 9 to the Bering Sea FMP (1985) suggests that \$235 per day is an appropriate cost for NMFS on board observers. The number of trips made in 1985 by various vessel categories and the average trip length (days) may be used to calculate total fishing days for the domestic fleet (Table 4.10). Total fishing days multiplied by the observer cost per day yields a total cost of \$1.1 million for placing observers on all DAP vessels.

The retention alternatives (alternatives 3 and 4) may also require observers. This is because the vessels may choose to discard fish at sea. Throwing fish overboard may be allowed if the particular management regime chosen permits fish that are unmarketable to be discarded.

Table 4.10 Days Fished by DAP Vessels, Bering Sea, 1985.

<u>Vessel Category</u>	<u>1985 Trips<sup>1/</sup></u>	<u>Average<sup>2/</sup> Days Per Trip</u>	<u>Total Fishing Days</u>
Catcher/Processors and Mothership/Processors	--	--	1,080 <sup>3/</sup>
Landbased Trawler	541	3- 6	2,435 <sup>4/</sup>
Landbased Longliner	118	7-10	1,003 <sup>4/</sup>
Landbased Pot Vessel	10	7-10	85 <sup>4/</sup>
TOTAL			4,603 vessel/days
Total Observer Cost - (at \$235/day)			\$1.1 million

1. Estimate from 1985 ADF&G fish ticket database, Fritz Funk, pers. comm.
2. It was not possible to compute the average trip length from the fish ticket database or from logbook information prior to the March Council meeting. Instead, knowledgeable individuals were asked for their best estimate on mean trip lengths. All individuals (Pete Jackson, Steve Kendall, Jim Branson) agreed on the figures presented.
3. Taken from Table 8, Final RIR, Bering Sea Groundfish Plan, Amendment 9.
4. Calculated using midpoint of trip lengths.

Information costs

Information costs are those expenditures necessary to collect and process the scientific information necessary to carry out the regulations implementing the fisheries management plan. All five management alternatives require the collection and analysis of information beyond that required under the status quo.

Recall that in presenting alternative 2, PSC limits, five methods for setting those limits were described. All require some additional information. Method 1 - fixed PSCs - requires some initial work on establishing a set of numbers and presumably an annual evaluation. Method 2 - fixed bycatch rates and annual limits - requires an initial determination of the appropriate bycatch rates, annual evaluation of those bycatch rates, and an annual computation of the PSC limits. Method 3 - declining bycatch rates used to calculate PSC limits - requires an initial determination and annual evaluation only, at least during the time period of the declining schedule. Method 4 - annual setting of PSCs which must fall within a specified range - will require an initial determination of an acceptable range of allowable limits and some annual calculation and evaluation. Method 5 - the fully frameworked approach - will require information appropriate to the frameworking measure selected. At the most information intensive level, frameworking the PSC limits will require information on bycatch rates, domestic and joint venture groundfish catches and exvessel prices, domestic halibut, king crab, Tanner crab, and salmon catches and exvessel prices, differential marketing arrangements and the benefits to the U.S. due to the processing, and retailing of both groundfish and halibut, king crab, Tanner crab, and salmon. Some of this information is easily attained while some of the information may take time to develop and verify.

Alternatives 3 and 4 also establish harvest limits for halibut, king crab, Tanner crab, and salmon and would require the same types of information as alternative 2. As above, the cost of the information would be related to the approach used in setting the quota. There may be considerable additional information necessary for implementation of the fee part of alternative 3. Depending on the management philosophy, fees may be related to groundfish profit margins, revenue or profits foregone by the traditional harvesters, benefits foregone by all users of the traditional species, or some other variation. Regardless, the information necessary for appropriately determining the fee schedule and for monitoring and updating the collection scheme will be substantial.

Under alternative 4 information needs are limited to that involved in determining and evaluating the retention quota limits. Since the harvesters may buy and sell these retention quotas the market will determine the appropriate per unit value of the prohibited species.

Implementation of alternative 5 will also require considerable information. It will be necessary to periodically monitor the seasonal and spatial distribution of all groundfish species and all of the prohibited species so as to set the correct time and area closures. It will be also necessary to monitor the performance of the groundfish fisheries to ascertain the effectiveness of the closures.

Alternative 6 - gear restrictions - will involve the collection of information on the effectiveness of various gear modifications in reducing the bycatch of prohibited species and, most likely, periodic evaluation of gear performance.

#### Enforcement costs

The five management alternatives also differ in the level of enforcement necessary to insure compliance with the implementing regulations. Since no PSC regulations currently apply to the DAP and JVP fisheries enforcement costs will be in excess of the status quo.

Without enforcement, vessels may choose to discard fish under the fee assessment alternative if the fee mandated is "incorrect" for their particular operations. That is, if the vessels' costs in relation to the fee schedule is such that it is cheaper to discard than retain fish the vessel may do so. Likewise, under the retention with transferrable rights system, it may be advantageous to discard fish rather than go to the retention quota market to buy more quota. This will depend on the value of the fish in relation to the retention quota "prices". Operationally, if a vessel meets its retention quota during a particular trip it may be a practical necessity that all subsequent catches of halibut, king crab, Tanner crab, and salmon are thrown over the side.

The enforcement costs of alternatives 5 and 6 (time/area closures and gear restrictions) are considerably less than the other alternatives, since, in general, these management measures are relatively easy to enforce. For time/area closures enforcement measures such as on-the-water or flyover patrols could be used in conjunction with vessel location reporting. Under gear restriction measures it can be made illegal to have on board any of the forbidden gear. The vessel could be checked upon landing its fish.

#### 4.3.4 Costs and benefits to consumers.

Changes in costs and benefits for consumers can be approximated by examining areas under market demand schedules, where the demand relationship measures the collective response of consumers to changes in prices given income and tastes. These schedules are characteristically downward sloping, that is, at higher prices people demand less. The reason that the gains and losses to consumers can be measured by changes in the area found under these curves is beyond the scope of this RIR.

We can make little quantitative assessment of the costs and benefits to consumers under any of the five proposed alternative management strategies. Such assessment requires two kinds of information. The first is some estimate of the demand relationship itself. This is accomplished through a statistical procedure which estimates the relation between the quantity demanded, product price, substitute product prices, income and perhaps other variables. Conducting such an analysis will require collection of considerable consumer information but poses no substantial conceptual difficulties.

The second step in the cost-benefit analysis involves predicting how the price and/or quantity will change in response to the proposed management alternative. This is difficult to do since the effect of a price or quantity change at the harvesting level (the regulated level) must be traced through

the processing, wholesaling and retailing sectors. This sectoral analysis therefore requires that the manager have information on the demand relations for all marketing sectors.

Nevertheless, it is possible to make some general comments on how consumers might be affected by the proposed management alternatives. Firstly, it is probably true that the price effects at the final demand level (consumer demand) will be minimal or zero. This is because the impact of the proposed alternatives on the amount of groundfish and of halibut, king crab, Tanner crab, and salmon supplied to consumers is small in relation to the total U.S. supply. If there are no price effects or supply effects at the consumer level there are no relative costs and benefits from adopting one of the management alternatives described above.

We can also examine in a general way the cases where price and/or supply changes. If there are no price effects yet supply increases, consumers benefit. If prices do not change but supply decreases consumers experience a net loss. If a supply decrease leads to an increase in the retail price consumers will experience a larger loss. If prices decline because of increased supply consumers gain. The magnitude of the gains and losses will depend on the magnitude of the price change, the quantity change, and the shape of the demand relationship. Without consumer demand models these effects cannot be quantified.

#### 4.3.5 Redistribution of costs and benefits.

This section is a summary of the preceding discussion on how the proposed regulations will impact the fishery sector, the consumer, and how the proposed management strategies will effect reporting, administrative, information and enforcement costs. The perspective of the summary is how costs and benefits will be redistributed, that is, who are the gainers and who are the losers. Section 5.3.6 will present an overall summary of the cost - benefit result; the net benefits of each alternative and how those five net benefits stand in relation to one another.

Under alternative 2 (PSC limits) most of the fishery costs relate to a loss of exvessel revenue due to restrictions on harvesting groundfish. The groundfish fishermen are therefore the losers. The gainers are the harvesters of halibut, king crab, Tanner crab, and salmon since under this management regime they gain some amount of the bycatch not taken. The amount actually received in the traditional fisheries will depend on the fate of the prohibited species thrown overboard by the groundfish harvesters. Environmental factors and other sources of mortality may play a role in the ultimate benefits.

It is unclear whether the consumers of these products will experience a net benefit or loss. In general it is unlikely that the consumer will be significantly affected, but the correct answer will very much depend on the particular fishery and the exact level of the PSC limit chosen.

The fishery managers, that is, the government, also stand to lose under this alternative as administration will require an observer program (if DAP is included) and because management and information costs can be expected to increase.

Alternatives 3 and 4 (retainable bycatch limits) will lead to the same kind of redistribution as for alternative 2. In particular, the groundfish fisheries will lose but their loss will be mitigated by the potential income gained from selling the retained bycatch. The traditional harvesters will gain exactly as in alternative 2, that is, in proportion to the "saved" halibut, king crab, Tanner crab, and salmon. Consumers may gain or lose depending on the particular numbers chosen. Those net losses or benefits are expected to be small.

If the fees collected under alternative 4 are transferred to the harvesters of halibut, king crab, Tanner crab, and salmon these fishermen will realize greater net benefits. If the fees revert to the general fund then the government gains. This may offset the loss due to enforcement, information and administrative costs. If alternative 5 is chosen there will be a net transfer to the fishermen assigned the right to retain the bycatch.

Under alternatives 5 and 6 losses will be borne by the groundfish harvesters and benefits received by the harvesters of halibut, king crab, Tanner crab, and salmon. The losses in the groundfish fisheries will be exacerbated by higher operational costs due to restricted ability to choose the best way to avoid the prohibited species. If measures 5 or 6 are effective in reducing onbottom mortality then the traditional fisheries will experience further gains.

#### 4.3.6 Benefit-cost conclusion.

It is difficult to compare net benefits and costs for alternatives whose costs and benefits have not been fully quantified. We can, however, draw the following conclusions:

- (1) All alternatives are designed to reduce the catch of halibut, king crab, Tanner crab, and salmon by the Bering Sea DAP and JVP groundfish harvesters. All alternatives do this to varying degrees. All alternatives negatively impact the groundfish fisheries primarily through reduced exvessel revenues and secondarily through increased costs. All alternatives positively impact the traditional fisheries for halibut, king crab, Tanner crab, and salmon by increasing the future availability of legal size animals. All alternatives imply increases in administrative, enforcement and information costs and possibly increases in reporting costs.
- (2) The first three alternatives involve catch quotas for halibut, king crab, Tanner crab, and salmon. Regardless of the retainability of the catch an observer program will be necessary. This is likely to very expensive. Alternatives 5 and 6 are indirect measures and as such are subject to the possibility of inaccuracy. The indirect measures may be simpler to implement and cheaper to enforce. They will not require observers and they will raise the costs of operation for the groundfish fishermen.
- (3) Allowing retention of king crab, Tanner crab, and salmon will necessitate plan amendments to the Bering Sea FMP (outside of the PSC section) and plan amendments to the king crab, Tanner crab, and possibly troll salmon FMPs. Retention of halibut and salmon will require arrangement with the IPHC and with ADF&G. These administrative changes may be costly.

- (4) All alternatives (except establishing an arbitrary set of PSCs) will increase information costs. A fully frameworked approach to establishing PSCs and fee setting (alternative 5) will have the highest information costs. The benefit of increased information is the increased likelihood of establishing the set of controls which maximizes the overall benefits to the fishery (the groundfish fishery and the traditional fisheries) and to the nation.
- (5) There is nothing to preclude management by using combinations of the five alternatives. Thus, it may be possible to maximize the advantages and minimize the disadvantage of the single management approach. An example is control of the prohibited species catch with PSCs (overall caps) and protection of certain smaller areas by time and area closures. It is also possible to require gear restriction in time/area windows. One combined approach worthy of consideration is establishing PSCs but giving individual vessels the right to that PSC. Prohibited species quotas could then be bought and sold by the groundfish harvesters and the legal and administrative difficulties associated with retention avoided.

We may attempt to rank the alternatives as follows:

Benefits. Benefits are gained by the harvesters of halibut, king crab, Tanner crab, and salmon. As the level of protection (lower PSC limit - lower retention quota) increases benefits increase. The alternatives would therefore be ranked according to the PSC limit or the retention quota and would not be specific to the alternative chosen.

Costs. The same is true for fishery costs since the greater the level of protection afforded to halibut, king crab, Tanner crab, and salmon the greater the costs to the groundfish fisheries. Note that costs to the groundfish fisheries could considerably exceed the benefits to the traditional fisheries. This ranking is not alternative specific.

Administrative, enforcement, and information costs are likely to be least for the indirect regulation methods (time/area closures and gear restrictions); intermediate for alternatives which require considerable information; and highest for alternatives which require observers (certainly alternative 2, perhaps alternatives 3 and 4).

4.4 Other E.O. 12291 Requirements

4.5 Impacts of the Rule Relative to the Regulatory Flexibility Act



## 5.0 ENVIRONMENTAL AND REGULATORY ANALYSIS OF RULE 4: ESTABLISH MEASURES TO LIMIT BYCATCHES OF FULLY U.S.-UTILIZED SPECIES BY DAP, JVP AND TALFF FISHERMEN

### 5.1 Introduction

#### BACKGROUND

A definition of fully U.S.-utilized species (fully utilized) is not available in the Magnuson Fishery Conservation and Management Act (MFCMA) or the Fishery Management Plan for the Bering Sea/Aleutian Island Area (FMP). A fully utilized species is one where the Domestic Annual Processing (DAP) is greater than or equal to the Total Allowable Catch (TAC) within a particular management area. Three species in the Bering Sea/Aleutian Islands FMP are fully utilized by DAP fishermen: Pacific ocean perch (POP), rockfish, and sablefish. All three of these species have separate TACs for the Aleutian Islands and Bering Sea subareas. Atka mackerel, which does not have separate TACs for those areas, is fully utilized by JVP.

The current implementing regulations of the Bering Sea FMP do not provide mechanisms to prevent the closure of other directed fisheries by a single species reaching its TAC. This problem is addressed in a Secretarial Regulatory Amendment (in preparation) which will allow the Regional Director (RD) of NMFS to close directed fishing within an area on a species by species basis. This amendment will be used as a basis for regulatory action regarding target species and for management of the DAP fisheries in the Bering Sea. However, a procedure must be established to account for fully utilized species caught incidentally in other target fisheries. Limitation of bycatches in other fisheries is the motivation of these proposals.

The Council has in recent years allocated small amounts of fully utilized species to JVP and TALFF for bycatch purposes. The intention has been to allow the fisheries to be prosecuted by allowing a small amount of fully utilized species to be taken. Under the status quo, when DAP has harvested their full allocation they may begin fishing out of the remaining JVP and TALFF allocations. All fisheries are then shut down when the TAC is reached. Amendment 1 to the FMP established a nonspecies-specific reserve which is apportioned during the fishing year. At the beginning of the fishing year 15% of each species' TAC is placed in that reserve. The apportionments are made so as to prevent fishery closures. Even though the reserves are taken from each species at a fixed percentage, they may be apportioned in "amounts and by species that are determined to be appropriate". This reserve is used for: "(a) unexpected expansion of the domestic fishery, (b) correction of operational problems of the fishing fleet, (c) unexpected adjustments of species TAC's according to the condition of stocks during the fishing year, and (d) apportionments". Also, the Regional Director may apportion to TALFF any portion of DAH or of the reserve that will not be harvested by the United States unless it is determined that reserves are to be withheld for conservation reasons.

Sablefish became fully utilized in 1985 when the Regional Director determined that the 2,625 mt TAC would be harvested by September 4. The RD then issued a notice of closure prohibiting all fishing in the Bering Sea subarea in any waters deeper than 200 fathoms. NMFS had projected a catch of 3,000 mt of

sablefish in the Bering Sea area, 375 mt over the TAC. In considering the closure, NMFS noted that the 1985 Resource Assessment Document (RAD) set Equilibrium Yield (EY) at 2,600 mt, 25 mt less than TAC. NMFS therefore felt that it would not be appropriate to apportion any of the reserve to the sablefish TAC.

However, when the draft 1986 RAD became available in July, it estimated an EY of 3,000 mt. In addition, NMFS discovered that their projections of catch differed from the actual catch. Their projection of 3,000 mt was 440 mt greater than the actual harvest of 2560 mt. For these reasons the RD felt that an apportionment of 200 mt from the reserves was warranted. This apportionment was made on October 24 and fishing in waters deeper than 200 fathoms was reopened and the closure rescinded. NMFS indicated that this amount would be sufficient for bycatch purposes for the remainder of the year. They did not however, prohibit targeting for sablefish. Those vessels which targeted on sablefish felt that the action was unfair in that fish were allocated to other fisheries.

#### ALTERNATIVES

Alternative 1: (Status Quo) In the status quo, once the TAC of a fully utilized species is taken, any fishing which would likely take even one fish of the species in question would not be allowed. Prior to the beginning of each season the following allocations are made:

- (1) DAP is apportioned all but a small amount of the TAC. Once that is taken, the DAP fishermen can fish out of any retainable balance in TALFF. If TALFF is used up they may fish out of the JVP allocation. If DAP takes the full amount of the TAC all fishing is shut down.
- (2) JVP is apportioned a small amount of the TAC for bycatch. Once that is taken JVP may fish out of any retainable balance in TALFF. Once that is taken they are shut down.
- (3) TALFF is apportioned a small amount of the TAC for bycatch. Once that is taken all TALFF fishing which would take the fully utilized species is not allowed.

Alternative 2: Allow the Secretary of Commerce to close a single species fishery and allow directed fishing for other species to continue. The fully utilized species would then become a prohibited species.

This alternative would authorize the Secretary of Commerce to allow continued fishing for other species in a regulatory area or district when the TAC of any fully utilized species has been reached. This is done when the Regional Director determines that the resulting mortality inflicted on the species for which the TAC had been reached, would constitute overfishing. The species subsequently becomes prohibited. It is important to note that no quantity specific limits are set, rather closures are determined by the Regional Director in season.

A critical part of this alternative is the term overfishing. The definition (602.2(b)(1) 50 CFR) states: "Overfishing is a level of fishing that results in a reduction in the capacity of a management unit to produce maximum

biological yield on a sustained basis for specified habitat and environmental conditions". This definition may not be operational as threshold concepts are poorly understood and little quantified. In practice, NMFS has been using EY as a definition of overfishing. EY is defined as " the annual or seasonal harvest which allows the stock to be maintained at approximately the same level of abundance (apart from the effects of environmental variation) in successive seasons or years".

Alternative 3: Establish PSC limits for all fully U.S.-utilized species for all fisheries.

This alternative differs from alternative 1 in two aspects. First, JVP and TALFF fisheries do not receive allocations from the TACs of fully utilized species, thus they never retain any of their bycatch. They would be provided PSC limits and when those are taken, all JVP and TALFF fishing would be closed. The PSC limits would be set by the Council during the apportionment process and could be set via a frameworked procedure.

Alternative 4: Establish harvest limits for fully utilized species in the JVP, TALFF, and DAP fisheries. Catches of those fully utilized species would be retainable.

This alternative permits retention of the allocated amount of the fully utilized species. The Regional Director may control targeting by (1) prohibiting any directed fishing for the species when some specified portion of the TAC is taken (e.g. 80%), (2) prohibiting, by specified gear groups, any directed fishing for the species at any time. A directed fishery for a species is said to occur when the landings of the species constitute 20% or more of the total landings (by weight) (Amendment 9).

Alternative 5: Establish harvest limits for fully utilized species in the JVP, TALFF, and DAP fisheries. Catches of these fully utilized species would be retainable and assigned to individual vessels or companies, and would be transferable.

Under this alternative, rights to a retainable amount of bycatch are assigned to individual vessels or companies. The rights are transferable which means that the quotas may be purchased or sold by those individual operations. Therefore, if a vessel or company had harvested its quota it could purchase the rights to further bycatch from an operation that had not harvested its amounts. Under current regulations it is not possible to guarantee JVP and TALFF retainable allocations once DAP vessels take their quota.

Alternative 6: Establish harvest limits for fully utilized species in the JVP, TALFF, and DAP fisheries. Catches of these fully utilized species would be retainable but the vessel would be assessed a fee in proportion to the value of that catch.

This alternative would provide allocations rather than PSC limits to the bycatch fisheries but, rather than allowing those fisheries to profit from those bycatches, vessels would be assessed a fee to remove the incentive for targeting.

## 5.2 Environmental Impacts

The environmental impacts of limiting bycatches of fully U.S.-utilized fish species by fisheries targeting on other species are expected to be negligible but positive. The total catch of each species is controlled by the existing FMP and implementing regulations and is not expected to change. The new regulations will provide for taking into account the total fishing mortality rather than only that portion which is actually retained by fishermen and processors. No increased direct stress to marine mammals and birds is expected for any of the alternatives. No changes in the effects on endangered species or the coastal zone are expected. This rule is primarily allocational in nature and is considered in greater detail in the Regulatory Impact section.

## 5.3 Regulatory Impacts

### 5.3.1 Fishery costs and benefits.

Costs and benefits are defined as in Chapter 4.3.1. Also, as in Chapter 4, the harvesting, processing, wholesaling, and retailing sectors are examined as part of the fisheries sector. Lastly, relative cost and benefit changes rather than absolute costs and benefits are analyzed.

## GROUND FISH HARVESTERS AND PROCESSORS

### Alternative 1: (Status Quo)

In 1985 the Regional Director closed sablefish fishing in all waters of depths greater than 200 fathoms to avoid shutting down all fisheries in the Bering Sea, but later cited the increased sablefish EY in the draft 1986 RAD as justification in apportioning 200 mt of sablefish out of the reserve. This management action prevented some fisheries from being shut down. If strictly interpreted, any fisheries that would remove a sablefish would be closed. This would have changed the status quo in the 1985 fishery by closing all fishing in the Bering Sea on September 4 for the remainder of the year. Fishing in the Aleutian Islands would have remained open since the TAC of sablefish was not reached in that area. An argument may be made that fishing in the Aleutians eventually would have been shut down since redistribution of effort into the Aleutians would cause an earlier harvest of the fully utilized species. The reasons for not considering that possibility are in the next section.

Costs to groundfish harvesters - operational. Removal of all effort in the Bering Sea would have caused a redistribution into the areas still open, most likely the Aleutian Island subarea. This redistribution of effort would have caused more crowding in a smaller area and thus changes in fishing patterns. The vessels may experience increased gear conflicts, increased running time searching unfamiliar or less productive grounds, and lower CPUEs which will translate into higher average costs.

The amount of effort redistributed is impossible to predict without knowledge of the cost functions of the individual vessels and the extent redistribution would increase costs. The decision to quit fishing or move to an open area is

dependent on whether or not the vessel could at least cover fixed costs. If the vessel operator cannot cover these costs, he or she would be better off shutting down.

Costs to groundfish harvesters - revenues. It is possible to estimate the costs in terms of lost revenue assuming that the Bering Sea was closed on September 4, 1985. Since there probably was some redistribution of effort when the fishing beyond the 200 fathom line was closed between September 4 and October 24, the foregone catch from that redistribution will not be reflected in the 1985 PACFIN statistics. Therefore this estimate may understate the impact of the hypothetical complete closure.

The revenue lost due to a total closure of the Bering Sea area is given in Table 5.1. Prices used are annual average DAP prices by species from the February PACFIN report. We chose not to use the monthly values due to large monthly variations as reports were revised. JVP prices are as reported by the Regional Office of NMFS in their survey (Smoker, personal communication). Because 1985 JVP sablefish prices are not available, and since the JV apportionments of the fully utilized species go to foreign vessels, we used foreign exvessel sablefish prices as reported by NMFS in the 1986 foreign fees notice. These foreign fee schedule values were also used to estimate foreign values.

Table 5.1 Losses in Income From a September-December Closure of the Bering Sea.

JVP	\$ 13,390,000
DAP	\$ 2,736,000
TALFF	\$ 75,892,000

If current trends continue more species will become fully utilized. As this occurs, the issue will change from TALFF - DAP allocation decisions to allocations between domestic user groups. In the short term, however, an increased number of fully utilized species increases the chances of earlier closures and hence, implies that there may be additional revenue losses in future years should the status quo alternative remain in effect.

Benefits to harvesters from decreased operational costs. We might expect that there would be some benefit in future years to the owners of vessels who target on the fully utilized species. By protecting those species in current years, those species will enjoy greater future abundance. This greater abundance should translate into higher CPUEs and lower operating costs due to less time searching for fish and less effort needed to harvest the quota.

Benefits to harvesters from increased revenues. There would be no increased revenue in the current year since the fishing season would be closed to both the bycatch fisheries and the directed fisheries. There would be, however, increased revenue from catches of the fully utilized species in future years. We would expect an increase in the future biomass due to decreased fishing mortality in the current year. The fully utilized species that were not harvested due to the closure in 1985 were: 676 mt of sablefish, 151 mt of POP, and 29 mt of rockfish. To obtain the present value of these future

catches we need estimates of bycatch mortality, annual natural mortality, future recruitment based on the above quantities and, an appropriate discount rate. Future management decisions will also impact the future harvests. Lacking this information, we use current exvessel value as a proxy. The values corresponding to the above quantities are: sablefish - \$ 850,000, rockfish - \$18,000, and POP - \$ 43,000.

Increased benefits to processors from increased revenues. An increase in production by the processors of fully utilized species would occur if there were increased amounts available for harvest in future years.

Costs to processors from decreased revenue. The cost to processors would be the lost profit from the unharvested fish. We are unable to provide an estimate of that profit without reliable wholesale prices and cost information from processors.

Alternative 2: Allow the Secretary of Commerce to close a single species fishery and allow directed fishing for other species to continue. The fully utilized species would then become a prohibited species.

This alternative would authorize the Secretary to allow continued fishing for other species in a regulatory area or district when the optimum yield of any species has been reached, if the Director, Alaska Region, NMFS, determines that the resulting mortality inflicted on the species for which the TAC had been reached would not constitute overfishing. The species for which the TAC had been reached would then become a prohibited species.

Costs to the harvesting sector The main determinant to the costs to the harvesting sector is the decision by the RD of whether or not to shut down fisheries that are taking fully utilized species as bycatch. This in turn is dependent upon which definition of overfishing the RD uses. If he were to use the threshold definition it is extremely difficult to estimate which fisheries would be shut down and the costs which would occur. We can analyze two extremes using data from the 1985 fishery. If, given the threshold definition, any of the removal which occurred after September 1 would have caused overfishing, the results would be identical to the status quo. This would not, however, be expected to occur. In fact, if the threshold approach were used, it may well be that none of the fisheries in the 1985 fishery would have been shut down. In this case, the costs and benefits would be exactly the inverse from the status quo scenario. The catch of groundfish by the bycatch fisheries would be a benefit. However, the catch of sablefish by foreign fleets would still represent a cost to the U.S. fleet. In 1985 this totalled \$264,000 at DAP prices. This is the total bycatch of fully utilized species by the foreign fleets between September and December multiplied by the DAP prices. This assumes no decrease in price resulting from the increased quantities.

The Regional office of NMFS has been using EY as the point at which, if harvest exceeded, overfishing would have occurred. Under this definition, and given the 1985 RAD EY of 2,600 mt, all fishing should have ceased in early September and the status quo costs and benefits again would result (Table 5.1).

Benefits to the Harvesting sector Again, the benefits derived would depend upon which definition of overfishing is used and to what extent it is used. Under the threshold definition the benefits would range from the harvest value of the nondirected DAP and JVP fisheries catch (\$16 million) to the exvessel value of the fully utilized species (\$911,000) by the directed fisheries.

Alternative 3: Establish PSC limits for all fully U.S.-utilized species for all fisheries.

TALFF and JVP fisheries do not receive allocations from the TACs of fully utilized species, thus they never retain any of their bycatch. JVP and TALFF fisheries would have PSC caps that, when exceeded, would shut them down. DAP fisheries would be able to land sablefish up to the point TAC is taken. After that time the DAP fisheries taking that fully utilized species as a bycatch would be apportioned PSC limits.

Costs to groundfish harvesters In analyzing this alternative, we note that for the JVP fisheries, the regime differs from the status quo alternative of receiving apportionments that can be landed and sold. They now receive PSC limits that must be discarded. This is a cost to the joint venture fishermen which will decrease their revenue. Again, we do not have reasonable cost functions to estimate profits, therefore we are limited to estimating the change in revenue resulting from the PSC limit. This will be an overestimate of the costs incurred by the JVP fishermen.

In 1985 the species fully utilized by DAP are rockfish, POP, and sablefish. The loss of revenue to the joint venture fisheries totals approximately \$ 153,400. This assumes that the PSC limit equals their 1985 apportionment. If the PSC limit were less than the 1985 apportionment, and if the fisheries did nothing to decrease their catch of the bycatch species, they would be shut down earlier and lose a portion of their income from their directed harvest. This is not likely since they do not profit from harvesting the fully utilized species.

DAP fishermen that harvest the fully utilized species as bycatch would incur no cost associated with this management alternative. DAP fishermen who target on the fully utilized species would be harmed to the extent that the DAP fishermen who take the fully utilized species as bycatch are given a PSC limit above and beyond what they may catch in the status quo. This allocation will remove a portion of the fully utilized species' TAC and, with a mortality rate of 100%, would decrease the revenue for fishermen who target on that fully utilized species. The direct loss is due to the killing of fish and the indirect loss is due to lost reproduction potential.

Benefits to the harvesting sector The JVP fishermen would benefit from this regime under one possible scenario, namely, if the PSC limit were so high that the joint venture vessels could harvest enough additional groundfish to make up for the lost revenue from having to discard the fully utilized species.

DAP fishermen who take the fully utilized species as bycatch would benefit from this proposed action by continuing fishing after the TACs for those fully utilized species were taken. The extent of that additional fishing would depend upon the amount of the PSC limit provided. The fishermen who target on the fully utilized species would also receive a benefit from this management

action. There are few, if any, fishermen in the Bering Sea who harvest only one of the fully utilized species and then cease fishing. By receiving PSC limits, these fishermen could continue to fish other target fisheries when the TAC of a fully utilized species is taken. For example, a fisherman targeting on sablefish would have to fish elsewhere if he wanted to continue fishing when the TAC of sablefish were reached. Under this alternative, he could fish for Pacific cod or some other longline species in the Bering Sea up until the PSC limit for sablefish was reached.

Costs and benefits to processors. Processors net income will be affected by the changes in the amount of DAP harvested. As DAP increases, domestic processors should generally be better off. Under this regime, there will be an increase in domestic processing, but processors could receive less of the fully utilized species in the future. We would expect the costs and benefits to be unevenly distributed. Even though many companies process all groundfish species there are some companies which specialize in the processing of certain fully utilized species and some which primarily process the nonfully utilized species. Therefore, regulations which benefit the expanding fisheries over the fully utilized species, or vice-versa, will unevenly impact the processing sector.

Alternative 4: Establish harvest limits for fully utilized species in the JVP, TALFF, and DAP fisheries. Catches of those fully utilized species would be retainable.

This alternative allows the retention of bycatch species with the RD prohibiting directed fishing on the fully utilized species by any or all gear types.

The cause for concern in allowing the bycatch fisheries to sell the bycatch they take is that the individual owner/operator of the vessel may find he would be better off by targeting on the bycatch fishery if he is allowed to sell the product. This has the unwanted result of shutting down the rest of the fishermen in that category or area prematurely even though they may not be targeting on the bycatch species. If this were to take place the fisheries that take a bycatch could be worse off than if under the status quo which allows them to sell thier bycatch.

Thus, the Council may find it advantageous to regulate the fishery such that targeting on the fully utilized species is prohibited (or not profitable). In order to prevent directed fishing the RD may prohibit directed fishing for a specific segment of the industry once the harvest reaches a specified level. He would use the definition of directed fishing found in Amendment 9 of the Plan which states: " with respect to any species, stock, or other aggregation of fish, directed fishing means fishing that is intended or can reasonably be expected to result in the catching, taking or harvesting of quantities of such fish and amount to 20% or more of of the catch, take, or harvest, or to 20% or more of the total amount of fish or fish products on board at any time. It will be a rebuttable presumption that, when any species, stock, or other aggregation of fish comprises 20% or more of the catch, take, or harvest, or 20% or more of the total amount of fish or fish on board at any time, such fishing was directed fishing for such fish." The Secretary could thus close directed fishing for any particular gear group(s) for the entire season. The Council may instead choose to prohibit directed fishing by those groups at



some point prior to the full attainment of the TAC to assure that an adequate amount of bycatch of the fully utilized species remains. The fully utilized species must constitute less than 20% of the total landings by weight. Once the TAC were taken all fishing would close.

This management measure will set some level of directed fishery catch that is less than a mortality which the Council feels is acceptable given consideration of biological and socioeconomic factors. The difference between this acceptable mortality and the directed quota is that amount of the mortality which is apportioned for bycatch purposes. This bycatch may be retained. In the DAP operations, the bycatch total will be added to the target quota and would be the DAP apportionment.

Operational costs to harvesters. It is important to remember that this alternative allocates fish to the bycatch fisheries from the directed fisheries. This allocation, if greater than the apportionments that are currently made, will be a cost imposed on the domestic fleet. If the allocation is less than the current allocation, the regulation will provide a benefit to the directed DAP fishery.

This alternative should tend to lengthen the season and prevent the possibility of several vessels' directed fishing on fully utilized species from shutting down those fishermen who are taking only a bycatch.

Costs to harvesters from decreased revenue. In the status quo, the DAP and JVP fisheries receive allocations out of the TAC. This regulation would do the same. However, there would now be a regulation in place which would prevent any of the vessels from landing or having on board any regulated species comprising over 20% of the total. Currently there is no regulation which prevents directed fishing by any gear groups.

If this regulation were to be applied to the DAP fisheries which take fully utilized species as bycatch, it would allocate a species to a specific gear group. The extent of that allocation would depend upon when the mechanism which prohibits directed fishing is initiated. If it is in effect for the entire season, that allocation could be substantial. If, however, it were not to take effect until 80 or 90% of the TAC or DAP were taken its effect would not be as significant. Whatever the range of the effect, it would constitute an allocation away from, and a cost to, the DAP fisheries which take the fully utilized species as bycatch.

Benefits to the harvesters due to decrease operational costs. We expect no benefit to harvesters from decreased operational costs under this alternative.

Benefits to harvesters from increased revenue. If the allocations to foreign and joint venture fishermen were greater than the status quo allocations then we would expect that those fishermen would be better off. In addition, if the prohibition of directed fishing were to prevent fisheries from being shut down prematurely, increased revenue equivalent to the value of the additional catch would result.

We would anticipate a benefit accruing to the DAP fisheries which target on the fully utilized species if the allocation to the bycatch fisheries is less than what occurs under the status quo. In addition, they would also receive

increased income from the additional catch due to the prohibition of targeting by DAP bycatch fisheries. By slowing the rate of harvest of the bycatch fisheries, the season's length should be extended. This would provide the DAP target fisheries with the opportunity to fish additional days and thus take increased quantities of the fully utilized species providing any remains in the JVP or TALFF apportionments.

Benefits to processors. The processors which are engaged in processing of the fully utilized species would realize increased quantities of fish and thus increased revenue and presumably, increased profits. Also, if the prohibition of directed fishing on fully utilized species by certain fishermen resulted in increased landings of the other groundfish species, we would expect additional profits to result.

Costs to processors. Individual processors may experience gains and losses as a result of reallocation of groundfish. It is likely that certain processors would receive additional product at the expense of other processors. This may not be a cost to the nation, but is a cost to the individual company.

Alternative 5: Establish harvest limits for fully utilized species in the JVP, TALFF, and DAP fisheries. Catches of the fully utilized species would be retainable and assigned to individual vessels or companies, and would be transferable.

This alternative provides harvest allocations to DAP operations which take fully utilized species as bycatch. These allocations or quotas would be assigned by vessel or company and would be transferable.

This is another method of addressing the bycatch of fully utilized species by apportioning retainable limits to DAP bycatch fisheries. In this alternative, however, the limits are apportioned to an individual entity rather than distributed as a pool. The rights to that quota accrue to the company that receives it. These rights then are transferable.

Many of the effects of retention are the same in this alternative as any alternative that allows retention. This alternative however, allows market forces to determine the quota prices. This gives the fisherman the option to sell or retain their quota, depending on the market price for quotas and the vessels' individual cost structure. Under current regulations it is not possible to guarantee JVP and TALFF allocations once DAP is taken.

Benefits and costs to harvesters. Costs in addition to those in other retainable quota alternatives would be those costs borne by vessels that purchase additional shares of bycatch. However, we would assume that individuals would not purchase shares at a given price unless the revenue earned from that purchase is expected to more than offset the cost. The costs involved in the purchase of those individual quotas includes not only their price, but the transaction costs as well. In a market where new demand for shares could occur daily those transaction costs could be prohibitive.

Benefits and costs to processors. We do not anticipate any impact on domestic processors if the total allocation to DAP does not change.

Alternative 6: Establish harvest limits for fully utilized species in the JVP, TALFF, and DAP fisheries. Catches of these fully utilized species would be retainable but the vessel would be assessed a fee in proportion to the value of that catch.

Harvest allocations to JVP, TALFF, and DAP operations which take fully utilized species as bycatch are assessed a fee for that bycatch.

The Secretary could also limit directed fishing by those vessels which take the fully utilized species as a bycatch by assigning a fee which would comprise some proportion of the value of that fish to that vessel. The correct amount of the fee charged to induce the fishermen to harvest and land the fish but not target on it is difficult to calculate. We do not have the necessary cost information. Each vessel's costs are different so that a different fee for each vessel would (in principle) be required. An excessive fee would simply induce the fisherman to discard the fish rather than bother with its handling. Too small a fee, on the other hand, will not prevent targeting.

There is also a problem in the distribution of fees which are received from the sale of these fully utilized species. NOAA General Counsel has indicated that fees collected could not be distributed to reimburse the directed fisheries of those fully utilized species, nor could they be used by NMFS for research or management.

Operational costs to harvesters. We do not anticipate any changes in operational costs of harvester from this alternative.

Costs to harvesters from lower revenue The DAP fishermen who were previously allowed to harvest and sell the fish without having to pay a fee will experience decreased revenue equivalent to that fee or greater. If the fee is sufficiently low to induce the fishermen to retain their catch, the loss in revenue will be mitigated by that value. These fishermen are experiencing further reductions in revenue since they now have limits on species of fish they were previously allowed access up to the TAC.

Benefits to harvesters from decreased operational costs. DAP vessels which would be constrained by limits on fully utilized species would experience increased operating costs by having to avoid those species once their allocation is taken.

Benefits to harvesters from increased revenue We would expect that DAP vessels which are able to continue harvesting fully utilized species would experience increased earnings due to the receipt of fish that were previously harvested by other DAP vessels. This assumes, of course, that the limits placed on those fisheries are less than their historical harvest.

Benefits and costs to processors. There may be a redistribution of income in the processing sector. Those processors that purchased product from the DAP vessels which are now under limits may experience reductions in quantity. These quantities would be processed by those who buy from the DAP vessels that are still allowed to target. However, an excessive fee could cause discarding and losses to the processors in future years.

5.3.2 Reporting costs.

Section 4.3.2 of this document discusses the potential reporting costs of the alternatives which limit PSC harvests by groundfish fisheries. The effects of the five alternatives which address the bycatch of fully utilized species on reporting requirements are not substantially different than the impacts discussed in 4.3.2. We therefore refer you to that section for its conclusions.

5.3.3 Administrative, enforcement and information costs and benefits.

(See Section 4.3.2 for definitions of these costs.)

ADMINISTRATION COSTS

The main difference in the administration of alternative 3 and alternative 2 is that in alternative 2, there is no PSC limit. There is instead an in season determination made whether or not a particular fishery, if it were allowed to continue, would cause overfishing of a fully utilized species. There is no specified limit of bycatch. In alternative 3, some method for determining these PSC limits is necessary. Presumably, the Council would make its recommendations to the RD before the beginning of the fishing year. The Council may wish to framework these decisions in order to make timely decisions for the following year's fishery. Alternative 3 will therefore increase the time and thus cost of the Council's decision making process. This may be offset however, by a more rational decision in closing or allowing fisheries to remain open. Rather than using " overfishing " as the determination to close a fishery, this method incorporates a variety of biological and socioeconomic information to determine the closure.

The individual bycatch quota system in alternative 5 would require substantial effort to develop. A great number of questions about the details of the system that need to be addressed. For example, there may be a maximum number of quotas that any one entity may possess or some limitations on what type of entity would receive the quotas: individual vessels, JV companies, or nations.

In those alternatives which require observers on domestic vessels, the government would need to cover the costs if the full cost of observer coverage is not passed on to the vessel owners. Funding for this type of enforcement coverage may be difficult to obtain in light of current budget problems.

Increased enforcement would be necessary for alternative 5 to prevent vessels from dumping bycatch species overboard once their quota was obtained. This observer coverage may be unlikely given budget constraints.

INFORMATION COSTS

There would be a significant increase in management costs under alternative 6. In setting the fee, considerable research would need to be done to arrive at the correct amount. This would require considerable research into the cost structure of those vessels. These procedures would probably need to be

performed annually. Even then the calculated amount would be an average figure, that is, some high cost vessels would still find it preferable to discard the fully utilized species.

In frameworking either the PSC limits in alternative 3 or any retainable limits in the other alternatives, the Council's recommendations may be based on the following types of information:

- (1) estimated changes in the biomass and stock condition of each bycatch species or species group;
- (2) potential impact on bycatch species stocks;
- (3) potential impacts on domestic fisheries for the bycatch species;
- (4) estimated incidental catch in years prior to that for which PSC or retainable limits are being set;
- (5) expected change in groundfish catch;
- (6) estimated change in groundfish biomass;
- (7) methods available to reduce incidental catch;
- (8) the cost of reducing incidental catch; and
- (9) other biological and socioeconomic factors that affect the appropriateness of specific bycatch measures in terms of FMP objectives.

#### 5.3.4 Costs and benefits to consumers.

(See Section 4.3.4.)

#### 5.3.5 Redistribution of costs and benefits.

It may be useful to begin with a hypothesis as to what may happen under continued status quo management. In general, the losers would be those JVP, TALFF and DAP fishermen who take the fully utilized species as bycatch. If the Bering Sea would have been closed after September 4, 1985, the savings to DAP fishermen would have been an exvessel value of \$ 911,000. The foregone exvessel value of nonfully utilized species in DAH fisheries would have been just over \$16,000,000.

As more species become fully utilized the issue will shift to one of allocations between domestic gear groups. Also, as domestic effort continues expanding, earlier closures will likely result.

In alternative 2, the sectors made worse off and those made better off depend again on the RD's interpretation of overfishing. If all fisheries were shut down, as in the EY approach, those made worse off would still be the fisheries which take fully utilized species as bycatch. If, on the other hand, the removals were not seen to cause overfishing, then those harmed would be the directed fisheries of the fully utilized species.

The final outcome of distribution of costs and benefits from alternative 3 depends upon the framework used by the Council and how it weighs the information incorporated in those frameworked decisions. Compared to the status quo, the fishermen who currently target on the fully utilized species will be made somewhat worse off because prohibited species limits beyond what is allowed in the status quo are now occurring. This will be mitigated by the fact that those same fisheries will be allowed to fish for their other target

fisheries after their fully utilized target species' TACs have been reached. Joint venture and DAP vessels are now given PSC limits. One should remember that in the status quo, they could retain a certain apportionment out of the TAC. In this alternative, the limits must be discarded. If the PSC limits are less than or equal to what they could have received as a retainable apportionment, then they may actually be worse off. However, if designating the bycatch as a prohibited species prevents targeting by some vessels and thus increased harvest of their target species, the comparison of the value of the increased harvest and the value of the now discarded fully utilized species will determine whether the fleet is worse off.

We should note the changes in benefits and costs of alternative 3 from alternative 2. In alternative 2, the apportionments to JVP were retained by the JVP fishermen. At the point where TAC is reached, the bycatch species is designated as a prohibited species, but no specific limit is placed on the bycatch fisheries other than not allowing "overfishing" to occur. It is assumed that the limit would be less than or equal to that amount of bycatch which would cause overfishing. In all likelihood, the joint venture fleet will be more constrained by an absolute cap and would thus be worse off under this alternative than alternative 2. The same general argument applies to the DAP fishermen who take the prohibited species as bycatch. In alternative 2 they would also be subject to the same criteria as the joint venture fleet. Under this alternative, they too are under a PSC limit and will probably be worse off under alternative 3 than alternative 2.

The redistribution of costs and benefits from alternative 4 will be similar to that of alternative 3 with additional income going to bycatch fishermen from selling their bycatch. The bycatch fisheries may be harmed, however, if the provision to prohibit directed fishing fails to prevent an early closure due to increased landings of the bycatch species. If the provision does prevent directed fishing, these fishermen will realize revenue from both the sale of fully utilized species and the additional nonfully utilized species' catch. The remaining DAP fishermen who are able to target on the fully utilized species should not be affected if the allocations to the "other" fisheries remain stable. If DAP bycatch fishermen are included with those that are now limited as to their bycatch, the DAP fishermen who are still allowed to target on the fully utilized species will be better off in that some DAP fisheries which were previously given free access are now limited in their harvests.

The overall effect of alternative 5 will be generally the same as alternative 4 if the allocations to the user groups do not change substantially. There would be a difference in the costs and benefits to those fisheries which are allocated individual quotas of bycatch. Under this alternative, the vessels which take very little bycatch will be able to continue fishing without "dirty" fishing vessels closing them down.

Alternative 6 will have much the same general effect as alternative 4 if the setting of fees limits directed fishing on fully utilized species. The fishermen that are limited as to their bycatch will be somewhat worse off than under alternative 4 by the amount of the total fee that they would have to pay. This represents lost revenue to these fishermen.

## 5.3.6 Benefit-cost conclusion.

Many of the effects of the proposed alternatives were not quantifiable. Therefore, comparisons of those effects are made more difficult. We are, however able to make the following conclusions:

- (1) Continued status quo management could result in considerable foregone harvests of nonfully utilized species.
- (2) The primary difference between alternatives 2 and 3 is that in alternative 3 the Council is able to utilize biological and socioeconomic information in recommending PSC limits. In alternative 2, there are no specified limits and the Regional Director is only authorized to close fisheries if overfishing may occur. The impacts of alternative 2 depends upon which definition of overfishing the Regional Director uses. If the threshold definition is used, it is not evident that allowing the removal of fish to the point of overfishing is desirable.
- (3) Any of the alternatives which provide retainable quotas of fully utilized species to JVP and TALFF will make those fisheries better off than if they were given nonretainable limits. This is conditioned on the fact that the mechanism used; fees, individual quotas, or a regulation which prohibits directed fishing, are effective in their ability to prevent a minority of vessels targeting on the fully utilized species and thus shutting down the entire fleet prematurely.
- (4) Any of the alternatives which place limits on DAP fisheries which take fully utilized species as bycatch, whether they are retainable or not, are constrained since those limits negate any possibility of directed fishing on that species in the future. If the bycatch is retainable, then some method to prevent targeting must be used. Observer coverage on DAP vessels may be cost prohibitive (see Table 4.10). Increases in current enforcement practices such as surveillance flights and boardings may not be adequate to insure compliance of the regulations.
- (5) Alternatives 3, 4, 5, and 6 will substantially increase information and management costs. Frameworking any of those three alternatives will require annual administrative attention, but will provide greater flexibility in management.

## 5.4 Other E.O. 12291 Requirements

## 5.5 Impacts of the Rule Relative to the Regulatory Flexibility Act

# DRAFT

## 6.0 ENVIRONMENTAL AND REGULATORY ANALYSIS OF RULE 5: ESTABLISH PRIORITY ACCESS TO IMPORTANT STOCKS FOR U.S. FISH PROCESSORS THROUGH THE USE OF TIME AND AREA CLOSURES

### 6.1 Introduction

### 6.2 Environmental Impacts

The environmental impacts of reallocating fish from foreign processors to domestic fish processors are expected to be negligible. No increased direct stress to marine mammals and birds is expected. No changes in the effects on endangered species or the coastal zone are expected. This issue is primarily allocational in nature and is considered in greater detail in the Regulatory Impact Review.



7.0 SUMMARY OF ENVIRONMENTAL IMPACTS

8.0 EXECUTIVE ORDER 12291 SUMMARY

9.0 REGULATORY FLEXIBILITY ACT SUMMARY

10.0 ENVIRONMENTAL EFFECTS ON ENDANGERED SPECIES AND ON THE ALASKA COASTAL ZONE

None of the alternatives for each management proposal would constitute actions that "may affect" endangered species or their habitat within the meaning of the regulations implementing Section 7 of the Endangered Species Act of 1973. Thus, consultation procedures under Section 7 on the proposed actions and their alternatives will not be necessary.

Also, for the reasons discussed above, each of the alternative management measures would be conducted in a manner consistent, to the maximum extent practicable, with the Alaska Coastal Zone Management Program within the meaning of Section 307(c)(1) of the Coastal Zone Management Act of 1972 and its implementing regulations.

11.0 FINDINGS OF NO SIGNIFICANT ENVIRONMENTAL IMPACT

For the reasons discussed above, it is hereby determined that neither approval nor implementation of any of the reasonable alternatives concerning the five topics presented would significantly affect the quality of the human environment, and that the preparation of an environmental impact statement on these actions is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations.

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Assistant Administrator for Fisheries, NOAA

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Date

## 12.0 COORDINATION WITH OTHERS

The following persons were consulted during the preparation of this environmental assessment: Ronald J. Berg, National Marine Fisheries Service, Alaska Region, Juneau, Alaska; Patrick J. Travers, Alaska Regional Counsel, NOAA, Juneau, Alaska; and Fritz Funk, Alaska Department of Fish and Game, Juneau, Alaska.

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## 15.0 APPENDICES

(See attached Appendix 1: Summary of Bering Sea/Aleutian Islands Groundfish Fishery Management Plan.)

(\*Revised 2/1/86)

SUMMARY  
OF  
BERING SEA/ALEUTIAN ISLANDS GROUND FISH  
FISHERY MANAGEMENT PLAN

DRAFT

The Bering Sea/Aleutian Islands Groundfish Fishery Management Plan was implemented on January 1, 1982 and has been amended several times. Though not all amendments have been implemented as final regulations, those passed by the Council to date are incorporated in this summary to reflect the North Pacific Fishery Management Council's most current management of the foreign and domestic groundfish fisheries in the Bering Sea and Aleutian Islands. A history of amendments is at the end of this summary.

BOUNDARIES AND REGULATORY AREAS

The plan encompasses the Fishery Conservation Zone (FCZ) in that portion of the North Pacific Ocean adjacent to the Aleutian Islands which is between 170°W and the U.S.-Russian Convention Line of 1867, and of the Eastern Bering Sea (Figure 1). The plan area is divided into two regulatory areas: (1) the Bering Sea composed of the FCZ portions of INPFC Fishing Areas I-III; and (2) the Aleutian Islands or INPFC Area IV (Figure 2).

PARTICIPANTS, STOCKS AND FISHING YEAR

The plan covers all foreign and domestic fisheries for all finfish and marine invertebrates except salmonids, shrimps, scallops, snails, king crab, Tanner crab, Dungeness crab, corals, surf clams, horsehair crab, lyre crab, Pacific halibut, and Pacific herring. Harvest allocations and management are based on the calendar year.

PLAN AND MANAGEMENT OBJECTIVES

Primary Plan Objectives:

1. Promote conservation while providing for optimum yield.
2. Promote efficient use of fishery resources but not solely for economic purposes.
3. Promote fair resource allocation without allowing excessive privileges.
4. Use best scientific data available.

Secondary Plan Objectives:

1. Conservation and management measures must be flexible enough to account for unpredictable variations in resource and industry.
2. Manage stocks throughout their range.
3. Promote rebuilding if stocks are less than Maximum Sustainable Yield.
4. Promote efficiency while avoiding disruption of existing social and economic structures.
5. Management measures should contain a safety margin in setting Acceptable Biological Catch using questionable data.
6. Minimize impacts of fishing strategies on other fisheries and environment.

(\*Note: Substantive revisions are indicated with vertical lines in right margin.)

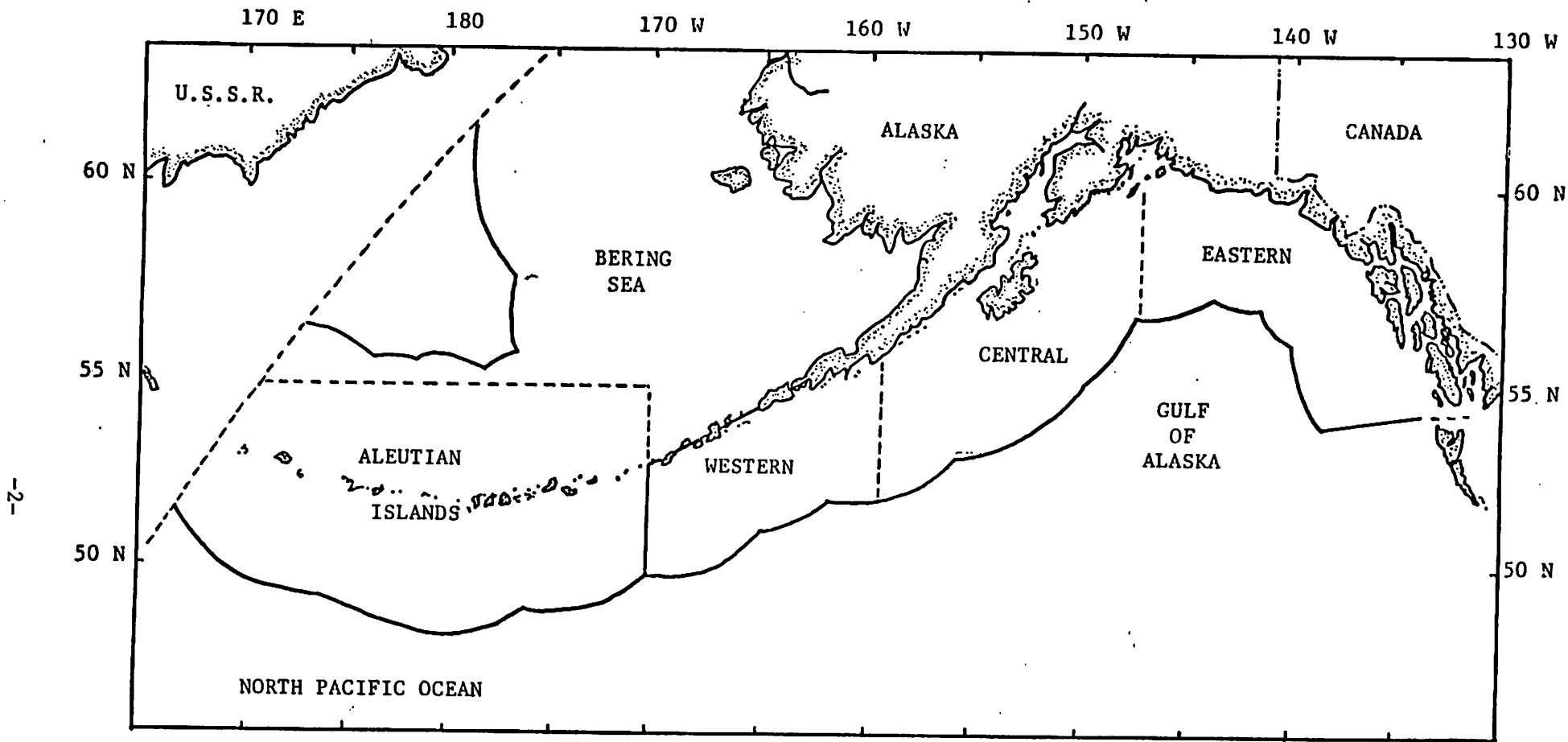


Fig. 1 Major regulatory areas of the Bering Sea and Aleutian Islands Groundfish and Gulf of Alaska Groundfish FMP's.

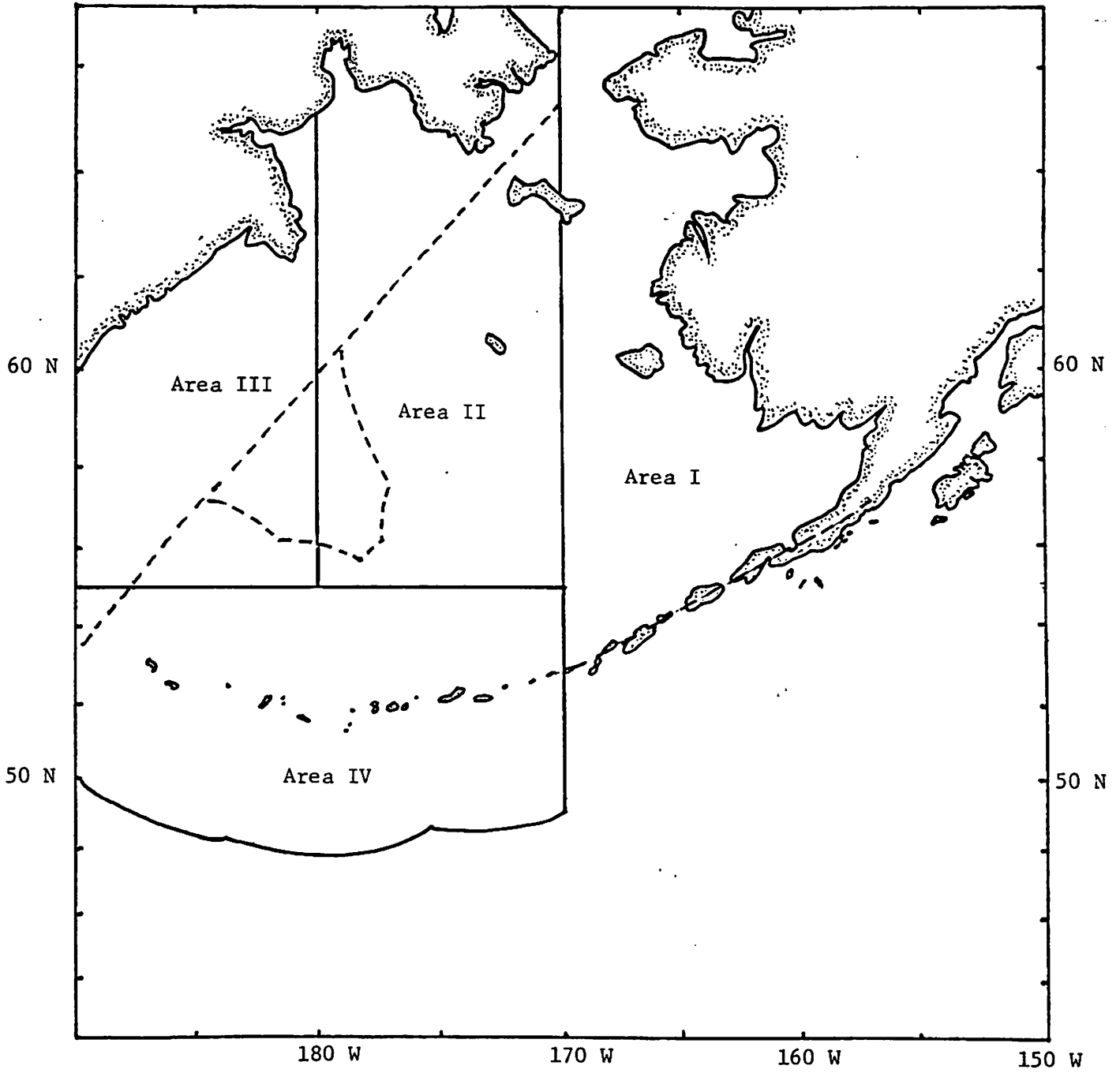


Fig. 2 Fishing areas in the Bering Sea and Aleutians.

Management Objectives:

1. Rational and optimal biological and socioeconomic use of resource.
2. Minimize impact on prohibited species and rebuild halibut stocks.
3. Provide for the orderly development of domestic groundfish fisheries consistent with objectives 1 and 2 at expense of foreign participation.
4. Provide for foreign fisheries consistent with objectives 1, 2 and 3.
5. Seek to maintain the productive capacity of the habitat required to support the groundfish fishery.

OPERATIONAL DEFINITIONS

Maximum Sustainable Yield (MSY) is an average, over a reasonable length of time, of the largest catch which can be taken continuously from a stock under current environmental conditions. It normally is presented with a range of values around its point estimate.

Equilibrium Yield (EY) is the annual or seasonal harvest which maintains the resource at approximately the same level of abundance (apart from the effects of environmental variation) in succeeding seasons or years. It usually is different from MSY because the sustainable level of abundance is normally less than the maximum.

Optimum Yield (OY) is that which provides the greatest overall benefit to the nation with particular reference to food production and recreational fisheries. OY is based upon the maximum sustainable yield for a given fishery, modified by relevant economic, social or biological factors. It may be obtained by a plus or minus deviation from ABC for purposes of promoting economic, social or ecological objectives as established by law and the public participation process.

The definition of OY prescribes that the benefits of the fishery resources be allocated among all of the people affected by the fishery. These include commercial fishermen, processors, foreign fishermen, sport fishermen, distributors, consumers, governments, and a host of manufacturing and service industries. These groups usually have different and often conflicting ideas about the best use of the resources. Optimum yield then involves judgmental decisions that must be made by the Council based upon the best obtainable information.

Domestic Annual Harvest (DAH) is the estimated total harvest of groundfish by U.S. fishermen. It is delivered to U.S. or foreign processors or nonprocessed markets such as for bait for crab pots.

Domestic Annual Processing (DAP) is the estimated portion of the U.S. groundfish catch delivered to U.S. shorebased or floating processors or U.S. nonprocessed bait markets. It includes catches by U.S. factory trawlers.

Joint Venture Processing (JVP) is the estimated portion of the U.S. groundfish catch that exceeds the capacity and intent of U.S. processors to utilize, or for which domestic markets are unavailable, that is expected to be delivered to foreign processors in the Fishery Conservation Zone.

Total Allowable Catch (TAC) is an annually determined catch which is species-specific and based on consideration of maximum sustainable yield, equilibrium yield, and optimum yield for the groundfish complex as a whole.

Total Allowable Level of Foreign Fishing (TALFF) is determined by deducting the expected domestic annual harvest from the total allowable catch and withholding reserves. This amount is made available by the U.S. Department of Commerce for harvest by other nations. The U.S. Department of State makes the actual allocations of those resources to other countries. The Act specifies that allocations must be based on past fishing history in the area, degree of cooperation in research and enforcement, whether the nation has trade barriers to our fish products or otherwise discourages trade of U.S.-caught fishery products, whether the nation fosters improvements in U.S. gear technology, and other guidelines deemed appropriate.

Reserve is a portion of the total allowable catch which is set aside at the beginning of the fishing (calendar) year for later allocations to DAH or TALFF.

Directed Fisheries are those which catch 20% or more by weight or number of a single species or species group.

#### DETERMINATION OF OPTIMUM YIELD AND TOTAL ALLOWABLE CATCH

Species Categories. Fish and shellfish species of the Bering Sea and Aleutians FCZ are categorized for regulatory purposes as follows:

1. Unallocated Species must be avoided by the foreign fisheries, and if caught, must be returned to the sea expeditiously. Foreign allocations for these species exist, if at all, only under other FMPs. Any incidental catch of salmonids or halibut must be recorded and reported. Unallocated species include:

King crab	Lyre crab	Pacific herring
Tanner crab	Surf clam	Pacific halibut
Dungeness crab	Scallops	Salmonids
Horsehair crab	Shrimp	Coral, Snails

The incidental catch of herring is specifically treated under the herring FMP.

2. Target Species are commercially important and generally targeted upon by the groundfish fishery. Sufficient data exist to specify total allowable catch (TAC) and to manage each species or species group separately. Catch records must be kept. Target species include:

Pollock	Other flatfish	Pacific Ocean perch
Sablefish	Other rockfish	Yellowfin sole
Pacific Cod	Atka mackerel	Arrowtooth flounder
Squid	Greenland turbot	



3. Other Species have little economic value and are not usually targeted upon, but they may be significant components of the ecosystem or have economic potential. A single TAC applies to this category as a whole. Catch records must be kept. Other species include:

Sculpin	Eulachon	Capelin	Shark
Skates	Smelt	Octopus	

4. Non-specified Species include all fish not listed above. They have no current or foreseeable economic value or ecological importance. They may be retained or discarded, and only records of the total amount retained need be kept.

Estimation of MSY, OY, and TAC. The groundfish complex and its fishery are a distinct management unit of the Bering Sea. The complex has more than 10 commercially important species and many others of lesser or no commercial importance. This complex forms a large subsystem of the Bering Sea ecosystem with intricate interrelationships between predators and prey, between competitors, and between those species and their environment. Therefore, the productivity and Maximum Sustained Yield (MSY) of groundfish are conceived for the groundfish complex as a unit rather than for many individual species groups. MSY for the complex, including the target and other species categories, is estimated to be 1.7-2.4 million mt and is the sum of individual species MSYs. This estimate is based on groundfish catches for 1968-77.

Optimum Yield (OY) for the complex is set equal to 85% of MSY, or 1.4 to 2.0 million mt, plus such amounts of "nonspecified species" as may be taken incidentally. OY is set lower than MSY to reduce the risk associated with relying on incomplete data and questionable assumptions in assessment models used to determine stock conditions. A change in OY outside this range would require a plan amendment.

Total Allowable Catch (TAC) for each target species and for the "other species" category will be determined by the Alaska Regional Director of NMFS by the end of the preceding fishing year. The sum of these TACs, or the TAC for the groundfish complex excluding nonspecified species shall be within the OY range of 1.4 to 2.0 million mt and is subject to the management measures prescribed in this FMP. TAC for the nonspecified species category is the amount taken incidentally to the harvest of target and "other" species.

Prior to the Regional Director's determination, the Council will recommend to him TACs for each target species and the "other species" category based on the best available data concerning the stocks and the fisheries. The Regional Director shall make these recommendations together with proposed figures for DAP, JVP, and TALFF, available to the public for comment. If the Council does not recommend TACs by December 15, the TACs already established shall automatically constitute the Council's recommendation to the Regional Director.

Council recommendations concerning TACs for the upcoming fishing year shall be based on the following:

1. Biological conditions of stocks as noted in an annual Resource Assessment Document (RAD) prepared by July 1 of each year by the Plan Maintenance Team with the assistance of NMFS and other agencies. The RAD shall contain historical catch trends, MSY and ABC estimates, assessments of harvest impacts, and alternative harvesting strategies. It is described in Annex I to the plan.
2. Socioeconomic considerations including promotion of efficiency, optimum marketable size of fish, impacts on prohibited species and dependent domestic fisheries, desire to enhance depleted stocks, seasonal access to the groundfish fishery by U.S. vessels, commercial importance to local communities, subsistence needs, and the need to promote utilization of certain species.

Status of Individual Species. The following summarizes the conditions of the target and other species based on data from as recently as last year. MSY, EY, and TAC values are summarized in Table 1.

1. Pollock. MSY for the Bering Sea stock is estimated at 1.5 million mt based on general production and yield per exploitable biomass models. Aleutian MSY is estimated as 100,000 mt. Compared to 1980-84, the present Bering Sea biomass is made up of fewer but larger fish from the strong year classes before 1979. Strong 1982 and 1984 year classes will cause population numbers to increase and biomass to level off or increase over the next several years. Aleutian stocks remain unchanged. EY is set at 1.1 million mt in the Bering Sea based on a 15% exploitation rate and at 100,000 mt in the Aleutians. TAC is set at 1.2 million mt in the Bering Sea and 100,000 mt in the Aleutians.
2. Yellowfin Sole. MSY is estimated at 150,000-175,000 mt using biomass estimates, the yield equation of Alverson and Pereyra for virgin biomass, and ecosystem modeling. Biomass peaked in 1983 and then declined. Based on 1985 surveys, biomass has declined 30% since 1984. This rapid decline cannot be explained, but the biomass is still relatively high considering historical trends. EY is 230,000 mt (compared to 310,000 mt in 1985) and TAC is set at 209,500 mt.
3. Greenland Turbot. The two turbot species were separated for the first time for 1986. Greenland turbot, more desirable than arrowtooth flounders, is depressed and suffering from a dramatic decline in juveniles since 1980. EY is estimated at 32,000-35,000 mt. TAC is set at 33,000 mt.
4. Arrowtooth Flounder. This species is increasing in abundance and EY is 20,000 mt. TAC is set at 20,000 mt.
5. Other Flatfish. This complex has declined since 1984, similar to yellowfin sole. The EY is estimated at 137,500 mt (compared to 150,200 mt in 1985) and TAC is 124,200 mt.

6. Pacific Cod. The decline in abundance has been much less dramatic than expected. Recent aging studies indicate that what was believed to be a single strong 1977 year class is really two year classes (1977 and 1978). Nevertheless, the numbers of fish have declined significantly and the population is now characterized by fewer fish but of larger size. The 1982 and 1984 year classes appear to be strong. EY is 249,300 mt and TAC is 229,000 mt.
7. Pacific Ocean Perch. This includes only Sebastes alutus. Abundance has remained very low and stable and is expected to remain so for a long time because of the long-lived nature of the species. EY is 1,600 mt for the Bering Sea and 15,000 mt for the Aleutians. TAC is set at 825 mt in the Bering Sea and 6,800 mt in the Aleutians to encourage rebuilding.
8. Other Rockfish. In 1986 this complex will also include four rockfish species formerly managed as part of the Pacific ocean perch complex: northern, rougheye, shortraker, and sharpchin rockfish. Stocks are in low but stable condition. TAC is set at 825 mt in the Bering Sea and 5,800 mt in the Aleutians.
9. Sablefish. Sablefish stocks have improved in both the eastern Bering Sea and Aleutians. Aleutian Islands EY of 4,200 mt exceeds the 2,100 mt MSY. The Bering Sea 3,000 mt EY is well below the 13,000 mt MSY. TAC is 2,250 mt in the Bering Sea and 4,200 mt in the Aleutians.
10. Atka Mackerel. MSY is estimated at 38,734 mt for stocks in the Aleutians. Length and age composition indicates that large year classes are about to leave the fishery, thus leading to a substantial stock decline. EY and TAC are set at 30,800 mt, down from 1985.
11. Squid. MSY equals 10,000 mt. Based on commercial catches, EY is set at 10,000 mt. TAC is 5,000 mt.
12. Other Species. The EY of 35,900 mt is estimated as 10% of the biomass derived from the 1985 trawl survey. TAC is 27,800 mt.

#### ALLOCATION OF TOTAL ALLOWABLE CATCH

At the beginning of the fishing year, after TAC is determined for each species or group, a reserve is set aside to accomodate unexpected growth of the domestic fishery, to correct operational problems in the fisheries, to adjust species TACs according to stock conditions, and for further apportionments. The reserve equals the sum of 15% of each target species and "other species" category TAC. The reserve is not designated by species and will be apportioned to the fishery during the year by the Regional Director in the amounts and by species that he determines necessary.

The remaining 85% of each TAC is apportioned to the fishery as follows: Highest priority is to DAP, the catch by U.S. fishermen delivered to U.S. shoreside or floating processors (including U.S. catcher/processors) or to U.S. non-processed bait markets. Second priority is to JVP, U.S. fishermen

Table 1. Maximum sustainable yield (MSY), equilibrium yield (EY), and total allowable catch (TAC) for target and other species in the Bering Sea and Aleutian Island area.

Species	Area <sup>1/</sup>	MSY	EY	TAC
Pollock	BS	1,500,000	1,100,000	1,200,000
	AI	100,000	100,000	100,000
Yellowfin sole	BSA	160,000	230,000	209,500
Arrowtooth flounder	BSA	19,700	20,000	20,000
Greenland turbot	BSA	67,000	35,000	33,000
Other flatfish	BSA	120,000	137,500	124,200
Pacific cod	BSA	57,000	249,300	229,000
Pacific ocean perch	BS	17,000	1,600	825
	AI		15,000	6,800
Other rockfish	BS	7,000	1,120	825
	AI	23,000	7,790	5,800
Sablefish	BS	13,000	3,000	2,250
	AI	2,100	4,200	4,200
Atka mackerel	BSA	38,734	30,800	30,800
Squid	BSA	10,000	10,000	5,000
Other species	BSA	<u>67,200</u>	<u>35,900</u>	<u>27,800</u>
TOTAL	BSA	2,201,734	1,981,210	2,000,000

<sup>1/</sup> BS = Eastern Bering Sea Area (Fishing Areas I, II, III combined).  
AI = Aleutian Area (Fishing Area IV).

delivering to foreign processors. Lowest priority is to TALFF, the catch by foreign fishermen. The estimated total catch by U.S. fishermen is DAH. Therefore:

$$\begin{aligned} \text{DAH} &= \text{DAP} + \text{JVP} \\ \text{Reserve} &= 15\% \text{ TAC} \\ \text{TALFF} &= \text{TAC} - \text{Reserve} - \text{DAH} \end{aligned}$$

Initial DAP and JVP are determined annually by the Regional Director in consultation with the Council, and equal the amounts harvested by U.S. fishermen the year before plus any supplement needed to satisfy the U.S. fishery for the new fishing year. The supplement is based on surveys conducted by the National Marine Fisheries Service, recommendations from the Council, and information provided by the domestic fishing industry and other agencies. The Regional Director, upon recommendation by the Council, publishes a rule-related notice in the Federal Register proposing apportionments of each TAC among DAP, JVP, and TALFF as soon as practicable after October 1, and allows for 30 days of public comment. Based on comments received, a second notice of final apportionments is published as soon as practicable after December 15. See Table 2 for initial harvest allocations.

Reapportionment of Reserves. Reserve apportionments to target or other species must be consistent with recent assessments of resource conditions, unless the Regional Director finds that socioeconomic considerations or operational problems dictate otherwise. Socioeconomic factors can be considered by the Regional Director in a reserve release for the sole purpose of justifying an apportionment which exceeds a species TAC. He may withhold reserves for conservation reasons, but not for socioeconomic reasons. The Regional Director must also find that the release will not result in overfishing.

On April 1, June 1, August 1, and on any other date deemed appropriate, the Regional Director shall release reserves to DAH and, if they will not be needed by U.S. fishermen, to TALFF, so long as the release will not lead to overfishing, and will not adversely affect conservation of groundfish or prohibited species. This reapportionment of reserves to DAH or TALFF shall be based on and consistent with the biological and socioeconomic considerations made in the determination of TAC.

Reapportionment of Unneeded DAH to TALFF. On April 1, June 1, August 1, and on any other dates deemed appropriate, the Regional Director shall reassess DAP and JVP and shall apportion to TALFF that part of DAH which will not be used by U.S. fishermen during the remainder of the fishing year. The Regional Director may decline to reapportion DAP or JVP if it would adversely affect conservation, or would adversely impact the biological or socioeconomic factors considered in setting TAC.

#### DOMESTIC MANAGEMENT

Permits. An annual permit is required from the Regional Director. According to NMFS enforcement an Alaska vessel license application will suffice for an application for a federal permit, but not for the permit itself.

Table 2. Initial apportionments (mt) of total allowable catch for 1986.

Species	Area	TAC	DAP	JVP	RESERVE <sup>1/</sup>	TALFF
Pollock	BS	1,200,000	141,775	690,000	180,000	188,225
	AI	100,000	18,039	10,804	15,000	56,157
Pacific ocean perch	BS	825	576	194	0	55
	AI	6,800	6,340	460	0	50
Rockfish	BS	825	648	143	0	50
	AI	5,800	5,791	9	0	50
Sablefish	BS	2,250	1,826	246	83	95
	AI	4,200	4,159	40	0	50
Pacific cod	BSA	229,000	133,394	50,830	12,370 <sup>2/</sup>	32,406
Yellowfin sole	BSA	209,500	1,030	127,300	31,425	49,745
Greenland turbot	BSA	33,000	5,414	5,000	4,950	17,636
Arrowtooth flounder	BSA	20,000	1,805	1,667	3,000	13,528
Other flatfish	BSA	124,200	4,192	89,550	18,630	11,828
Atka mackerel	BSA	30,800	10	30,790	0	50
Squid	BSA	5,000	10	50	750	4,190
Other species	BSA	<u>27,800</u>	<u>110</u>	<u>7,000</u>	<u>4,170</u>	<u>16,520</u>
TOTAL	BSA	2,000,000	325,119	1,014,083	270,378	390,635

<sup>1/</sup> Reserve = 15% of total TAC or 300,000 mt of unspecified groundfish at start of year. Reserves for POP, Sablefish, Pacific cod, and Atka mackerel have been reduced below 15% TAC to accommodate JVP needs or TALFF (see footnote 2).

<sup>2/</sup> Pacific cod reserve would initially be 15% TAC or 34,350 mt. The Council recommended that 21,980 mt be moved from reserves to TALFF and earmarked for a Japanese longline fishery north of 55°N and west of 170°W, ice conditions permitting.

Observers. In January 1986 the Council recommended that NMFS-approved observers be required on all DAP fishing vessels and joint venture processing vessels in the groundfish fishery east of 160°W longitude.

Prohibited Species. Halibut, Tanner crab, salmon, or any other species within the groundfish plan area whose retention is prohibited by other applicable law such as another FMP. Refer to section on "Protection of Prohibited Species" in this summary.

Reports. Processor, joint venture, and nonprocessed fish data must be reported. Fish tickets are required for all landings out-of-state and at sea.

Amendment 9 placed the following reporting requirements on U.S. catcher/processors and mothership vessels:

1. Federal fishing permit applications must indicate capability and intent to preserve catch at sea.
2. Catcher/processors must notify the Regional Director of the date, hour, and position, 24 hours before starting and upon stopping fishing in a regulatory area.
3. All operators of vessels that retain fish at sea for more than 14 days from the time it is caught or received must provide the Regional Director a weekly written report of the amounts of groundfish caught or received by species or species group in metric tons by fishing area.

#### Inseason Management Actions

1. When TAC is reached. Regulations for 1986 allow the Regional Director to designate a species as prohibited when its TAC is reached and to allow fisheries targeting on other groundfish species to continue. NMFS can, however, close or limit other fisheries to prevent overfishing of the prohibited species. This is a short-term solution and may be revised for 1987.
2. Fully U.S.-utilized species. Sablefish, rockfish, and Pacific ocean perch will be fully utilized by domestic fishermen in 1986. The Regional Director has sufficient flexibility under Amendment 1 to the FMP to designate minimal retainable bycatches of these species for joint ventures and foreign fisheries. These minimal amounts can be augmented from the unspecified reserves and it is doubtful that a fishery would be closed unless there was danger of overfishing a specific stock.

#### FOREIGN MANAGEMENT

Permits. Foreign vessels must have an annual permit from the Secretary of Commerce.

Prohibited species. These generally include those species fully utilized by U.S. fisheries and managed under some other plan. Tanner and king crab, halibut, and salmon are treated specifically in a scheduled reduction of incidental catch; see the section on "Protection of Prohibited Species" in this summary.

Fully U.S.-utilized Species. Foreign fisheries will have minimal allocations for bycatch of certain species such as POP, sablefish, rockfish and Atka mackerel. They must stop all fishing when their allocations for bycatch are reached. Bycatch amounts may be augmented from the unspecified reserve.

Foreign Fishing Restrictions.

1. Joint venture receiving vessels must stay outside 3 miles.
2. Specific times for openings and closings are 0800 GMT.
3. Area restrictions are summarized in Table 3 and Figures 3-6. The longline restrictions along the Aleutians are still in the foreign regulations, even though the longliners have agreed to stay north of 55°N and west of 170°W, ice conditions permitting.

Size and Sex Restrictions. None.

Inseason Adjustments by Regional Director.

1. When TAC is reached. For 1986 the regulations have been changed to allow the Regional Director to designate a species as prohibited when its TAC is reached and to allow fisheries targeting on other groundfish species to continue. NMFS can, however, close or limit other fisheries to prevent overfishing of the prohibited species. This is a short-term solution and may be revised for 1987.
2. When allocation is reached. The Regional Director shall close a regulatory area to a nation when its allocation of a targeted species is caught. Again, this closure would only apply to longliners if the exhausted allocation is for Pacific cod, sablefish, or turbot.

Cooperative Research.

In order to arrive at long-term solutions for controlling incidental catch of prohibited species, the foreign groundfish fisheries are encouraged to:

1. conduct NMFS approved gear experiments which are intended to reduce the incidental catch of prohibited species;
2. collect detailed information on the characteristics of incidental catches; and
3. transfer the information and gear technology conducive to reduction of the incidental catch of prohibited species to the U.S. for use by government and industry.

Foreign Loading Zones. There are the following ten loading zones between three and twelve nautical miles off Alaska:

1. Near Forrester Island
2. East of Kayak Island
3. North of Tonki Cape, Afognak Island
4. North and West of Sanak Island
5. South of Unalaska Island
6. North of Unalaska Island
7. South of Umnak Island
8. North of Umnak Island
9. Near St. George
10. North of St. Matthew Island



Table 3. Bering Sea/Aleutian Islands foreign fishery restrictions by area.

SPECIAL AREA	FOREIGN TRAWL <sup>1/</sup>	FOREIGN LONGLINE <sup>2/</sup>
All Areas	Pacific cod allowed in bycatch amounts only.	Directed Pacific cod fisheries allowed only north of 55°N and to the extent ice conditions permit, stay west of 170°W.
Bristol Bay Pot Sanctuary (A)	Closed all year.	Open all year beyond 12 miles except area between 160° and 162°W longitude which is closed south of 58°N.
160°-162°W longitude south of 58°N latitude	Closed all year.	Closed all year.
Winter Halibut Savings Area (B)	Closed 12/1 to 5/31. Otherwise open beyond 12 miles.	Beginning June 1 each year, when longline interception of halibut in the entire BSA management area reaches 105 mt, that part of the WHSA (area B) inside 500-meter isobath will close for rest of period 12/1-5/31. Foreign fisheries must stay outside 12 miles.
U.S. Fishery <sup>3/</sup> Development Zone	Closed 12/1 to 9/15	Closed 3/15 to 9/15 in addition to restrictions for Winter Halibut Savings Area above.
170°30'W-172°W north of Aleutians; 170°W-172°W south of Aleutians	Open all year beyond 3 miles.	Open all year beyond 3 miles.
170°W-170°30'W north of Aleutians	Open all year beyond 12 miles.	Open all year beyond 3 miles.
Longline Sanctuary (C)	Closed all year.	Open all year outside 3 miles.
Petrel Bank (D)	Closed: 1/1 to 6/30. Open beyond 3 miles: 7/1-12/31	Open all year outside 3 miles.
West of 178°30'W (except Petrel Bank)	Open beyond 12 miles all year. Open 3-12 miles from 5/1 to 12/31.	Open all year outside 3 miles.

- <sup>1/</sup> In December 1985 the Council recommended that foreign directed fisheries in the Aleutian Islands be limited to pollock.
- <sup>2/</sup> Foreign longliners have agreed to stay north of 55°N and west of 170°W, ice conditions permitting. However, the longline restrictions listed in this table are still in the foreign regulations.
- <sup>3/</sup> The proposed complete closure of the FDZ to foreign fishing was disapproved by NMFS on December 8, 1983. The restrictions listed above are voluntary and based on an industry agreement made in February 1984 and reaffirmed for 1986. Current regulations officially close the area to foreign trawlers only from December 1 through May 31.

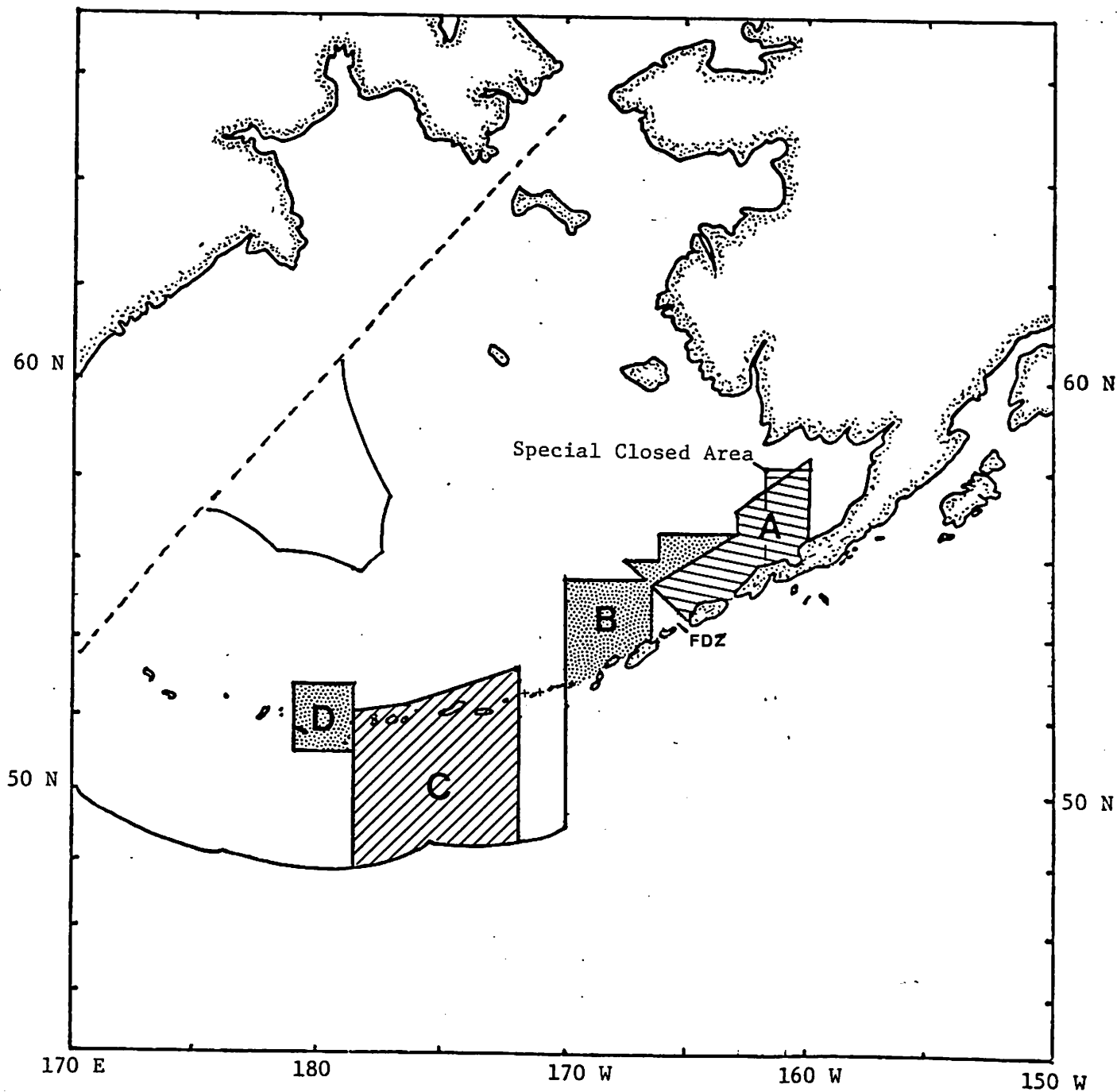


Fig. 3 Areas with special restrictions on foreign and/or domestic fisheries in the Bering Sea and Aleutian Islands Groundfish Plan area.



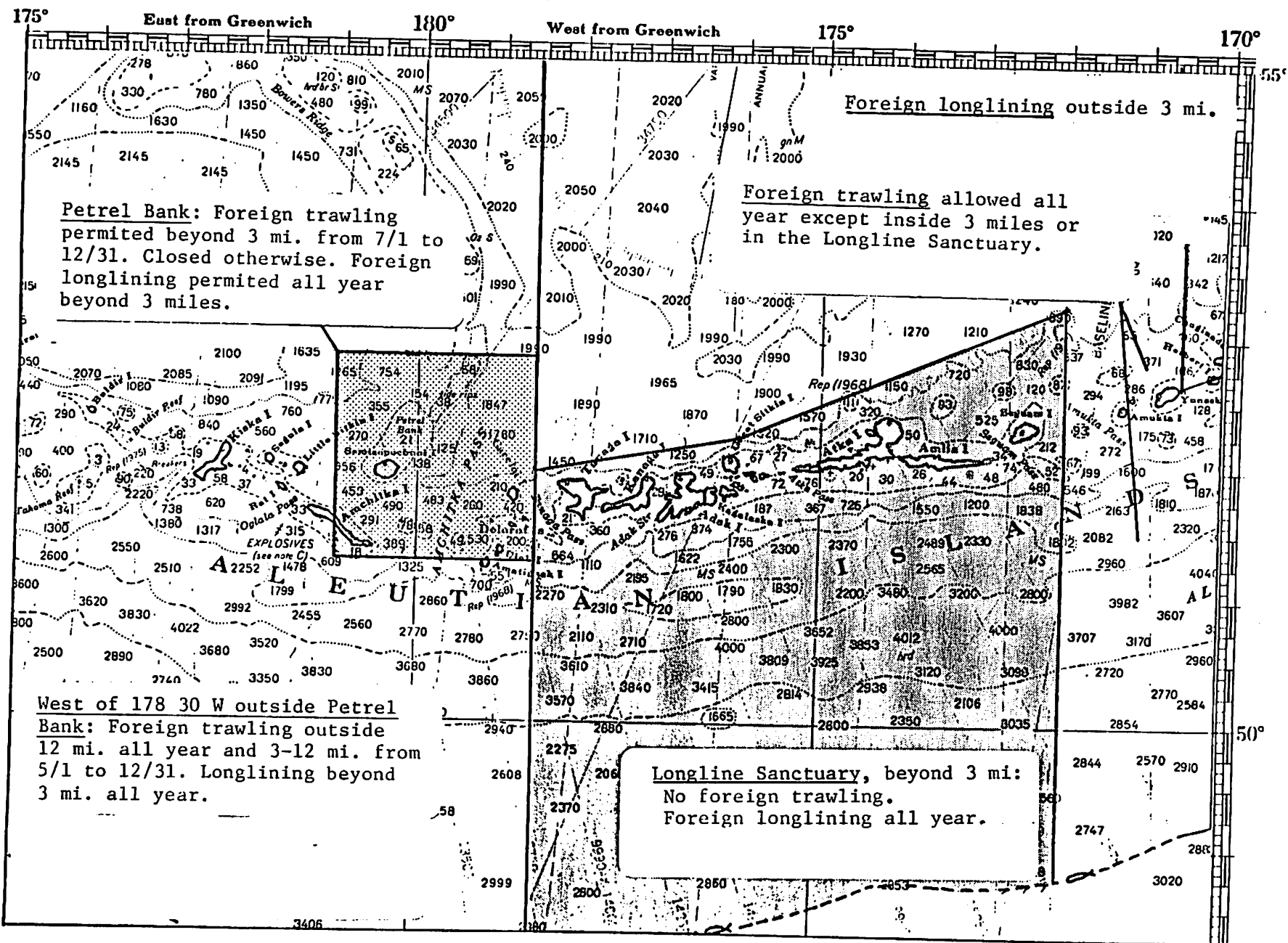


Fig. 5 Special restricted areas of the Aleutian Islands Regulatory Area in the Bering Sea and Aleutian Islands Groundfish Plan.

## RATIONALE FOR TIME-AREA-GEAR RESTRICTIONS

1. Domestic trawl restrictions in the Eastern Bering Sea. To protect crabs and halibut.
2. Total closure 160-162°W longitude south of 58°N. To protect crabs.
3. Closure of Bristol Bay Pot Sanctuary (Area A) to foreign trawling. To prevent gear conflicts and the incidental catch of juvenile halibut.
4. Partial closure of Winter Halibut Savings Area (Area B) to foreign trawling and depth restrictions on longliners. To protect winter concentrations of juvenile halibut and spawning concentrations of pollock and flounder.
5. Closure of Longline Sanctuary (Area C) to foreign trawling. To provide a sanctuary for traditional foreign and domestic longline fisheries free of gear conflicts with trawlers.
6. Partial closure of Petrel Bank (Area D) to foreign trawlers. To protect molting crab and minimize incidental crab catch.
7. Fishery Development Zone voluntary closures to foreign fisheries. To provide a sanctuary for the U.S. groundfish fishery to develop.

## PROTECTION OF PROHIBITED SPECIES

Domestic and foreign groundfish fishermen are required to avoid and return all prohibited species immediately to the sea. In the Bering Sea/Aleutian Islands area, these species include king, Tanner, Dungeness, horsehair and lyre crabs, surf clams, scallops, shrimp, coral, snails, Pacific herring and halibut, and salmonids.

### Domestic Fisheries Restrictions

In July 1983 the Council adopted the following policy on incidental catch by the domestic fisheries:

#### Council Policy on Incidental Catch by the Domestic Fisheries

The Council believes that domestic fishermen should be aware that incidental catches of halibut, salmon, king crab, and Tanner crab may affect other domestic fisheries and appreciate the need to minimize, to the fullest extent practicable, their incidental take of these species. It also believes that all domestic fishermen have a responsibility to develop an information base concerning these species through maintenance of logbooks, accurate catch reports and contributions to knowledge of fish distribution, behavior, etc.

The Council advocates and strongly supports development of domestic harvesting and processing of Bering Sea and Aleutian Islands groundfish. At the same time, it is fully committed to minimize the impact of groundfish trawl fisheries on stocks of salmon, halibut, king crab, and

Tanner crab, consistent with rational utilization of the resources. In so doing, the Council recommends that domestic fishermen develop their fishing strategies, techniques, and practices with appreciation of the objectives of this Amendment (#3).

The Council urges domestic fishermen to study and adopt, where possible, proven techniques used by foreign fleets and to develop their own techniques and strategies which accomplish the same objectives.

The Council will help facilitate direct transfer of information and technology from foreign and domestic sources to the fishing industry.

The Council will follow the development of Bering Sea and Aleutian Islands domestic groundfish fisheries with particular attention to their incidental catches of salmon, halibut, king crab, and Tanner crab. It recognizes that the policy implication of these incidental catches by the domestic fishery are quite different from those by the foreign fishery. These implications include allocation of catches among domestic groups and must be fully evaluated from a different perspective from this amendment if it is necessary to develop any regulations in the future.

In January 1986 the Council adopted the following measures to minimize king crab, Tanner crab, and halibut bycatch in trawl fisheries in the Bering Sea (refer to Figure 6):

The Fishery Conservation Zone east of 162°W longitude and south of 58°N latitude, bounded on the south by the Alaskan peninsula and on the east by 160°W longitude shall be closed to all commercial fishing during 1986 except that:

(a) Domestic (DAH) trawling for Pacific cod shall be allowed in waters of 25 fathoms or less in the area described, provided NMFS-approved observers are on all DAP fishing and all JVP processing vessels engaged in the fishery. NMFS shall develop and implement measures to close the fishery if excessive bycatches of crab are taken. Catches exceeding two red king crab per ton of fish caught will be considered excessive for initial consideration of closure.

(b) In the Pot Sanctuary west of 162°W longitude, there shall be a PSC limit of 25,000 halibut on all yellowfin sole/flounder joint venture operations. East of 160°W longitude there shall be a PSC limit of 15,000 halibut in the yellowfin sole/flounder fishery. The total catch of halibut in all yellowfin sole/flounder joint ventures in the Bering Sea in 1986 may not exceed 250,000 fish.

(c) The incidental catch (PSC) of red king crab in all yellowfin sole/flounder joint venture fisheries in the Bering Sea in 1986 in the area east of 165°W longitude and south of 58°N latitude shall not exceed 135,000 crab and shall not exceed a cap (in number of crab) of one red or blue king crab per metric ton multiplied by the JVP allocation tonnage of flounder/yellowfin sole caught outside the aforementioned area.

Entire Bering Sea/Aleutian Islands - 1986

250,000 Halibut (includes Pot Sanctuary)

1 Red or Blue King Crab/mt of JVP

320,000 Tanner Crab (*C. bairdi*)

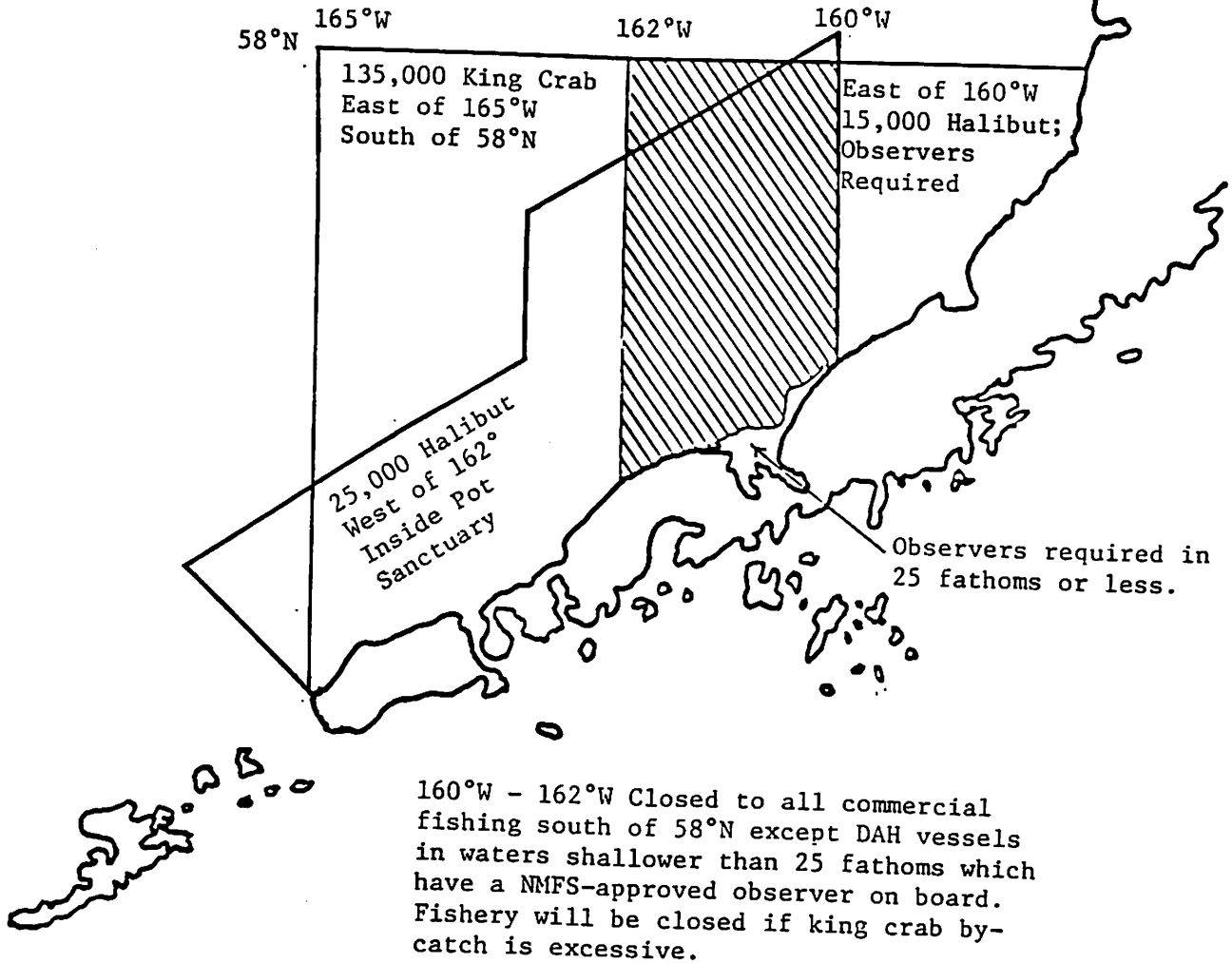


Figure 6

(d) Joint venture bottom trawling for yellowfin sole and flounder will cease when a cap of 320,000 Tanner crab (C. bairdi) is taken.

(e) Caps on halibut, red and blue king crab and C. bairdi Tanner crab catches shall apply to yellowfin sole/flounder joint ventures in the aggregate. When the cap for any of the three species is reached in any of the areas described, all yellowfin sole/flounder joint venture operations will end in that area for the remainder of 1986.

(f) It is the Council's intention that these measures apply for one year only and that they be carefully evaluated during 1986.

(g) If a DAP fishery for yellowfin sole and flounder should develop during 1986, the Council intends that measures as similar as possible to those applying to joint ventures, with provision for NMFS approved observers, if necessary, be developed by NMFS.

(h) In the area east of 160°W longitude all DAP fishing vessels and all JVP processing vessels engaged in the groundfish fisheries shall carry NMFS-approved observers.

#### Foreign Fisheries Restrictions

The Council has established a five-year schedule to reduce the incidental trawl catch rate of Pacific halibut by 50%, and of Tanner and king crab by 25%, and to reduce the incidental catch of salmon, mainly chinook, by 75%. These reductions are from the base years 1977-80. See Tables 4 and 5. The catch limits for 1986 are assumed to continue into 1987 and beyond unless changed by the Council.

Halibut and Crab. A nation's allowed Prohibited Species Catch (PSC) of halibut and crabs is its TALFF multiplied by the scheduled incidental catch rate. PSCs will increase during the year with further TALFF allocations. When a nation reaches its PSC limit, the Regional Director shall close the entire management area to that nation's trawlers. Some selected fleet elements may be exempted.

Salmon. A nation's initial portion of a scheduled salmon PSC equals the total PSC multiplied by the ratio of the nation's initial groundfish allocation to the total initial TALFF plus reserves. Subsequent allocations to the nation of initial unallocated TALFF or reserves will be accompanied by a proportional amount of the remaining salmon PSC. For salmon, a rolling PSC limit which fixes bycatch levels over a period of three successive years, will be in effect. In any year, a nation's incidental salmon catch may exceed the specified limit by up to 10%, but the three-year total cannot exceed the sum of the PSC limits for those three years. Calculations of the rolling limit started with the 1982 season. Once the rolling PSC limit is reached for salmon, the Salmon Savings Area shown in Figure 7 will be closed to trawling by the affected nation for so much of January-March and October-December that remains in the fishing year. Any salmon caught after a PSC closure will be deducted from the nation's limit for the next year, consistent with the rolling limit.



Annual Review. This prohibited species management system will be reviewed annually by the Council and may be adjusted as necessary after considering stock conditions, socioeconomic impacts of prohibited species catches, and the ability of foreign fisheries to take their groundfish TALFF.

Note. All prohibited species including halibut, crabs, and salmon must be returned to the sea immediately regardless of the above management measures established to control incidental catch.

#### HABITAT PROTECTION

The Secretary, upon the recommendation of the Council, may adopt the following types of regulations:

1. Propose regulations establishing gear, time, or area restrictions to protect particular habitats or life stages of species in the Bering Sea/Aleutian Islands groundfish fishery.
2. Propose regulations establishing area or time restrictions to prevent the harvest of fish in contaminated areas.
3. Propose regulations restricting disposal of fishing gear by domestic vessels.

Table 4. Incidental catch rate reductions for Pacific halibut, king crab and Tanner crab, based on the average 1977-80 foreign trawl groundfish and prohibited species catches.

Year	Halibut <sup>1/</sup>	King Crab <sup>2/</sup>	Tanner Crab <sup>2/</sup>
<u>Base Catch Rates</u>			
1977-80	3,182	916,804	16,003,329
Average	<u>1,301,250</u>	<u>1,301,250</u>	<u>1,301,250</u>
	base R=0.00245	base R=0.70456	base R=12.29843
<u>Rate Reduction Schedule, R</u>			
(1981)	--	--	--
(1982)	R=.00220 90%	R=.66933 95%	R=11.6840 95%
(1983)	R=.00196 80%	R=.63410 90%	R=11.0686 90%
(1984)	R=.00171 70%	R=.59887 85%	R=10.4537 85%
(1985)	R=.00147 60%	R=.56365 80%	R= 9.8387 80%
(1986)	R=.00122 50%	R=.52842 75%	R= 9.2238 75%

1/ Metric tons per metric ton of groundfish.

2/ Number of individuals per metric ton of groundfish.

Table 5. Target reduction schedule of salmon prohibited species catches based on the average 1977-80 foreign trawl salmon incidental catch.

		<u>Salmon</u>	
		Chinook	Total Salmon <sup>1/</sup>
<u>Base Years</u>		<u>Average Incidental Catch</u>	
1977-80		74,400	80,000
<u>Reduced Catch Levels:</u>			
Year	1981	65,000	69,893
	1982	55,250	59,409
	1983	45,500	48,925
	1984	35,750	38,441
	1985	26,000	27,957
	1986	16,250	17,473

<sup>1/</sup> Total salmon numbers are calculated on the assumption that 93% of incidentally-caught salmon are chinook.

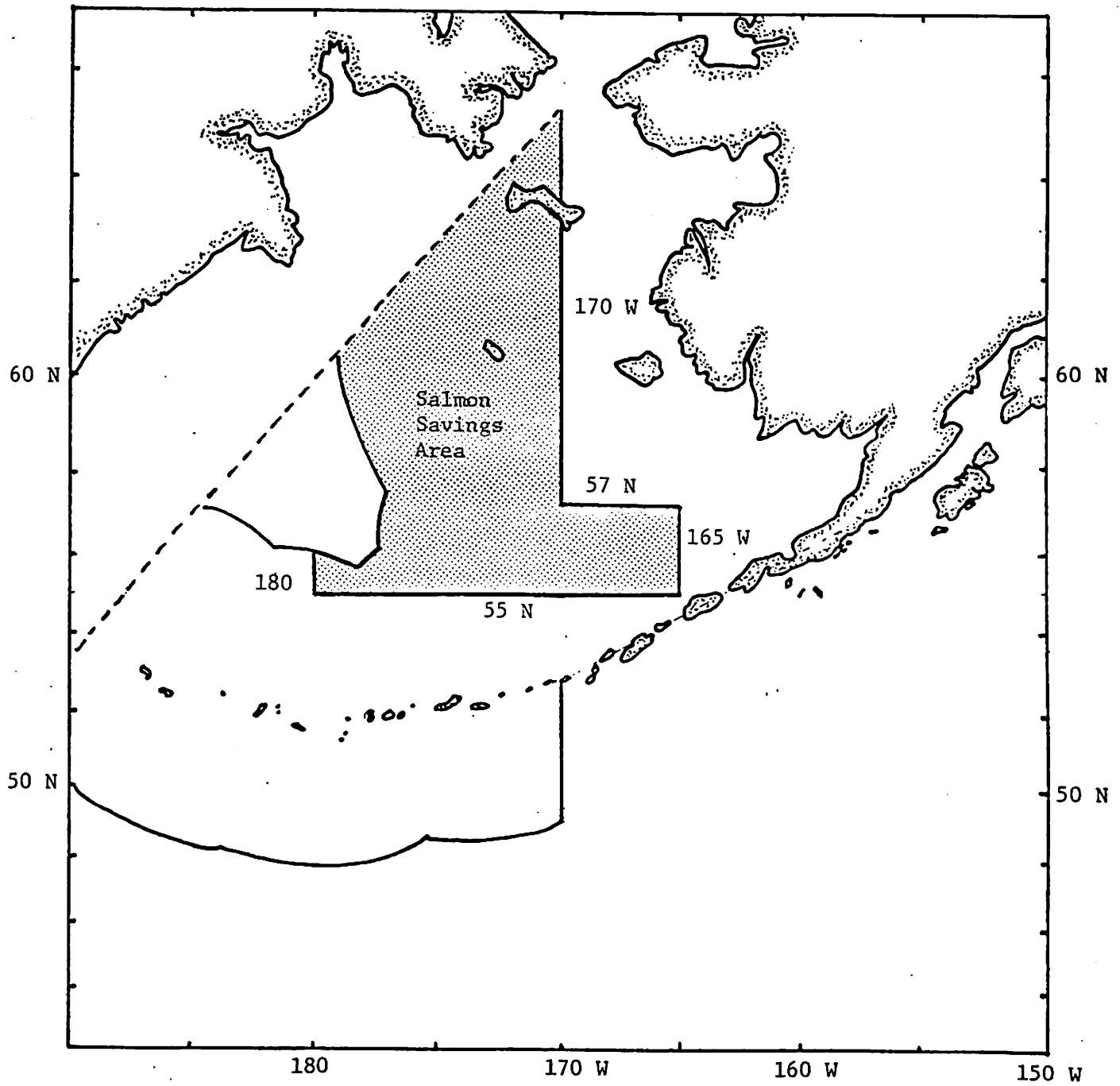


Fig. 7 Salmon Savings Area of the Bering Sea and Aleutian Islands Groundfish Plan.

## HISTORY OF PLAN

PMP in early 1977

FMP on January 1, 1982

### Amendment 1a on January 12, 1982:

1. Set Prohibited Species Catch limit on chinook salmon.

### Amendment 2 on January 12, 1982:

1. For Yellowfin Sole; increased DAH to 26,200 mt from 2,050 mt, increased JVP to 25,000 mt from 850 mt, and decreased TALFF by 24,150 mt.
2. For Other Flatfish, increased DAH to 4,200 mt from 1,300 mt, increased JVP to 3,000 mt from 100 mt, and decreased initial TALFF by 2,900 mt.
3. For Pacific Cod, decreased MSY to 55,000 mt from 58,700 mt, increased EY to 160,000 mt from 58,700 mt, increased ABC to 160,000 mt from 58,700 mt, increased OY to 78,700 mt from 58,700 mt, increased Reserve to 3,935 mt from 2,935 mt, increased DAP to 26,000 mt from 7,000 mt, and increased DAH to 43,265 mt from 24,265 mt.

### Amendment 4 on May 9, 1983:

1. For Pollock, increased JVP for Bering Sea to 64,000 mt from 9,050 mt, increased DAH to 74,500 mt from 19,550 mt, and decreased TALFF to 875,500 mt from 930,450 mt.
2. For Yellowfin Sole, increased JVP to 30,000 mt from 25,000 mt, increased DAH to 31,200 mt from 26,200 mt, and decreased TALFF to 79,950 mt from 84,950 mt.
3. For Other Flatfish, increased JVP to 10,000 mt from 3,000 mt, increased DAH to 11,200 mt from 4,200 mt, and decreased TALFF to 46,750 mt from 53,750 mt.
4. For Atka Mackerel, increased JVP to 14,500 mt from 100 mt, increased DAH to 14,500 mt from 100 mt, and decreased TALFF to 9,060 mt from 23,460 mt.
5. For Other Species, increased JVP to 6,000 mt from 200 mt, increased DAH to 7,800 mt from 2,000 mt, and decreased TALFF to 65,648 mt from 68,537 mt. Also corrected ABC to 79,714 mt, OY to 77,314 mt, and reserves to 3,866 mt.
6. For Pacific Cod, increased EY and ABC to 168,000 mt from 160,000 mt, increased OY to 120,000 mt from 78,700 mt, increased Reserves to 6,000 mt from 3,935 mt, and increased TALFF to 70,735 mt from 31,500 mt.
7. For Other Rockfish, assigned DAP of 1,100 mt to BSAI area combined. This caused no change in total DAP. (This conformed FMP with federal regulations.)
8. For Pacific Ocean Perch, assigned DAP of 550 mt to Bering Sea and 550 mt to Aleutians but caused no change in total DAP. Also assigned JVP of 830 mt to Bering Sea and 830 mt to Aleutians without changing total JVP. (This conformed FMP with federal regulations.)

9. For Sablefish, assigned JVP of 200 mt to Bering Sea and 200 mt to Aleutians without changing total JVP. (This conformed FMP with federal regulations.) Changed MSY to 11,600 mt in Bering Sea and 1,900 mt in Aleutians to eliminate inconsistencies with annexes.
10. Changed foreign fisheries restrictions to allow trawling outside 3 miles north of the Aleutians between 170°30'W and 172°W and south of the Aleutians between 170°W and 172°W; and to allow longlining outside 3 miles west of 170°W.
11. Established the authority of the Secretary of Commerce to issue field orders for conservation reasons. (Disapproved by Secretary of Commerce.)

Amendment 1 on January 1, 1984:

1. Established a multi-year, multi-species optimum yield for the Bering Sea/Aleutian Islands area groundfish complex.
2. Established a framework procedure for determining and apportioning TAC and Reserves to DAH and TALFF.
3. Eliminated "Misty Moon" grounds south of the Pribilof Islands from the Winter Halibut Savings Area.
4. Allowed experimental year-round domestic trawling in the Winter Halibut Savings Area that will be monitored to the extent possible by observers.
5. Allowed year-round domestic trawling in the Bristol Bay Pot Sanctuary and year-round domestic longlining in the Winter Halibut Savings Area.
6. Allowed foreign trawling in Petrel Bank (Area "D") from July 1 to December 31.
7. Established new Annex I which is a description of the Resource Assessment Document.
8. Specified that the fishing and plan year is the calendar year.

Amendment 3 on July 4, 1983:

1. Established procedures for reducing the incidental catch of halibut, salmon, king crab and Tanner crab by the foreign fisheries.
2. Established a Council policy on the domestic fisheries and the incidental catch problem.

Amendment 5 (Withdrawn):

1. Decreased chinook PSC to 45,500 from 55,250 salmon for 1982. (This amendment was withdrawn because it was redundant to Amendment 3.)

Amendment 6 (Disapproved by NMFS on December 8, 1983):

1. Established U.S. Fishery Development Zone where no foreign fishing is allowed.
2. Instead of resubmitting the proposed amendment, the Council agreed to the voluntary industry arrangement described in Table 3.

Amendment 7 on August 31, 1983:

1. Modified the December 1 to May 31 depth restriction on the foreign longline fisheries in the Winter Halibut Savings Area.

Amendment 8 on February 24, 1984:

1. Set salmon PSCs for 1984 and 1985.

Amendment 9 on December 1, 1985:

1. Closed areas west of 170°W within 20 miles to foreign trawling year round. (Disapproved by NMFS.)
2. Require all catcher/processors that hold their catch for more than two weeks to check in and check out by radio from a regulatory area/district and to provide a written catch report weekly to the NMFS Regional Office.
3. Incorporated habitat protection policy. (A proposed regulation authorized by this part of Amendment 9 is reserved until an analysis of the measure is prepared.)
4. Established definition for directed fishing as 20% or more of the catch.

Council Recommended Changes - December 1985:

1. Set new TACs and apportionments for 1986.
2. Designate about 21,980 mt of cod TALFF to be taken by Japanese longliners north of 55°N and west of 170°W, ice conditions permitting.
3. Manage Greenland turbot and arrowtooth flounders separately rather than as turbot complex.
4. Limit foreign directed fisheries in the Aleutians to pollock. Allow foreign targeting on turbot only in the Bering Sea outside the Aleutians management area.
5. Continue voluntary foreign closure of Fishery Development Zone.
6. Foreign bycatch allowances should be taken from unspecified reserves rather than from DAP or JVP apportionments.

Council Recommended Changes - January 1986:

1. Limit crab and halibut bycatches in trawls in the Bering Sea.
2. Close all commercial fishing in area between 160°W longitude and 162°W longitude south of 58°N latitude except for waters shallower than 25 fathoms (see #3).
3. Allow U.S. trawling in waters less than 25 fathoms if the U.S. trawler or joint venture mothership has a NMFS-approved observer.
4. Allow NMFS to designate a species as prohibited when its TAC is reached and permit NMFS to close or limit fisheries targeting on other species to prevent overfishing of the prohibited species.

6.0 ENVIRONMENTAL AND REGULATORY ANALYSIS OF RULE 5: ESTABLISH PRIORITY ACCESS TO IMPORTANT STOCKS FOR U.S. FISH PROCESSORS THROUGH THE USE OF TIME AND AREA CLOSURES

6.1 Introduction

6.2 Environmental Impacts

The environmental impacts of reallocating fish from foreign processors to domestic fish processors are expected to be negligible. No increased direct stress to marine mammals and birds is expected. No changes in the effects on endangered species or the coastal zone are expected. This rule is primarily allocational in nature and is considered in greater detail in the Regulatory Impact Review.

6.3 Regulatory Impacts

6.3.1 Fishery costs and benefits.

Alternative 1: Status Quo.

Under the status quo alternative DAP fisheries have priority in the fish apportionment procedure. In the event DAP needs increase beyond the original allocation during the fishing year, fish can be reallocated from the TALFF and JVP categories to meet that increased demand. As has been experienced in the pollock fishery in Shelikof Strait, however there may be a problem implementing this procedure successfully in cases where a fishery targets on spawning concentrations for a short period of the year. In the case of Pacific cod in the Bering Sea spawning occurs roughly February through May in the vicinity of Unimak Pass. The fishery during those months is a target fishery on those spawning stocks which have a higher CPUE than in other areas at other times of year. By the time an increased need for fish by DAP is perceived and reacted to it is conceivable that little of the available resource is left to catch. In addition under the status quo no specific measures have been implemented which would reduce foreign competition in the Pacific cod market.

Alternative 2: Establish a new FMP management goal to make Pacific cod the next fully U.S.-utilized species in the Bering Sea/Aleutian Islands area.

Although not an alternative which implements a specific time and/or area closure to establish priority access this proposed alternative does echo Amendment 11 to the Gulf of Alaska Groundfish Fishery Management Plan which in October 1983 established a new management objective for sablefish. The objective states that sablefish in the Gulf of Alaska will be managed Gulfwide to benefit the domestic fishery. This objective essentially set the stage for the lowering of the OY for sablefish to promote stock rebuilding contained in Amendment 11 and for gear restrictions, gear/area restrictions and OY apportionments to specific gear types contained in Amendments 12 and 14, respectively.

In view of the precedent set in the Gulf for this kind of management objective, alternative 2 could be adopted in conjunction with any of the proposed alternatives here or any other appropriate regulation which would implement the goal. Without knowing specifics of how the objective would be



implemented it is difficult to analyze the impacts of this alternative as it stands alone.

Alternative 3: Allow only DAP fishing for cod during January, February, and March in the Bering Sea/Aleutian Islands.

This could be accomplished as follows: Pacific cod TALFF could be withheld until April 1 each year by the State Department. Joint venture permits could include a restriction that prohibits retention of or targeting on Pacific cod until April 1. This proposed alternative primarily distinguishes itself from alternatives 4-6 in that it can preclude any foreign or joint venture fishing (that may include Pacific cod as bycatch) anywhere in the entire Bering Sea/Aleutian area for the months of January, February, and March. Alternatively, Pacific cod could be made a prohibited species to foreign and joint venture fleets during those months or bycatch limits could be established to allow fisheries for which Pacific cod is a bycatch to continue. The intent of the proposal is to give the U.S. industry exclusive access to the concentrations of Pacific cod in the Unimak Pass area and to the Pacific cod market for the first three months of the year. Industry feels higher CPUEs will lower operating costs during these months and exclusive access to the Pacific cod market will combine to give the domestic industry an economic advantage not available under current regulation.

#### Foreign Fishing

The primary foreign fishing activity in the region during this time of year is a targeted longline fishery for Pacific cod and a trawl yellowfin sole/flounder fishery in which Pacific cod is a bycatch. The longline catches for 1985 during these months were 16,949 mt of Pacific cod. The yellowfin sole fishery caught 16,506 mt of yellowfin sole in 1985 during these three months. Pacific cod averaged 3.21% of the catch mix during this period or approximately 412 mt. In 1986 the entire foreign allocation for Pacific cod is 32,406 mt and the yellowfin sole allocation has been substantially reduced to 49,745 mt. Total catch in 1985 was 125,698 mt.

These numbers imply a substantial reduction in foreign fishing effort has already occurred in these fisheries and since they are both basically year round fisheries, taking the reduced quotas in months other than January-March would not present a problem if the fishery were closed down entirely during these months. Alternatively, Pacific cod could be made a prohibited species or a bycatch limit could be instituted in the yellowfin sole fishery. Using the 1985 catch figures and allowing the 3.21% bycatch of Pacific cod the foreign fleet gross revenue amounts to \_\_\_\_\_. This amount represents an upper limit for two reasons. First the bycatch percentage could be reduced and secondly the lower 1986 allocations would undoubtedly imply a smaller tonnage would be harvested during these months. A complete discussion of the implications of PSCs and bycatch limitations under various scenarios is offered in the discussion under Rule 4.

#### Joint Venture Fishing

The joint venture fishery encounters Pacific cod primarily as a targeted catch and also as a bycatch in the pollock fishery during January through March. The pollock catch during this period in 1985 was 47,056 mt. The total Pacific cod

catches during this period were 10,979 mt in 1985. The value of roe pollock is \$85/ton to the fisherman if fishing for a Korean joint venture and \$115/ton if fishing for a Japanese joint venture. Prohibiting joint venture operations which encounter Pacific cod January through March would, then, imply a minimum loss in pollock revenue of approximately \$4 million and a maximum loss of \$5.4 million depending on the ratio of Japanese to Korean joint ventures in operation during those months in 1985. The exvessel value of Pacific cod is \$.10/lb. This implies a value of \$2.4 million to be added to the minimum and maximum values above to obtain a total dollar value loss in terms of 1985 catches to joint venture operations if they were prohibited from fishing the first three months of the year. In terms of 1986 allocations, the allocation for pollock increased by 75% while Pacific cod underwent a 20% reduction. Using 1985 catches 17% of the Pacific cod allocation was taken January through March. Similarly 12% of the pollock allocation was taken during these months in 1985. Applying these percentages to the 1986 allocations, implies a total revenue loss of a minimum of \$9.0 million and a maximum of \$11.6 million. Since these fisheries, during these months, are exploiting spawning concentrations of pollock and Pacific cod it is doubtful these catches could be compensated for (at least at those fishing costs) if the fishery were closed down entirely. If Pacific cod were made a PSC or if the pollock fishery were allowed to continue with a bycatch allowance, gross revenues of between \$7.1 million and \$9.7 million could be earned on the pollock catches alone. The bycatch percentage of Pacific cod in the pollock fishery is unknown so the possible Pacific cod gross revenues under the bycatch alternative are excluded from the above figure. Similarly the impact of those Pacific cod bycatches on the Pacific cod market are unknown. Also unknown is the possible increased cost of dealing with Pacific cod catches as discards should a PSC be instituted and the extent to which Pacific cod could be avoided in pollock catches if necessary.

A complete discussion of PSCs and bycatch limitations under various scenarios is discussed under Rule 4.

#### Domestic Fishing

Domestic fishing which encounters Pacific cod during January-March primarily is a target fishery for that species. Based on 1985 data, DAP caught 34% of it's total Pacific cod catches during the January through March period. If it is assumed domestic fishermen catch 34% of the TALFF and JVP allocations for 1986 as a result of implementing this alternative in addition to the 34% DAP allocation then the exvessel gain in gross revenue would be \$6.2 million (based on additional catches of 28,300 mt). What is more likely is that the domestic catches will not be this large. The domestic industry hopes this will force a positive price effect to occur in the market combined with the effect of being a principal supplier during this period. Not included in this analysis is the possible future gains to the domestic industry from leaving unharvested Pacific cod in the water.

At the wholesale level the potential gains in gross revenue depend on the catch by gear. Longline gear accounted for only .1% of the DAP catch in the BSAI area in 1985. The other 99.9% of the catch was taken by trawl gear. Using the additional catch figure defined above, additional longline catches would yield between \$28.0 and \$40.5 thousand dollars depending on the mix of H&G and filleted product. Additional trawl catches would yield between \$19.9 and

\$26.1 million depending on the mix of H&G and filleted product. Again, the domestic catches probably would not be this large. Revenue gains, it is hoped would come about more from increased prices than from drastically increased catches.

Alternative 4: Establish a DAP-only area in the area of highest DAP fishing concentration (e.g. Unimak Pass).

#### Foreign Fishing

Grid sampling data on foreign fishing indicate approximately \_\_\_\_\_ % of 1985 foreign catches came from the Unimak Pass area.

#### Joint Venture Fishing

Using grid sampling data and 1985 joint venture catch information joint venture operations caught approximately 88% of their total 1985 pollock catches and 43% of their total Pacific cod catches for the BSAI in the Unimak Pass area. Applying these percentages to 1986 joint venture allocations for 1986, approximately 57,000 mt of Pacific cod and 617,000 mt of pollock will be caught in the Unimak Pass area in 1986. The Pacific cod has an approximate exvessel value of \$12.6 million and the pollock has an approximate value of between \$65.7 million and \$68.2 million (assuming 14% is roe pollock) depending, again, on the ratio of Korean to Japanese joint ventures operating in the area. If joint venture fishing is prohibited in the Unimak Pass area joint venture operations would probably either move north and target on yellowfin sole in which case ice would be a possible problem in early months of the year or they would move northwest to target on roe pollock. It is unknown whether the lost gross revenues from being excluded from the Unimak Pass area could be recouped under these alternatives.

#### Domestic Fishing

The domestic fishery for Pacific cod is a target fishery. Exclusive access to the Unimak Pass area year round would imply possible catch increases of \_\_\_\_\_ of Pacific cod. This figure is based on 1985 grid sampling data which show the proportion of catches taken in the Unimak Pass area by joint ventures and foreign operations. These approximate catch percentages were then applied to JVP and TALFF allocations for 1986. It is assumed that domestic fishermen would in fact take these additional catches for purposes of calculating potential gross revenues at the exvessel and wholesale levels. A calculation of the value to the domestic fishery in future years if a proportion of the catch was left unharvested was not attempted. The exvessel value of the increased catches is \_\_\_\_\_.

At the wholesale level the potential gains in gross revenue depend on the catch by gear. Longline gear accounted for .1% of the DAP catch in the BSAI area in 1985. The other 99.9% of the catch was taken by trawl gear. Assuming these percentages apply to the Unimak Pass area and using the potential catch figure derived above, additional longline catches would yield between \_\_\_\_\_ and \_\_\_\_\_ depending on the mix of H&G and filleted product. Additional trawl catches would yield between \_\_\_\_\_ and \_\_\_\_\_ depending on the mix of H&G and filleted product.

As the discussion under alternative 3 implies, however, the increased catches implied here are probably unlikely. Revenue gains are expected from market effects as described above.

Alternative 5: Establish a DAP-only area in the area of highest DAP fishing concentration for the first six months of the year (e.g. Unimak Pass).

#### Foreign Fishing

#### Joint Venture Fishing

Using grid sampling data and 1985 catch information for joint venture operations, approximately 35% of the total BSAI catches for Pacific cod and 12% of the pollock catches came from the Unimak Pass area in the first six months of 1985. Applying these percentages to 1986 joint venture allocations, approximately 46.6 thousand mt of Pacific cod and 84.1 thousand mt of pollock will be caught in the Unimak Pass area in the first six months of 1986. The Pacific cod has an approximate exvessel value of \$10.2 million and the pollock has an approximate exvessel value of between \$7.1 million and \$9.7 million depending, again, on the ratio of Korean to Japanese joint ventures operating in the area. If joint venture operations were prohibited from operating in the Unimak Pass area from January through June, they would most likely either move north to target on yellowfin sole, in which case ice could present a possible problem in early months of the year, or they would move to the northwest to target on roe pollock. In either case it is unknown whether gross revenues lost due to closure of the Unimak Pass area from January through June could be recouped by these alternatives.

#### Domestic Fishing

The domestic fishery for Pacific cod is a target fishery. Exclusive access to the Unimak Pass area for the first six months of the year would imply possible catch increases of \_\_\_\_\_ of Pacific cod. This figure is based on 1985 grid sampling data which show the proportion of catches taken in the Unimak Pass area by joint ventures and foreign operations. These approximate catch percentages were then applied to JVP and TALFF allocations for 1986. It is assumed that domestic fishermen would in fact take these additional catches for purposes of calculating potential gross revenues at the exvessel and wholesale levels. A calculation of the value to the domestic fishery in future years if a proportion of the catch was left unharvested was not attempted. The exvessel value of the increased catches is \_\_\_\_\_.

At the wholesale level the potential gains in gross revenue depend on the catch by gear. Longline gear accounted for .1% of the DAP catch in the BSAI area in 1985. The other 99.9% of the catch was taken by trawl gear. Assuming these percentages apply to the Unimak Pass area and using the potential catch figure derived above, additional longline catches would yield between \_\_\_\_\_ and \_\_\_\_\_ depending on the mix of H&G and filleted product. Additional trawl catches would yield between \_\_\_\_\_ and \_\_\_\_\_ depending on the mix of H&G and filleted product.

As the discussion under alternative 3 implies, however, the increased catches implied here are probably unlikely. Revenue gains are expected from market effects as described above.

Alternative 6: Close the area within 100 miles of any shorebased processing plant to all but DAP fishing.

Shorebased processing plans currently include the ports of Dutch Harbor, Akutan and Port Moller. A closure area for these ports is outlined in Figure \_\_\_\_.

#### Foreign Fishing

#### Joint Venture Fishing

#### Domestic Fishing

### 6.2.3 Administrative, enforcement and information costs and benefits.

This section discusses other costs associated with adoption of one of the alternative management strategies for establishing priority access to Pacific cod stocks for U.S. processors. Costs highlighted are those relating to administration, enforcement and information.

#### Administrative Costs

The costs include administrative expenses for Council, Council staff, Council family, NMFS Regional Office, NMFS Central Office and ADF&G activities. Of the six alternatives outlined, a change in management goals alone or a time/area closure to implement those goals do not present an administrative burden beyond present costs. A discussion of the costs associated with PSCs or bycatch requirements is found under Rule 4.

#### Enforcement Costs

No change in enforcement costs would be anticipated as a result of a change in management goals alone or by time/area closures to implement those goals. Enforcement costs associated with PSCs or bycatch requirements are discussed under Rule 4.

Time/area closures as presented in the above management alternatives for establishing priority access to Pacific cod stocks by U.S. processing do not present new or costly enforcement problems.

#### Information Costs

Information costs are those expenditures necessary to collect and process the scientific information necessary to carry out the the regulations implementing the fisheries management plan. No change in enforcement costs would be anticipated as a result of a change in management goals alone or by time/area closures to implement those goals. Information costs associated with PSCs and bycatch requirements are discussed under Rule 4.

#### 6.2.4 Impacts on consumers.

It is difficult to anticipate the possible effects on U.S. consumers as a result of implementation of these alternatives given the lack of market information on Pacific cod. If the U.S. catches go to Japan for further processing for the Japanese market little effect would be felt by the U.S. consumer. Even if some of the resultant product is reexported to the U.S. it must compete in price with cod from other sources. The same is true of the Pacific cod which is processed in the U.S. for the domestic market. Without extensive demand analysis it would be difficult to draw any conclusions concerning the benefits or costs to the U.S. consumer as a result of these alternatives.

#### 6.2.5 Redistribution of costs and benefits.

#### 6.2.6 Benefit-cost conclusion.

### 6.3 Other E.O. 12291 Requirements

### 6.4 Impacts of the Rule Relative to the Regulatory Flexibility Act

SEA-ALASKA PRODUCTS  
P.O. Box C900902  
1800 W. Emerson Place  
Seattle, Washington 98119

March 18, 1986

Mr. James O. Campbell, Chairman  
North Pacific Fishery Management Council  
P. O. Box 103136  
Anchorage, Alaska 99510

Dear Chairman Campbell:

I request an opportunity to comment on the "Reconsideration of Tanner Crab by-catch limits on yellowfin sole/flounder trawl fisheries" in the Bering Sea/Alaskan Islands Groundfish portion of the Council meetings scheduled for Wednesday, 3/19/86, at Anchorage, Alaska.

I would like to recommend that the Council favor the conservation of Bering Sea stocks of both Bairdi Tanner and Red King crab in any decisions it takes because:

- There is genuine concern on the part of all groups involved about the depressed state of both stocks of crab.
- There is general agreement that the concentrations of crab in the "Bering Sea Pot Sanctuary" and "58° North by 160° to 162° West trawl gear closure area" identified by the Council at its January 1986 meeting require/consideration <sup>special</sup> now if these valuable fisheries are to have a chance to rebuild in the future.
- NMFS is to begin, within six weeks, a research project that will provide data to help resolve the hotly disputed issues regarding the extent of damage done to crab stocks by trawl gear.
- There are other fishing areas in which yellowfin sole and flounder operations can be conducted on an economically viable basis during the time that the NMFS survey work and further crab stock assessment work is being done.

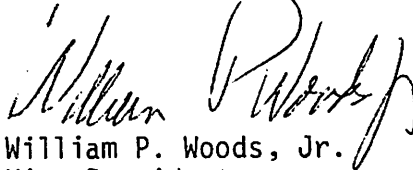
Mr. James O. Campbell, Chairman  
North Pacific Fishery Management Council  
Page Two  
March 18, 1986

For these reasons, and in the interest of responsible fishery management practice consistent with the objectives of the Magnuson Fisheries Conservation Management Act, I urge the Council to give serious consideration to enlarging the area closed to trawl fishing and to lowering the by-catch cap on Bairdi Tanner crab in the area of known high crab concentrations.

I feel these actions would be reasonable and prudent because we should not permit any further damage to the crab stocks in the final weeks before the NMFS gear impact research project develops the additional information needed to responsibly manage the fishery.

Sincerely,

SEA-ALASKA PRODUCTS



William P. Woods, Jr.  
Vice President

WPW/D

Copy to: Jim H. Branson, Executive Director NPFMC



## BERING SEA SABLEFISH CLOSURE OPTIONS

The Council has several options for determining when the directed sablefish fishery should be closed. These are as follows:

1. Status Quo: If the single species closure authority is not in place when TAC is reached, NMFS could either :

(1) take action similar to 1985 and close all fishing in depths greater than 200 fathoms or

(2) increase TAC from the operational reserve to allow the fisheries to continue. Currently the RD does not have authority to close only the directed fishery and therefore he could not prevent targeting by DAP vessels. The SSC says TAC could be adjusted from the reserve to as high as 4500mt.

2. Single species closure authority: If the single species closure authority is in place, the RD could

(1) close the directed fishery when TAC is reached and sablefish would become a prohibited species for all fisheries. No PSC limits would be implemented. The SSC has said that if the total catch (mortality) does not exceed 4500 mt we're okay.

(2) The RD could close the directed fishery when DAP is reached and slowly dribble out additional amounts of fish to allow DAP bycatch fisheries to continue to retain sablefish. JVP and TALFF fisheries could also retain their apportionments. The main problem is trip limits or some similar technique would be necessary and we cannot monitor the fishery adequately to ensure compliance with the "no targeting" rule. It is doubtful whether this option would work.

3. The RD could increase the TAC from the reserve so that the fishery would continue until the June Council meeting. The Council could then reevaluate the situation (markets, prices, etc.) and provide the RD with additional guidance at that time.

UNITED STATES DEPARTMENT OF JUSTICE

The following information was received from the Bureau of the Internal Revenue Service on 10/15/54:

On 10/15/54, the Bureau of the Internal Revenue Service advised that the following information was received from the Bureau of the Internal Revenue Service on 10/15/54:

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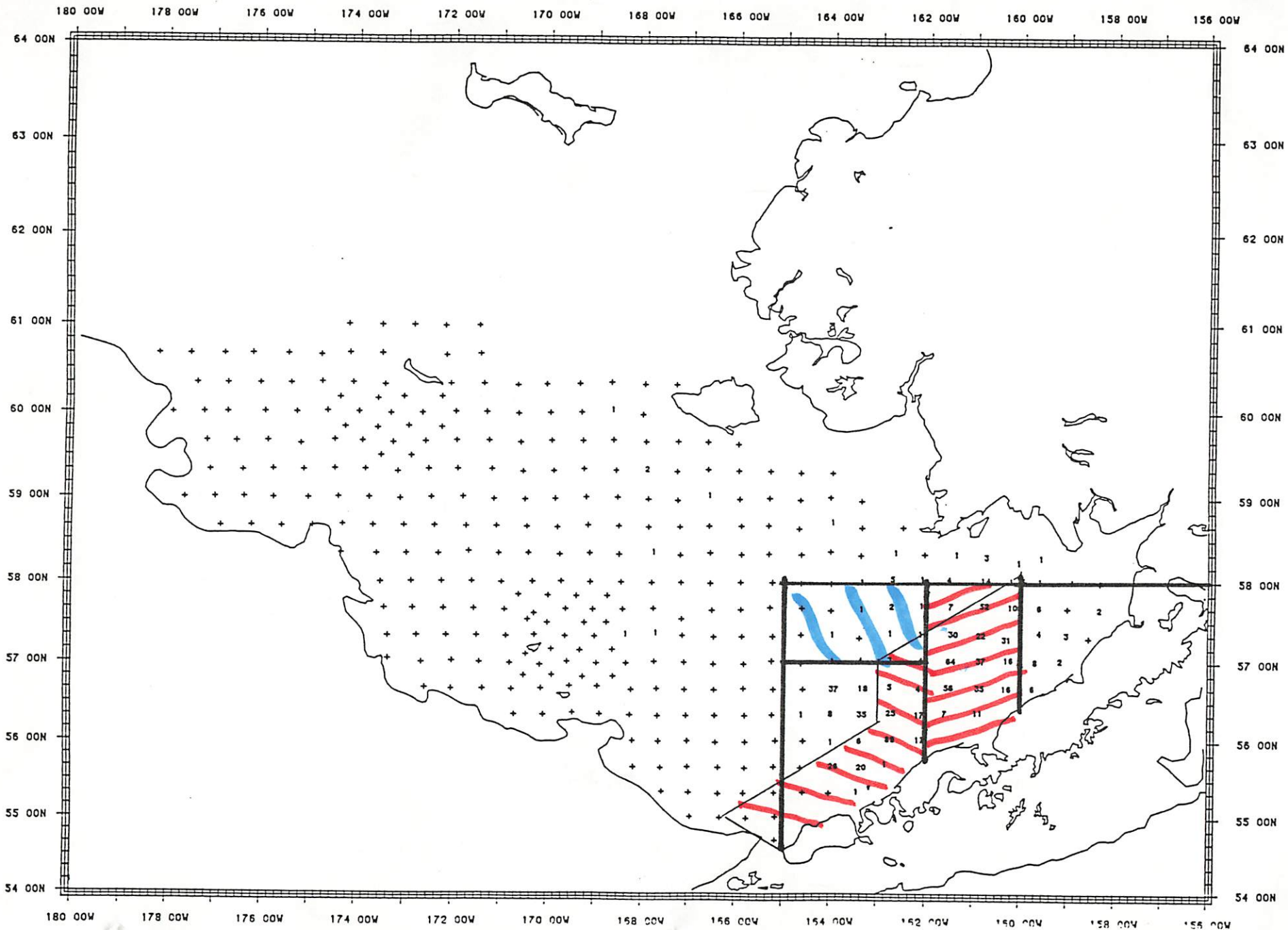
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3/21/86  
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Figure 88.--Catch per unit effort (number/nautical mile trawled) of red king crab (*Paralithodes camtschatica*) from 1985 research survey data.

111





The use of a small mesh trawl towed over the first trawl's track represents a different approach to estimating crab mortality resulting from trawling. For this approach to succeed: 1) the second trawl must be towed within the path of the first trawl; 2) the second trawl must sample a known proportion of the crab that were left by the first trawl, without causing any additional injuries in the process (i. e., which trawl injured the crab?); and 3) there can be no migration of crab into or out of the area swept by the first trawl before the small mesh trawl arrives. These conditions would be difficult to meet.

In your letter, and at the meeting, you stated your opinion that trawl-induced crab mortality can be measured by towing an ROV from a second following trawl and/or by towing a second small mesh trawl in order to pick up injured crab. We do intend to deploy the ROV behind the trawl to scan the bottom that was swept by the trawl. In addition, during Leg II it may be desirable to deploy the ROV from the experimental vessel to observe another vessel's trawl. However, it should be pointed out that it will be very difficult to evaluate the physical condition of any crab sighted during the brief time that they will be within the field of view from the moving ROV, or to determine whether such crab had been contacted by the trawl or had moved into the swept path after the trawl's passage.

I recently reviewed your letter of February 24 to Bill West in which you explained your reasons for withdrawing your offer of support for the Bering Sea King crab/trawling study, and Bill's reply to you dated February 28. I feel that Bill's letter did not go far enough in terms of responding to the points raised in your letter, even though those points and others were discussed in depth at the February 13 working group meeting which you attended.

Mr. Kris Poulsen  
 Kris Poulsen & Associates  
 1143 N. W. 45th Street  
 Seattle, Washington 98107

Dear Kris,

AGENDA D-4(a)  
 MARCH 1986  
 SUPPLEMENTAL  
**UNITED STATES DEPARTMENT OF COMMERCE**  
 National Oceanic and Atmospheric Administration  
 NATIONAL MARINE FISHERIES SERVICE  
 Northwest and Alaska Fisheries Center  
 7600 Sand Point Way NE.  
 Building 4, BIN C15700  
 Seattle, Washington 98115



MAR 14 1986

R/NWC1:CMW

We believe that the methodologies we proposed represent a reasonable first effort at studying the fate of king crab encountering bottom trawl gear, with a reasonable chance of producing answers to a limited set of carefully-defined questions. For example, it should be possible to resolve the controversy over the nature of sweep line contact with the bottom. We again caution, however, that the results from this initial study will be limited.

Which brings me to my final point. I am very disappointed that you have withdrawn your offer to contribute to the fuel costs of the commercial vessel participating in Leg II operations. The commitment of Industry resources to conduct a portion of the research increases our joint ability to provide answers to the questions that trouble you and other fishermen, crabbers and trawlers alike. We will carry out the research in any case, thanks, in part, to the willingness of trawl fishermen to allow us the opportunity to make ROV observations during their fishing operations.

Sincerely,

*Bill*

William Aron  
Center Director

cc: James O. Campbell, Chairman, NFFMC  
Don W. Collinsworth, Commissioner, ADF&G  
Jim Branson, NFFMC

D-4c

DISTRIBUTION AND ABUNDANCE OF  
EASTERN BERING SEA KING AND  
TANNER CRABS RELATIVE TO PROPOSED  
CLOSED AREAS

REPORT TO: NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

ANCHORAGE, ALASKA  
MARCH 17 - 21, 1986

ROBERT S. OTTO  
NATIONAL MARINE FISHERIES SERVICE  
NORTHWEST AND ALASKA FISHERIES CENTER  
RESOURCE ASSESSMENT AND CONSERVATION ENGINEERING DIVISION

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## INTRODUCTION

No new surveys of eastern Bering Sea crab resources have been conducted since the 1985 summer trawl survey. Estimates of crab abundance presented by Stevens (1985a, 1985b) are hence the latest available and formed the basis of information on the status of crab stocks that was presented to the Council in September and again in January. I have, however, used the 1985 summer data to calculate the numbers and percentages of crabs found within areas affected by proposed restrictions adopted by the Council on January 17, 1986.

Crab landing data for 1985 have been published (ADFG 1986) since the January meeting. Landing data have also been grouped according to restricted areas. These data provide some insight into the costs associated with area closures, changes in distribution of legal stocks and handling mortalities of crab in the fishery.

Taken together, survey and fishery data have been used to project the abundance of commercial king and tanner crab stocks in 1986. Projections for 1986 indicate no change in abundance of legal-size red king crab but declining abundance for Pribilof blue king crab (-33%), St. Matthew blue king crab (-27%) and *C. bairdi* (-29%). Commercial-size *C. opilio* will probably decline also, but a method of projecting abundance is not available for this species.



## DISTRIBUTION OF CRABS BY AREA

Fishery data published by ADFG (1986) are given in one-half by one degree latitude-longitude squares. The 1985 data were grouped by area (Table 1) and interpreted as follows:

1) About 76% of C. bairdi landings came from the "closed area", this amounted to 2.39 million pounds worth \$3.35 million (1.40/Lb). An additional 18% of landings or 0.57 million pounds came from elsewhere in the area bounded by 58° N and 165° W ("quota area"). Total landings were 3.15 million pounds worth \$4.41 million.

2) Landings of C. opilio from the quota and closed areas were negligible. Total Bering Sea landings were 66.00 million pounds worth \$19.80 million. (\$0.30/Lb).

3) About 57% of red king crab landings came from the closed area; this amounted to 2.39 million pounds or \$6.93 million (2.90/Lb). The remainder of landings were contained within the quota area. Totals were 4.17 million pounds or \$12.09 million.

4) There were no reported landings of blue king crab within quota or closed areas. Landings were 0.53 and 2.42 million pounds or \$1.54 and \$3.87 million for the Pribilof Islands and St. Matthew Island Fisheries (\$2.90 and \$1.60/Lb).

5) The total value of eastern Bering Sea King and Tanner crab fisheries was \$41.71 million of which \$10.35 million (25%) came from the closed area.

The ADFG data also include handling mortality figures ("dead loss") for legal-sized crabs. These are to be summarized for 1985 as follows (pounds):

<u>Fishery</u>	<u>Catch</u>	<u>Dead Loss</u>	<u>%</u>
C. bairdi	3,151,498	14,096	0.45
C. opilio	65,998,875	1,064,184	1.61
Red King	4,174,953	6,436	0.15
Blue King (Prib.)	532,735	7,500	1.43
Blue King (St. M)	2,427,110	2,618	0.11

Historically, the percentage of dead loss has been:

<u>Fishery</u>	<u>Years</u>	<u>Range (%)</u>	<u>Mean</u>
C. bairdi	1980 - 1985	0.15 - 1.25	0.62
C. opilio	1979 - 1985	0.58 - 5.07	2.88
Red king	1977 - 1985	0.15 - 3.30	1.69
Blue King (Prib.)	1977 - 1985	0.00 - 4.75	1.82
Blue King (St. M)	1977 - 1985	0.11 - 26.67	9.03

In general, the percentage of dead loss has been low over the past three years and 1985 figures were below average in all cases. To some degree low handling mortalities may reflect lower catch rates, however, the highest mortalities recorded were from St. Matthew Island during years when landings were less than 250,000 pounds. It seems probable that handling methods have improved.

If one assumes that rates of dead loss are representative of handling mortality, and that 0.31 mature female red king crab are taken for each legal male (from Griffin et al 1983), then some 4,200 mature females (mean rate) would have been killed (in the course of catching 796,200 legal males (from ADFG 1986).

Alternatively, if mature females were taken in proportion to

their relative abundance (6.8 million per 2.5 million legal males) then 36,600 may have been killed. Application of 1985 dead loss rates leads to estimates of 370 and 3250 mature females for the two methods of calculating catch rate. The closed area would probably account for 60 to 70% of mortalities.

In general, when survey data are grouped according to restricted areas (Table 2), the results are similar to those for fishery data. Legal Red king crab were, however, encountered less frequently in the closed area during the survey than they were during the fishery. This condition probably reflects the fact that legal males were most concentrated near the 162° W latitude line during fishery and survey periods. Minor differences in reporting or distribution could easily result in the observed differences. Assuming that the 1985 survey data are representative of the current east-west distribution of *C. bairdi* and red king crab (neither species occurs appreciably north of 58° in Bristol Bay); these data are interpreted as follows:

- 1) Quota and closed areas are largely irrelevant to the distributions of *C. opilio* and blue king crab.

- 2) The closed area includes about half of the red king crab population but protects about 68% of mature females and 60% of immature females. Negligible quantities of red king crab are found outside the combined closed and quota areas.

- 3) Most of the *C. bairdi* stock lies outside of the combined and quota areas. The closed area does, however, contain 69% of the legal-sized *C. bairdi*. Data for mature females is not easily

summarized because there is an east-west cline in the size at maturity (highest in Bristol Bay), and because mature females are found in continental slope areas (not covered by the survey) in addition to shallower areas.

#### ABUNDANCE TRENDS

Male red king crab abundance has been forecasted using methods of Otto (1986) which incorporate rates of growth and natural mortality derived by Balsiger (1974). The model used to forecast legal male abundance calculates future abundance from a given year's survey estimates of male abundance by 5 mm carapace length (CL) groups, fishery removals (5 mm CL), rates of growth (a transfer matrix) and natural mortality. Forecasts are made one and two years in advance. One year forecasts were reasonably accurate predictors of the following year's survey estimates until 1980 but since that time have overestimated abundance by approximately 100% (Fig. 1). Using Balsiger's (1974) estimates of natural mortality the expected legal population in 1986 is 5.2 million legal males. Using higher mortality rates characteristic of the years 1980 - 1985 results in an estimate of 2.5 million legal males. Since predator abundance and environmental factors appear to be similar to last year the latter estimate is more likely.

The abundance of mature female red king crab peaked in 1977 and has declined at an average compounded rate of 32% from 1977 to 1985. The apparent decline from 1984 to 1985 was 61%. Size-frequency data (Stevens 1985a) show that the mean size of females

was 90 mm CL in 1985 which is identical to the mean size at maturity. The total estimated number of females in 1985 was 13.7 million of which 6.8 million were larger than 90 mm CL and virtually all of the remaining 6.9 million were within 15 mm (one average molting increment, Weber 1967) of 90 mm CL. The 1985 survey data showed no incidence of crab smaller than approximately 70 mm CL. The abundance of females will continue to decline going into 1986. Assuming all females present in 1985 will be mature in 1986 and applying rates of decline of 32 or 61% results in a range of 5.4 to 9.4. The midpoint of this range 7.4 million mature females as compared to 6.9 million estimated in 1985.

Calculations for Pribilof and St. Matthew Island blue king crab follow the same methodology as used for red king crab. Expected populations of legal males and mature females compare to 1985 estimates as follows:

Stock	1984 ( $\pm$ 95% C.I)	(1985)
Bristol Bay		
Mature females	6.8 (3.5, 10)	7.4
Legal males	2.5 (1.9, 3.5)	2.5
Pribilof Islands		
Mature females	0.5 (0.3, 0.9)	0.2
Legal males	0.3 (0.2, 0.5)	0.2
St. Matthew Island		
Mature females	0.2 (0.0, 0.3)	-
Legal males	1.1 (0.7, 1.5)	0.8

Forcasts of abundance for either tanner crab species are extremely tenuous. In the case of C. bairdi, use of abundance, fishery removals, growth data and reasonable rates of mortality

analogous to that used for red king crab, has not provided useful predictors of abundance (R-square typically 70%). Projected abundance was hence computed from a descriptive regression equation based on abundance and catch data for the years 1973 - 1984. The equation was:

$$Y = 0.65 + 1.09A + 0.089B - 0.19C.$$

where:

Y = the logarithm of legal abundance in year t + 1,

A = logarithm of legal abundance in year t,

B = logarithm of prerecruit abundance (males 110-135 mm width) in year t,

C = Logarithm of catch between surveys in year t and year t + 1.

The R-square value for this equation was 92.4%, and according to it, the abundance of legal males in 1986 would be 3.2 million crab as compared to 4.5 million in 1985.

Recruitment patterns for commercial-size (95 mm carapace width minimum) C. opilio are not clear due to variable immigration from areas to the north of the survey area. Estimates of commercial stock declined from 244.4 million crabs in 1984 to 108.1 million crab in 1985. Size frequency data (Stevens 1985a) indicate that abundance will continue to decline.

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Table 1 -- Landings of king and tanner crabs during 1985 from areas of the eastern Bering Sea affected by NPFMC proposed restrictions adopted on January 17, 1986. Millions of pounds (percent of species catch).

Species	Areas <sup>1</sup>			
	Closed	Quota	Outside	Total
C. bairdi	2.39 (75.8)	0.57 (18.0)	0.20 (6.2)	3.15
C. opilio	<0.01 (<0.1)	0.23 (0.3)	65.77 (99.7)	66.00
Red King <sup>2</sup>	2.39 (57.1)	1.79 (42.9)	0.00 (0.0)	4.17
Blue King	0.00 (0.00)	0.00 (0.0)	2.96 (100.0)	2.96

<sup>1</sup> Closed area bounded by 58° N. latitude, 160° W. longitude, 162 W. longitude and the Alaska Peninsula (includes waters within the 25 fathom isobath); quota area bounded by 58° N. latitude 165° W. longitude and the Alaska coast line but exclusive of the closed area; outside refers to the remainder of the eastern Bering Sea.

<sup>2</sup> Excludes Norton Sound.



Table 2. Estimated abundances (millions) and percentages of various sex-size (mm) groups of crabs from areas affected by NPFMC proposed restrictions adopted on January 17, 1986. All figures are derived from the 1985 NMFS trawl survey in the eastern Bering Sea. Totals may differ slightly due to rounding.

Species	Areas <sup>1</sup>			
	Closed	Quota	Outside	Total
<b>C. bairdi:</b>				
Males <110	2.8 (6.1)	6.0 (13.)	37.3 (80.9)	46.1
Males 110-134	3.3 (30.8)	1.9 (17.8)	5.5 (51.4)	10.7
Males >134	3.1 (68.9)	0.7 (15.6)	0.7 (15.6)	4.5
Female <85	1.5 (3.6)	2.4 (5.7)	38.2 (90.7)	42.1
Female >84	9.0 (56.6)	1.4 (8.8)	5.5 (34.6)	15.9
<b>Total</b>	<b>10.7 (9.0)</b>	<b>12.5 (10.5)</b>	<b>87.2 (73.1)</b>	<b>119.3</b>
<b>C. opilio<sup>2</sup></b>				
Males <95	1.2 (0.2)	5.9 (1.1)	506.8 (98.6)	513.9
Males >95	0.3 (0.3)	3.4 (3.1)	104.3 (96.5)	108.1
Females <50	0.0 (0.0)	0.1 (0.0)	257.7 (100.0)	123.4
Females >49	0.0 (0.0)	0.1 (0.0)	123.4 (100.0)	1003.3
<b>Total</b>	<b>1.6 (0.2)</b>	<b>9.5 (0.0)</b>	<b>992.4 (98.9)</b>	<b>1003.3</b>
<b>Red King<sup>3</sup></b>				
Males <110	7.0 (51.5)	6.6 (48.5)	0.0 (0.0)	13.6
Males 110-134	4.0 (40.4)	5.9 (59.6)	0.0 (0.0)	9.9
Males >134	0.8 (30.7)	1.7 (65.4)	0.1 (3.8)	2.6
Females <90	4.1 (59.4)	2.8 (40.6)	0.1 (0.0)	6.9
Females >89	4.6 (67.6)	2.1 (30.9)	0.1 (1.5)	6.8
<b>Total</b>	<b>20.4 (51.3)</b>	<b>19.1 (48.0)</b>	<b>0.3 (0.8)</b>	<b>39.8</b>
<b>Blue King</b>				
<b>Total</b>	<b>0.00 (0.0)</b>	<b>0.00 (0.0)</b>	<b>3.3 (100.0)</b>	<b>3.3</b>

<sup>1</sup> Per Table 1.

<sup>2</sup> Excludes areas north of St. Matthew Island.

<sup>3</sup> Excludes Norton Sound.

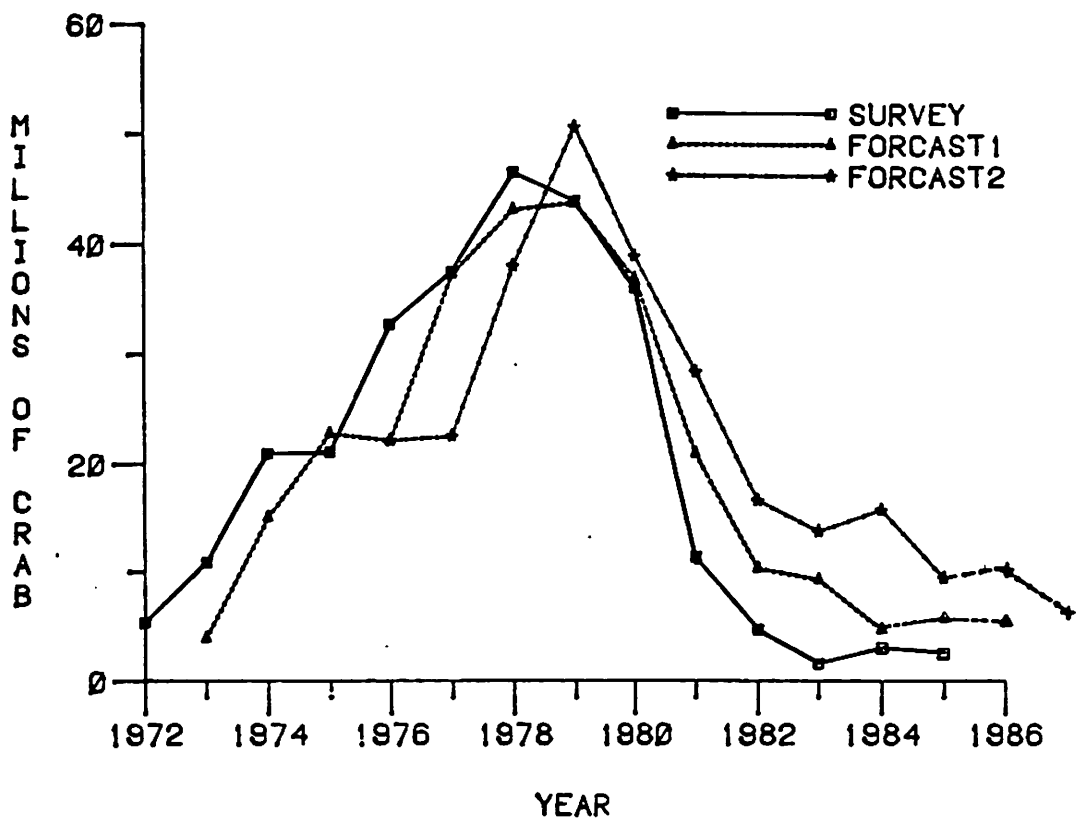


Figure 1. Forcasted abundance of legal male red king crab in comparison to abundance estimates from surveys one (FORCAST1) and two (FORCAST2) years later.

SEA-ALASKA PRODUCTS  
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March 18, 1986

Mr. James O. Campbell, Chairman  
North Pacific Fishery Management Council  
P. O. Box 103136  
Anchorage, Alaska 99510

Dear Chairman Campbell:

I request an opportunity to comment on the "Reconsideration of Tanner Crab by-catch limits on yellowfin sole/flounder trawl fisheries" in the Bering Sea/Alaskan Islands Groundfish portion of the Council meetings scheduled for Wednesday, 3/19/86, at Anchorage, Alaska.

I would like to recommend that the Council favor the conservation of Bering Sea stocks of both Bairdi Tanner and Red King crab in any decisions it takes because:

- There is genuine concern on the part of all groups involved about the depressed state of both stocks of crab.
- There is general agreement that the concentrations of crab in the "Bering Sea Pot Sanctuary" and "58° North by 160° to 162° West trawl gear closure area" identified by the Council at its January 1986 meeting require <sup>Special</sup> consideration now if these valuable fisheries are to have a chance to rebuild in the future.
- NMFS is to begin, within six weeks, a research project that will provide data to help resolve the hotly disputed issues regarding the extent of damage done to crab stocks by trawl gear.
- There are other fishing areas in which yellowfin sole and flounder operations can be conducted on an economically viable basis during the time that the NMFS survey work and further crab stock assessment work is being done.

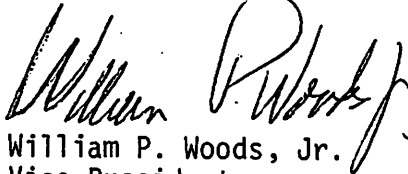
Mr. James O. Campbell, Chairman  
North Pacific Fishery Management Council  
Page Two  
March 18, 1986

For these reasons, and in the interest of responsible fishery management practice consistent with the objectives of the Magnuson Fisheries Conservation Management Act, I urge the Council to give serious consideration to enlarging the area closed to trawl fishing and to lowering the by-catch cap on Bairdi Tanner crab in the area of known high crab concentrations.

I feel these actions would be reasonable and prudent because we should not permit any further damage to the crab stocks in the final weeks before the NMFS gear impact research project develops the additional information needed to responsibly manage the fishery.

Sincerely,

SEA-ALASKA PRODUCTS



William P. Woods, Jr.  
Vice President

WPW/D

Copy to: Jim H. Branson, Executive Director NPFMC