

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

APPROVED
BY
THE NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
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ENVIRONMENTAL ASSESSMENT/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

SUMMARY

As part of the annual amendment cycle for the Bering Sea/Aleutian Islands Groundfish Fishery Management Plan (FMP) the Council reviews proposed changes submitted by the public and management agencies. The Plan Team and NMFS have identified several problems or potential problems which they feel warrant Council attention. These include:

1. Inadequate control of bycatch of crabs and halibut in DAP fisheries;
2. Inadequate catch reporting requirements in DAP fisheries;
3. Inadequate authority for inseason reapportionment among domestic fisheries; and
4. Inadequate inseason management authority.

The purpose of this document is to determine what will happen if these proposals are implemented. The Environmental Analysis (EA) portions consider general environmental impacts. The Regulatory Impact Review (RIR) and Initial Regulatory Flexibility Analysis (IRFA) sections consider the economic impacts of the change in management. Chapter 1 explains in detail the legal requirements and standards for the environmental and socioeconomic analyses. Chapter 1 also provides an overview of the stocks involved, the number of fishermen participating in the various fisheries, and overall magnitude of the groundfish fishery in the Bering Sea/Aleutians management area.

Chapters 2 through 5 describe the specific problems and the potential environmental and socioeconomic impacts of each alternative solution. Each alternative is analysed in relation to the status quo so that the relative merits and shortcomings of each alternative can be compared. The environmental analysis of each alternative is presented first, followed by the regulatory impact analysis.

Chapter 2 addresses the crab and halibut bycatch issue. Five alternative solutions to the status quo (including the Council's preferred alternative, which was developed at their September 1986 meeting) are presented and analysed. These include the emergency rule as approved by NMFS in 1986 to control DAP bycatches, the emergency rule as recommended by the Council, a framework management approach which allows adjustments of the prohibited species catch (PSC) limits on an annual basis, and a closure of the Bristol Bay Pot Sanctuary. It is apparent from the 1986 fishery, which operated under the emergency rule, that joint venture yellowfin sole/flatfish trawlers can greatly reduce their bycatches and still take their full target tonnages. Thus the emergency rule alternatives would be expected to successfully achieve the Council's goals under the current stock and fishery conditions. However, the halibut PSC limits within Zone 1 in the Council's emergency rule would greatly constrain the joint venture fishery. The framework offers greater flexibility to address changing circumstances while still providing the needed protection to halibut stocks and depressed crab stocks. The Pot Sanctuary closure alternative may not adequately protect red king crab because a significant portion of the stock lies outside the closed area where no PSC

limits would be established. Tanner crab and halibut bycatches would likewise be unrestricted. Any choice of PSC limits for DAP vessels would require observers to monitor and record bycatches, but indirect measures (such as groundfish target quotas and seasons) would not require observers.

Alternative 6 is identical to Alternative 2 but includes a halibut PSC provision for the joint venture flatfish fishery.

Chapter 3 addresses a shortcoming of the catcher/processor reporting requirement approved last year in Amendment 9. The NMFS regional office recommends that weekly catch reports be mandatory whether or not the catch remains on board 14 days. The recommended revision, which is identical to that proposed for the Gulf of Alaska (GOA) FMP, will rectify the problem.

Chapter 4 addresses inseason reapportionment between DAP and JVP. Currently the FMP is silent on this issue and NMFS has asked for explicit authority, although implicit authority for such adjustments already exists. Identical language to that currently in the GOA FMP is recommended for the BSAI FMP.

Chapter 5 addresses inseason management (i.e. field order) authority. Currently the Regional Director (RD) has no authority to reduce TACs or PSC limits even if biological emergencies arise. The proposed language is identical to that proposed for the GOA FMP except that here an alternative considering action based on socioeconomic criteria is not considered. Adoption of the proposed authority should allow the RD to respond quickly to biological emergencies such as a dramatic drop in female red king crab abundance. Without this inseason authority, the RD would have to respond with an emergency rule, a procedure which could easily take six months to complete. Any socioeconomic impacts should be short term since the inseason measures would expire at the end of the fishing year.

ADDENDUM

COUNCIL'S PREFERRED ALTERNATIVES

Introduction

At its September 24-26, 1986 meeting the Council approved Amendment 10 for submission to the Secretary for review and implementation. In reaching its decisions on the various management issues, the Council reviewed written public comments and oral testimony presented at the meeting along with the Draft EA/RIR/IRFA. This addendum to the EA/RIR/IRFA identifies the Council's adopted alternatives and provides the rationale and background for their decision.

I. Management Problem 1: Inadequate control of bycatch of crabs and halibut in DAH fisheries.

The Council adopted Alternative 6, the emergency rule as implemented by NMFS for the 1986 fishery with an additional provision to limit halibut bycatch by joint venture vessels. The Advisory Panel (AP) and Scientific and Statistical Committee (SSC) advised the Council that a more flexible management regime would be more desirable and that work should continue on a framework approach. To emphasize the short term nature of the chosen alternative, the AP recommended that a two year sunset provision be included. The Council concurred with this recommendation and stated that all bycatch restrictions in Amendment 10 will expire at the end of 1988.

With respect to the requirement for observers on DAP vessels, the Council noted that while a NMFS-approved data collection program for DAP fisheries is mandatory this does not mandate 100% observer coverage.

The halibut provision recommended by the AP and approved by the Council is based on the following calculation:

3,100 mt	halibut bycatch level approved by industry in 1985
-500 mt	average halibut bycatch by crab and shrimp fisheries
-360 mt	expected halibut bycatch by foreign fisheries
2,240 mt	available for bycatch by DAH fisheries

Assuming the average weight of incidental halibut to be 1 pound, this equates to 987,392 halibut.

987,392 halibut	total DAP bycatch allowance
-98,740 halibut	allowance of 10% for DAP fishery bycatch
-60,000 halibut	allowance for non-flatfish joint ventures
828,000 halibut	PSC limit for yellowfin sole/other flatfish joint ventures

While the figures for the crab fishery, DAP, etc., are non-binding, the 828,000 halibut for the yellowfin sole/other flatfish joint venture is a PSC limit that triggers closure of Zone 1 when attained.

Although Alternative 6 was not specifically included in earlier drafts of the EA/RIR/IRFA, the analysis in those documents was broad enough to include the impact of the alternative. A specific discussion of the impact of Alternative 6 has been incorporated into the final EA/RIR/IRFA. The Council supported this alternative since it was developed jointly by representatives of both the halibut and trawl industries as an interim measure (pending development of a more comprehensive framework amendment). The Council has directed an industry workgroup and the Plan Team to continue work on a comprehensive bycatch framework, if possible, in time for the 1987 FMP amendment cycle.

II. Management problem 2: Inadequate catch reporting requirements in DAP fisheries.

The Council approved Alternative 2, which stipulates that each U.S. vessel which will process fish at sea during the fishing year must report its catch on a weekly basis whenever it has fish on board, regardless of how long it holds the fish on board. The revision also includes a new definition of fish processing.

III. Management Problem 3: Inadequate authority for inseason reapportionment among domestic fisheries.

The Council adopted Alternative 2, which explicitly authorizes the Secretary of Commerce (through the Regional Director) to reapportion unneeded DAP to JVP and unneeded JVP to DAP. The Council views this as a technical correction to the FMP and regulations and that no change in the current reapportionment procedure will result from this action.

IV. Management Problem 4: Inadequate inseason management authority.

The Council approved a revised and clarified inseason management authority along the lines of Alternative 2. Their decision was based on the understanding that this authority will be used only in the case of true

emergency such as the prevention of overfishing. The Council intends that the least restrictive management response possible will be exercised, but that increasingly restrictive measures would be implemented as necessary.

The description of Alternative 2 in the EA/RJR/IRFA has been revised to reflect the Council's intent. The analysis in the earlier draft adequately described the impacts of the revised alternative.

1.0 INTRODUCTION

1.1 Council Action

The domestic and foreign groundfish fishery in the Fishery Conservation Zone (3-200 miles offshore) of the Bering Sea and Aleutian Islands (BSAI) is managed under the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands (FMP). The FMP was developed by the North Pacific Fishery Management Council (Council) under the Magnuson Fishery Conservation and Management Act (Magnuson Act). It was approved by the Assistant Administrator for Fisheries, NOAA, (Assistant Administrator) and implemented on January 1, 1982 (46 FR 63295, December 31, 1981). Seven of nine amendments to the FMP have been implemented. This document assesses the effects of Amendment 10.

The Bering Sea/Aleutian Islands groundfish fishery is characterized by: (1) fluctuating fish stocks; (2) the rapid replacement of foreign fisheries by wholly domestic and joint venture fisheries; (3) incidental catches of species which are fully used by other American fishermen; and (4) changing market conditions. The FMP, as amended through 1985, does not adequately manage the current groundfish fisheries. These inadequacies tend to prevent the FMP goals from being met. These goals serve to: (1) protect the long-term productivity of living marine resources by preventing either overfishing or fishing related degradation to fishery habitat; and (2) within the bounds set by this conservation goal, provide a management environment that will result in the allocation of these resources that will generate the greatest benefit to the nation.

At its January and March 1986 meetings, the Council reviewed the status of the FMP and proposed amendments to address problems which have been identified. These management problems are:

1. Inadequate control of crab and halibut bycatches in DAP fisheries.
2. Inadequate catch reporting requirements in DAH fisheries.
3. The need to formalize the procedure for reapportionment of unneeded DAP to JVP.
4. Inadequate inseason management authority.

The Council received recommendations from the public, the Plan Team, the Advisory Panel (AP), and the Scientific and Statistical Committee (SSC) on alternative management measures that could be adopted to resolve the problems. The Council adopted a "public hearing" package for consideration of all affected and interested parties. After an initial review period the proposals addressing crab bycatch and inseason management were revised and clarified. This extra step was taken to ensure that the affected public would be fully informed of the Council's options and the potential impacts of those alternatives under consideration.

1.2 Purpose of Environmental Assessment (EA)

This document addresses the predicted impacts that the proposed regulatory alternatives will have on the socioeconomic and biological environment. The Environmental Assessment (EA) portion of the document is required by the

National Oceanic and Atmospheric Administration in compliance with the National Environmental Policy Act of 1969. The purpose of the EA is to analyze the impacts of major Federal actions on the quality of human environment. It serves as a means of determining if significant environmental impacts could result from a proposed action. If the action is determined not to be significant, the EA and resulting finding of no significant impact (FONSI) would be the final environmental documents required by NEPA. An EIS must be prepared if the proposed action may be reasonably expected: (1) to jeopardize the productive capability of the target resource species or any related stocks that may be affected by the action; (2) to allow substantial damage to the ocean and coastal habitats; (3) to have a substantial adverse impact on public health or safety; (4) to affect adversely an endangered or threatened species or a marine mammal population; or (5) to result in cumulative effects that could have a substantial adverse effect on the target resource species or any related stocks that may be affected by the action. Following the end of the public hearing, the Council could determine that Amendment 10 will have significant impacts on the human environment, and proceed directly with preparation of an EIS required by NEPA. This EA is prepared to analyze the possible impacts of alternative management measures to solve the four management problems identified above.

1.3 Purpose of Regulatory Impact Review/Initial Regulatory Flexibility Analysis (RIR/IRFA)

The socioeconomic analysis has been prepared in compliance with Executive Order 12291. The National Marine Fisheries Service requires the preparation of a Regulatory Impact Review (RIR) for all regulatory actions or for significant DOC/NOAA policy changes that are of public interest. The RIR: (1) provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; (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 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 any proposed regulations are major under criteria provided in Executive Order 12291 (E.O. 12291) and whether or not proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Act (P.L. 96-354, RFA). The primary purpose of the RFA is to relieve small businesses, small organizations, and small governmental jurisdictions (collectively, "small entities") of burdensome regulatory and record keeping requirements. This Act requires that if regulatory and record keeping 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.

1.4 Description of the Bering Sea Area and Stocks Involved

The Bering Sea/Aleutian Islands management area is defined as those waters lying south of the Bering Strait, east of the U.S.-U.S.S.R. convention line of 1867, and extending south of the Aleutian Islands for 200 miles between the convention line and 170°W. Waters lying south of lines joining headlands in

the eastern Aleutian Islands, east of 170°W, are considered a part of the Gulf of Alaska management area. The most prominent and unique feature of the Bering Sea is the extensive continental shelf in the eastern and northern portion of the sea. It constitutes approximately 80% of the total shelf area in the Bering Sea and is one of the world's largest. For the Bering Sea as a whole, 44% of its 2.3 million km² area is continental shelf, 13% continental slope, and 43% deepwater basin. A number of large bays, including Bristol and Kuskokwim Bays and Norton Sound on the Alaska coast, makes the coast line of the Bering Sea highly irregular. The area of all bays in the Bering Sea makes up 11.1% of the total area of the sea.

The broad eastern Bering Sea shelf is extremely smooth and has a gentle uniform gradient resulting from sediment deposits. The sediments, originating along the coast and transported offshore in graded suspension by storm waves, are predominantly sands over the inner shelf and silt and clay sediments on the outer shelf and slope. The continental slope bordering the eastern Bering Sea shelf is abrupt and very steep and is scoured with valleys and large submarine canyons.

The dominant water movement on the eastern Bering Sea continental shelf originates from Pacific waters entering the Bering Sea in the vicinity of Unimak Island. These waters move northward toward St. Matthews Islands and eastward toward Bristol Bay. The northward stream divides near St. Matthews Island before joining again and passing through the Bering Strait.

A major environmental feature of the Bering Sea is the pack ice which covers most of the continental shelf in the eastern and northern sections of the sea in winter and spring. The ice edge begins to intrude into the northern Bering Sea in November, and normally reaches its maximum in late March. At its maximum the ice pack may cover the continental shelf south to the Pribilof Islands and extend from the Pribilof Islands eastward to the vicinity of Port Moller. The areas of the outer shelf between the Pribilof Islands and Unimak Island and deeper waters of the Bering Sea are generally ice free throughout the year because of the intrusion of warmer Pacific Ocean water. In April and May the ice edge begins to retreat and by early summer the Bering Sea is normally free of ice.

The physical, climatic, and oceanographic features in the eastern Bering Sea combine to create conditions highly favorable for primary biological productivity, which are only surpassed by some of the upwelling regions in the eastern Pacific and Atlantic Oceans. This productivity supports some of the largest fish, marine mammal, and bird populations in the world.

The Bering Sea supports about 300 species of fish, the majority of which are found near or on the bottom. Relatively few of these species form aggregations large enough to attract target, or occasional target fisheries. The major species that do are Pacific cod, Pacific ocean perch, other rockfish, sablefish, Atka mackerel, pollock, and various species of flatfish. Yellowfin sole dominates the flatfish group and has the longest history of intense exploitation by foreign fisheries. Other flatfish species that are known to occur in aggregations large enough to form target species or occasional target species are Greenland turbot, rock sole, flathead sole, Alaska plaice and arrowtooth flounder. Pacific halibut, although supporting a major domestic fishery, is not managed by the Bering Sea/Aleutian Islands Groundfish FMP.

The depth distribution of principal commercial species varies by species and by season. Species of flounders that occupy the shallowest depths on the continental shelf (generally shallower than 100 m during summer) are yellowfin sole, Pacific halibut, rock sole, and Alaska plaice. In winter most of the flounders retreat to waters of the outer shelf and upper slope to avoid the sub-zero temperatures that extend over much of the eastern Bering Sea shelf in winter and early spring. These bathymetric migrations are most extensive for those flounders occupying the inter shelf in summer such as yellowfin sole, rock sole, Alaska plaice, and Pacific halibut. The migrations of Pacific halibut result in their occupying the greatest depth range of all flounders, extending from shallow bays to slope waters of over 500 m in depth.

1.5 General Discussion of Environmental Impact of Groundfish Fishing

Removal of fish by fishing operations results in a net loss of nutrients from the ecosystem. The discharge of fish waste material by floating and/or shorebased processors returns a portion of those nutrients to the system. However, because of the nature of fish wastes (bone, blood, etc.), most of those nutrients will be available at different trophic levels than they would have been if the fish had not been harvested. Increases in total harvest results in an increase in the net loss of nutrients and fish protein, but the amount of processing effluent also increases. In the Bering Sea groundfish fisheries, the vast majority of the processing occurs in offshore waters where these nutrients are rapidly dispersed, circulated and reconverted into usable protein without eutrophic or other deleterious effects. Also, fish processing does not introduce any hazardous materials into the environment, but rather is limited to replacing material that has been removed.

Removal of fish from the ecosystem by fishing will reduce the number of fish to an abundance below what would occur in the absence of fishing. Harvesting less than the total allowable catch (TAC) of a groundfish species will most likely result in a greater than expected abundance of that species. This means that the system will be closer to the natural state in which fishing does not occur, thus requiring less adjustment of the system to an equilibrium range. This contrasts with harvesting more of the TAC which represents further departure from the natural system, and requires greater adjustment.

Depending on the role of a particular groundfish species in the ecosystem, harvesting less than its TAC may result in the consumption of more prey and the species may provide more biomass for predators (including marine mammals and birds) in the system. Overharvesting a groundfish species, on the other hand, will most likely result in a lower abundance of that species, thus effecting both the ecosystem as well as the individual species involved. The ecosystem effects include the situation that less prey may be consumed by the overharvested groundfish species and less biomass may be provided for other predators, at least in the short run. The effect of overfishing on the individual species is that its productive capacity may be reduced to the point where it could never return to former levels of abundance and, in the theoretical extreme, may become extinct. The ultimate effect on groundfish harvests is inevitably difficult to predict. Prediction is especially difficult against the background of other factors such as: (1) physical changes in ocean chemistry, temperature, and weather conditions; and

2) biological changes in animal populations resulting from disease, and competition between and among species. This normal background variability masks all but the most extreme direct effects of any management practice.

A major part of the commercially important groundfish in the eastern Bering Sea and Aleutians region are harvested with bottom trawls. Bottom trawling involves passing an open net along the ocean floor. These nets tend to dig into the sand and clay that make up most of the ocean floor in the Bering Sea. This disturbance has positive and negative effects. The positive effects involve turning over the sediment and bringing buried nutrients to the surface where they can be recycled into the biotic environment. Benthic organisms are also exposed and made available to predators such as crabs and flatfish, which sometimes tend to aggregate along the trawl path after the net has passed. The negative effects include the capture or killing of commercially important nontarget species such as king and Tanner crabs. This particular type of incidental capture and mortality can be minimized by adjusting the net in such a way that contact with the ocean floor is minimized. Pelagic trawling is likely to capture nontarget pelagic species such as salmon and herring which inhabit the higher portion of the water column. There is currently no precise way to determine the net impact of bottom trawl activities in the Bering Sea. However, where concentrations of important nontarget species occur, a reduction in bottom trawl activities would tend to reduce the mortality of those species.

1.6 Introduction to the Socioeconomic Analysis

Solutions to the four management problems mentioned above will be analyzed with respect to the economic impacts of those solutions on the harvesting, processing, and retail sectors. The impacts examined will be reported as a relative change from that existing under the status quo. For example, if under the status quo, total fishery revenue were \$100 million, and if under solution 1 to problem 1, total fishery revenue were \$110 million, we report the impact of adoption of solution 1 to problem 1 as an increase in revenue of \$10 million.

Such an approach requires a careful definition of the status quo. Here we take the status quo to be the fishery as it would exist in 1987 barring adoption of any amendment to the FMP or its implementing regulations. This means that emergency rules adopted in 1986, but which expire in 1987, will not be part of the status quo. Also, any regulatory amendments (e.g., the single species closure authority) which are currently in preparation, but are expected to be adopted by 1987, are part of the status quo.

The change relative to the status quo, given adoption of a management alternative, is quantified when data allow quantification, and described qualitatively when the necessary data are unavailable.

If it is necessary to deviate from this general approach when analyzing solutions to a particular management problem, those differences will be highlighted in the introduction to the "Fishery Costs and Benefits" section.

1.7 Description and Estimate of the Number of Small Entities Affected by the Proposed Rule

The vessels fishing for groundfish, crabs and halibut in the BSAI area are considered to be small entities within the meaning of the Regulatory Flexibility Analysis. These vessels vary in size and capacity to harvest and/or process fish. Domestic vessels fishing in the BSAI area have home ports primarily in the states of Alaska, Washington and Oregon. The principal fishing gear used by domestic groundfish vessels includes trawls, pots and hook-and-line (longlines). Foreign groundfish vessels fishing in the BSAI area are from Japan, Republic of Korea, Poland, the Soviet Union, the Peoples Republic of China, and Taiwan. These vessels primarily use trawl gear except that the Japanese also conduct a longline fishery in the BSAI area. In addition, many foreign vessels receive fish from U.S. groundfish catcher vessels involved in joint venture processing (JVP) arrangements through private companies. Domestic groundfish vessels involved in JVP fisheries do not need separate permits and may deliver fish to JVP and domestic processors within a year. The numbers of DAP vessels to which the proposed rule will apply are listed in Table 1.1. The numbers of JVP and foreign vessels to which the proposed rule will apply are listed in Table 1.2.

Table 1.1 Numbers of DAP vessels^{1/} which filed fish tickets
for sales of groundfish in 1985 and 1986
(Source: ADF&G)

<u>GEAR TYPE</u>	<u>1986</u> <u>VESSELS</u>		<u>1985</u> <u>VESSELS</u>	
	<u>Bering Sea</u>	<u>Aleutians</u>	<u>Bering Sea</u>	<u>Aleutians</u>
Trawl	39	6	46	9
Longline	29	15	44	7
Pot	7	2	6	3

1/ Vessel numbers are not additive across areas.

Crab and halibut fishermen are also affected directly and indirectly by the proposed bycatch regulations. The only legal fishing gear for Tanner and king crab is crab pots, and only longline gear may be used to take halibut. The number of crab vessels is approximately equal to the number of fishing permits issued by the State of Alaska in 1985 and 1986 (Table 1.3). Historical fishing data indicate that many more vessels would be involved in the fishery if stocks were at higher levels. The actual number of vessels which actually fished is somewhat less than the number of permits. Halibut vessels are also included in Table 1.3.

Table 1.2 Numbers of federal permits issued for BSAI area groundfish fisheries in 1986-^{1/} (Source: NMFS)

GEAR TYPE	DOMESTIC	JVP	FOREIGN
Trawl	137	95 ^{2/}	299 ^{3/}
Longline	303		23 ^{4/}
Other	36		268 ^{4/}
TOTAL	476	95	590

1/ Data are current as of July 7, 1986 and represent the number of vessels receiving federal fishery permits for the BSAI area, except as noted in (3) below.

2/ A separate permit is not required for JVP operations; this number represents domestic vessels known to have made JVP deliveries to date. All of these vessels are included in the domestic column.

3/ This category includes foreign catcher vessels and catcher/processor vessels receiving JVP deliveries.

4/ This category includes support vessels requiring permits as fishing vessels.

Table 1.3 Number of vessels involved^{1/} in BSAI area Tanner crab, king crab and halibut fisheries in 1985 and 1986 by statistical area as identified in State of Alaska or IPHC regulations.

	TANNER CRAB		KING CRAB		HALIBUT	
	1986	1985	1986	1985	1986 ^{2/}	1985
Bristol Bay (Q)	152	132	13	104		
Dutch Harbor (O)	16	18	11	22		
Adak (R)	18	35	54	75		
Bering Sea/Aleutians (IPHC Area 4)					263	188

1/ Crab vessel numbers are number of permits issued. Actual number of fishing vessels may be somewhat less. Numbers of vessel permits are not additive across areas or species.

2/ Preliminary.

1.8 1986 Optimum Yield

The BSAI FMP specifies the Optimum Yield (OY) as a range of 1.4-2.0 million metric tons. Each year the Council reviews the status of each major groundfish species or species group and determines the Total Allowable Catch (TAC) for each, and the sum of the TACs must fall within the OY range. The TACs are then apportioned to the domestic (DAP), joint venture (JVP) and foreign (TALFF) fisheries. The values presented in Table 1.4 are the current values as of August 1, 1986.

Table 1.4. 1986 TACs and Apportionments for the Bering Sea and Aleutian Islands Groundfish Fishery (in metric tons), as of August 1, 1986.

Species	Area	1986 TAC ^{1/}	DAP	JVP	DAH	TALFF	15% RESERVE
Pollock	BS	1,200,000	101,755	750,000	851,755	348,245	
	AI	100,000	18,039	33,804	51,843	48,157	
Pacific	BS	825	826	194	1,020	55	
ocean perch	AI	6,800	6,340	460	6,800	50	
Rockfish	BS	825	648	143	791	50	
	AI	5,800	5,791	259	6,050	50	
Sablefish	BS	2,250	2,726	246	2,972	95	
	AI	4,200	4,159	120	4,279	50	
Pacific cod	BSAI	229,000	133,394	50,830	184,224	38,823 ^{2/}	
Yellowfin sole	BSAI	209,500	1,030	144,300	145,330	64,170	
Greenland turbot	BSAI	33,000	5,414	5,000	10,414	17,636	
Arrowtooth flounder	BSAI	20,000	1,805	1,667	3,472	13,528	
Other flatfish	BSAI	124,200	4,192	98,850	103,042	16,158	
Atka mackerel	BSAI	30,800	10	30,790	30,800	50	
Squid	BSAI	5,000	10	100	110	4,210	
Other species	BSAI	27,800	610	7,000	7,610	16,520	
TOTAL		2,000,000	286,749	1,123,763	1,410,512	567,847	21,641

^{1/} TACs for all species except pollock in the Bering Sea and Aleutians and yellowfin sole have been adjusted by reserve releases or withheld reserves. Thus, DAH + TALFF ≠ TAC, with those exceptions.

^{2/} Pacific cod TALFF includes 21,980 mt from Reserve for foreign longliners, plus additional for bycatch. Longline TALFF must be taken north of 55°N and west of 170°W, ice conditions permitting (same restrictions as 1985).

2.0 DESCRIPTION OF MANAGEMENT PROBLEM 1 AND ENVIRONMENTAL AND REGULATORY IMPACTS OF THE PROPOSED ALTERNATIVE SOLUTIONS: INADEQUATE CONTROL OF BYCATCHES OF CRABS AND HALIBUT IN DAH FISHERIES

2.1 The Management Problem

Bottom dwelling species such as crabs and halibut are vulnerable to capture or mortality by trawl gear used to harvest yellowfin sole and other flatfish. Of particular concern are two crab species, the red king crab (Paralithodes camtschatica) and one species of Tanner crab (Chionoecetes bairdi), because of their depressed condition and the magnitude of the incidental catches. Bycatch of nontarget species in the Bering Sea/Aleutians area was initially a problem only with foreign fleets. Foreign groundfish fisheries have been restricted to reduce bycatch of crabs, halibut and salmon by FMP Amendment 3 which set a five-year reduction of bycatch rates. The five-year period ends in 1986 and the most restrictive (i.e., 1986) bycatch limits will remain in effect until modified by FMP amendment.

The U.S. fishing industry has enjoyed a period of freedom from such restrictions to allow development of domestic groundfish fisheries. U.S. fishing capacity has grown rapidly, with domestic fishermen expected to take more than 50% of the total harvest in 1986. In the process, they are expected to take much more than 50% of the total bycatch of crabs and halibut. The Council recommended emergency interim measures to protect these crab species and Pacific halibut from excessive incidental catches in the DAH trawl fisheries in 1986. NMFS implemented an emergency rule which included most of the Council's recommendations (not included were the halibut restrictions). This rule expires in December 1986, however, and will not be extended. The depleted condition of the red king and C. bairdi crab stocks make necessary continued controls after 1986. Although retention of these species by groundfish fishermen is prohibited, incidental catches directly affect crab and halibut fisheries by reducing harvestable surpluses and, in the case of depressed species such as red king crab, possibly delay in the rebuilding to healthy abundance levels. While foreign yellowfin sole/other flatfish fisheries have been largely excluded from areas where red king crab and halibut concentrate, the joint venture fishery has found these areas quite productive. These areas are also relatively close to the few major ports on the Bering Sea, which has allowed joint venture fishermen to control fuel and other travel-related costs. Safe moorage is also a major consideration since most joint venture vessels are much smaller than the foreign vessels which operate farther north.

The Council is attempting to achieve a balance between conservation needs, allocation considerations, and development of the domestic bottom trawl industry.

2.2 The Alternatives

Six major alternatives, the first being the status quo, have been suggested to address the bycatch problem (Table 2.1). The second is the emergency rule as implemented by NMFS. The third is the emergency rule as recommended by the Council. The fourth is a framework for setting PSCs annually. The fifth alternative would close the Pot Sanctuary to all groundfish fishing. The sixth, which is the Council's preferred alternative, is similar to

TABLE 2.1 Provisions of Alternatives to Control Bycatches of Crab and Halibut in the Bering Sea.

	RED KING CRAB			C. BAIRD		HALIBUT		MISCELLANEOUS
	TOTAL CLOSURES	PROVISIONS	PROVISIONS	PROVISIONS	PROVISIONS	PROVISIONS	PROVISIONS	
Alternative 1: The Status Quo	DAH: No closures. TALFF: Trawling prohibited in Pot Sanctuary.	DAH: None. TALFF: PSC limit of 52842 animals multiplied by the metric tonnage of groundfish harvest.	DAH: None. TALFF: PSC limit of 9,2238 animals multiplied by the metric tonnage of groundfish harvest.	DAH: None. TALFF: PSC limit of .00122 metric tons multiplied by the metric tonnage of groundfish harvest.	DAH: None. TALFF: PSC limit of .00122 metric tons multiplied by the metric tonnage of groundfish harvest.	DAH: None. TALFF: PSC limit of .00122 metric tons multiplied by the metric tonnage of groundfish harvest.		
Alternative 2: An extension of the emergency rule as implemented by NMFS.	DAH: Area between 160° and 162°W longitude and south of 58°N latitude and north of a straight line approximating the 25-fathom line (Crab and Halibut Protection Zone). TALFF: Trawling prohibited in Pot Sanctuary.	DAH: PSC limit of 12,000 animals for (Pacific cod) trawling landward of line approximating 25-fathom line and between 160° and 162°W long. DAH: PSC limit in Zone 1 of 135,000 DAH yellowfin sole/other flatfish trawling. TALFF: DAH King crab closures apply.	DAH: PSC limit of 80,000 in Zone 1 for yellowfin sole/other flatfish trawling. DAH: PSC limit of 326,000 in Zone 2 for yellowfin sole/other flatfish fishery. TALFF: PSC limit of 64,000 in Zones 1 and 2.	DAH: PSC limit of 80,000 in Zone 1 for yellowfin sole/other flatfish fishery. JVP: PSC limit of 80,000 in Zone 1 for yellowfin sole/other flatfish fishery. JVP: PSC limit of 326,000 in Zone 2 for yellowfin sole/other flatfish fishery. TALFF: PSC limit of 64,000 in Zones 1 and 2.	DAH: None. TALFF: Status quo.*	DAH: Scientific data gatherers required on vessels fishing for Pacific cod in area landward of line approximating 25-fathom line between 160° and 162°W longitude.		
Alternative 3: An extension of the emergency rule as passed by the Council.	DAH: Area between 160° and 162°W longitude and south of 58°N latitude and north of the 25-fathom line. TALFF: Trawling prohibited in Pot Sanctuary.	DAH: When bycatch in Pacific cod exemption zone exceeds 2 animals per metric ton of groundfish, area is closed. JVP: PSC limit of 135,000 in Zone 1 for yellowfin sole/other flatfish fishery. JVP: PSC limit of 1 red or blue king crab multiplied by apportionment of yellowfin sole/other flatfish not taken in Zone 1.	DAH: PSC limit of 80,000 in Zone 1 for yellowfin sole/other flatfish fishery. JVP: PSC limit of 80,000 in Zone 1 for yellowfin sole/other flatfish fishery. JVP: PSC limit of 326,000 in Zone 2 for yellowfin sole/other flatfish fishery. TALFF: PSC limit of 64,000 in Zones 1 and 2.	DAH: PSC limit of 80,000 in Zone 1 for yellowfin sole/other flatfish fishery. JVP: PSC limit of 80,000 in Zone 1 for yellowfin sole/other flatfish fishery. JVP: PSC limit of 326,000 in Zone 2 for yellowfin sole/other flatfish fishery. TALFF: PSC limit of 64,000 in Zones 1 and 2.	DAH: None. TALFF: Status quo.*	DAH: PSC limit of 25,000 in yellowfin sole/other flatfish fishery in Pot Sanctuary west of 162° longitude. JVP: PSC limit of 15,000 in area east of 160°W longitude, south of 58°N latitude. JVP: PSC limit for entire Bering Sea of 250,000. TALFF: Status quo.*	DAH: Observers required on vessels in Pacific cod exemption Zone.	

*NOTE: DAH king crab and halibut closures apply to foreign fishermen.

TABLE 2.1 continued

TOTAL CLOSURES		RED KING CRAB PROVISIONS	C. BAIRD PROVISIONS	HALIBUT PROVISIONS	MISCELLANEOUS
Alternative 4: Framework	DAH: Area between 160° and 162°W longitude and south of 58°N latitude and north of a straight line approximating the 25-fathom line. TALFF: Trawling prohibited in Pot Sanctuary.	JVP: PSC limits vary within Zone 1 based on population levels of crab. DAH: Pacific cod exemption zone opens on May 15 and closes on August 1 or when fleet takes 6,000 mt of groundfish. TALFF: Status quo.*	JVP: PSC limits vary within Zone 1 based on population levels of crab. TALFF: Status quo.*	JVP: PSC limits vary, when limit is reached as measured in all of the Bering Sea, Zone 1 and HPZ closes. TALFF: Status quo.*	DAP: Flatfish PSC limits and observer requirements will be considered when DAP harvest is greater than or equal to 10% of DAH harvest.
Alternative 5: Pot Sanctuary	Total closure of the Pot Sanctuary.	DAH: None. TALFF: Status quo.*	DAH: None. TALFF: Status quo.*	DAH: None. TALFF: Status quo.*	
Alternative 6: Preferred Alternative	DAH: Area between 160° and 162°W longitude and south of 58°N latitude and north of a straight line approximating the 25-fathom line (Crab and Halibut Protection Zone). TALFF: Trawling prohibited in Pot Sanctuary.	DAH: PSC limit of 12,000 animals for (Pacific cod) trawling landward of line approximating 25-fathom line and between 160° and 162°W long. DAH: PSC limit in Zone 1 of 135,000 DAH yellowfin sole/other flatfish trawling. TALFF: DAH King crab closures apply.	DAH: PSC limit of 80,000 in Zone 1 for yellowfin sole/other flatfish trawling. DAH: PSC limit of 326,000 in Zone 2 for yellowfin sole/other flatfish fishery. TALFF: PSC limit of 64,000 in Zones 1 and 2.	JVP: PSC limit of 828,000 in yellowfin sole/flatfish fishery in BSAI. When limit is reached, Zone 1 closes. TALFF: Status quo.*	DAP: Within Crab and Halibut Protection Zone, vessels must comply with data collection program.

*NOTE: DAH king crab and halibut closures apply to foreign fishermen.

Alternative 2 but includes a halibut provision for the joint venture yellowfin sole/flounder fishery. Four of the alternatives address only the DAF yellowfin sole/other flatfish fisheries.

These are at best a stop gap measure to deal with the most pressing immediate problem, and more comprehensive bycatch management measures will need to be developed in the future.

Applicability to foreign fisheries. Where specific PSC limits are set for TALFF fisheries and DAF fisheries in identical areas (e.g. Zone 2), closures of either gear type are independent. That is, DAF could be closed and TALFF could remain open. Where limits are not specified for TALFF (e.g. king crab in Zone 1), TALFF fisheries will close when DAF PSC limits are reached.

2.2.1 Alternative 1: Do nothing (the status quo).

No PSC limits will be set for the DAF and JVP fisheries. The emergency rule in effect for the 1986 fishery will no longer be in effect. It was implemented on June 3, 1986 and the first 90-day period expires on September 2, 1986. The Council at its June meeting approved an extension which would extend the effect of the rule until December 1, 1986. Since the rule cannot be extended more than once, it will not be in effect in 1987, and therefore cannot be considered as the status quo.

2.2.2 Alternative 2: The emergency rule as implemented by NMFS.

This is not a framework and the measures would remain in effect until modified by plan amendment.

Closed area. Domestic and foreign trawl fishing is not permitted in the EEZ north of the Alaska Peninsula, south of 58°N latitude, east of 162°W, and west of 160°W longitude (Figure 1).

The foreign trawling prohibition in the "Bristol Bay Pot Sanctuary" is expanded to encompass the area closed by this rule. This is to ensure protection of crab stocks to the full extent envisioned by the Council.

Bycatch limitation zones. Two bycatch zones are established:

Zone 1 - area east of 165°W longitude and south of 58°N latitude.

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

Observer requirements. The Secretary may allow domestic trawl fishing for Pacific cod in a portion of the closed area lying south of a line generally conforming to the 25 fathom depth contour, provided that such fishing is conducted under a data gathering program approved by the Regional Director after consultation with the Council. The program would be designed to provide data useful for management of the trawl fishery and Tanner and king crab fisheries in the area.

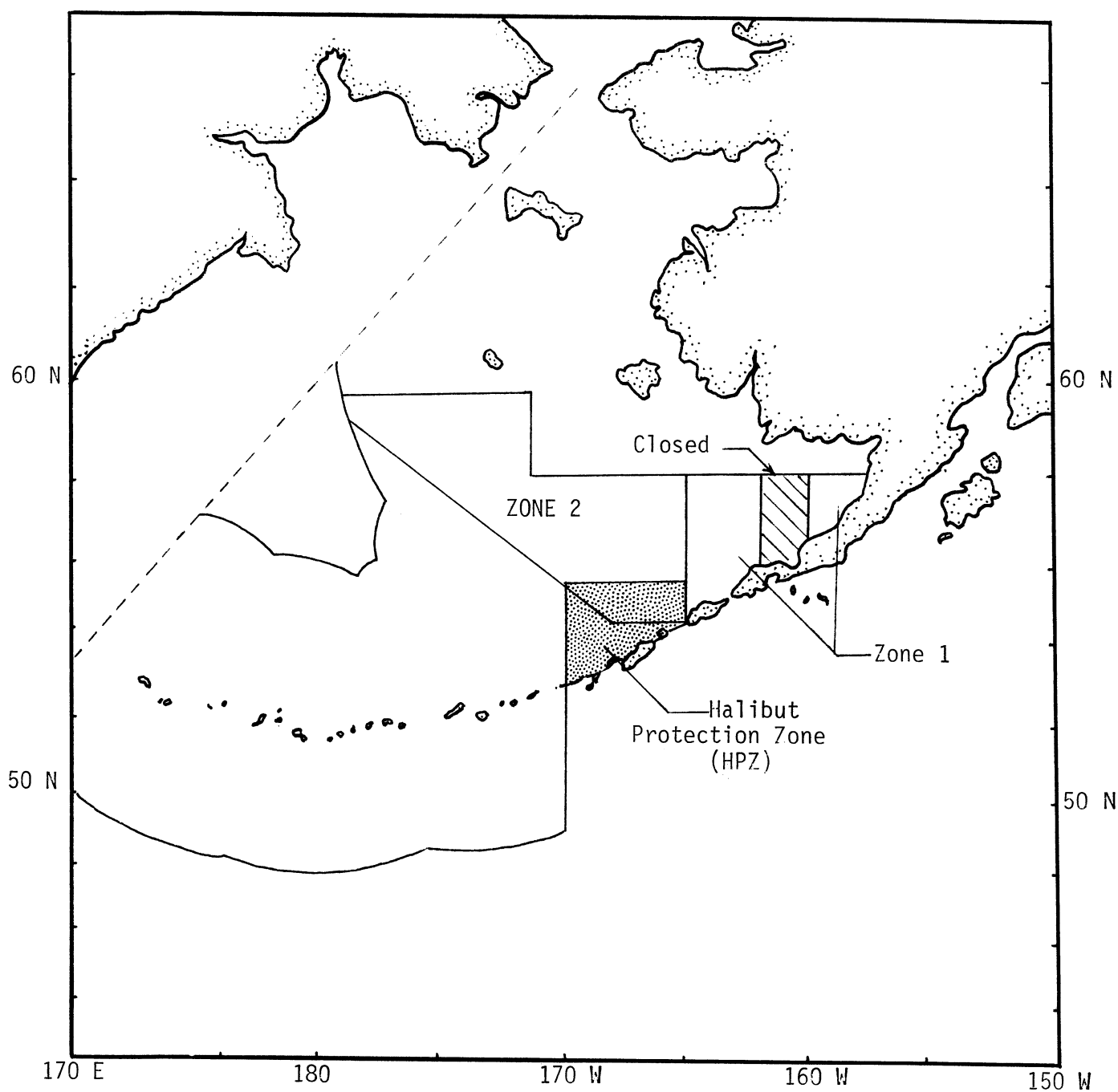


Figure 1. Areas relevant to bycatch Alternatives 2, 3, 4, and 6. The HPZ applies only to Alternative 4, and in Alternative 6 the "closed" area is called the "Crab and Halibut Protection Zone".

Incidental catch limits. The PSC limits for C. bairdi Tanner crabs and red king crabs implemented by this rule apply to DAF (i.e. DAF plus JVP) fisheries.

The DAF fishery for Pacific cod south of the 25-fathom line is limited to a PSC of 12,000 red king crabs.

The DAF fishery for yellowfin sole and other flatfish is limited to a PSC of 80,000 C. bairdi Tanner crabs and to a PSC 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, which is Zone 1.

A PSC limit of 326,000 C. bairdi Tanner crab applicable to the DAF fishery for yellowfin sole and other flatfish is established in the area of the EEZ bounded by straight lines beginning at 54°30'N latitude and 165°W longitude, extending north to 58°N latitude, west to 58°N latitude and 171°W longitude, north to 60°N latitude, west to 179°20'W longitude, south to 59°25'N latitude, then extending on a diagonal straight line southeast to the intersection of 167°W longitude and 54°30'N latitude, and then extending eastward along 54°30'N latitude to 165°W longitude, which is Zone 2.

A PSC limit of 64,000 C. bairdi Tanner crabs applicable to the foreign directed fisheries for yellowfin sole and other flatfish is established in the combined areas of zones 1 and 2.

Effect on foreign fisheries. When the DAF fishery takes 135,000 king crab in Zone 1, the TALFF yellowfin sole/other flatfish fisheries will close simultaneously with the DAF fishery.

The C. bairdi Tanner crab PSC limits are independent; DAF fisheries could be closed in Zone 1 and TALFF fisheries would continue until 64,000 C. bairdi are taken. At that time both Zones 1 and 2 close to foreign yellowfin sole/other flatfish fishing.

Regional Director's discretionary authority. When the fishing vessels of the United States to which a PSC limit applies have caught an amount of prohibited species equal to that PSC limit (but less than an amount which would constitute overfishing), the Secretary may allow some or all of those vessels to continue or resume directed fishing for yellowfin sole and other flatfish under conditions which will limit fishing by permissible gear, areas, times, and other appropriate factors, and subject to other provisions of this part. Such other factors may include delivery of a vessel's catch to United States fish processors. In authorizing and conditioning such continued or resumed directed fishing by those vessels, the Secretary will take into account the following considerations:

- (a) A determination by the Regional Director of the risk of biological harm to Tanner and king crab stocks and of socioeconomic harm to authorized crab users posed by authorizing continued or resumed directed fishing for yellowfin sole and other flatfish.
- (b) A determination by the Regional Director of the extent of incidental catches of Tanner and king crabs in specific areas.
- (c) A determination by the Regional Director of the accuracy of the estimates of incidental catches of Tanner and king crabs.

- (d) A determination by the Regional Director that adherence to the prescribed conditions can be assured in light of available enforcement resources.
- (e) A determination by the Regional Director that continued or resumed directed fishing for yellowfin sole and other flatfish will not lead to overfishing of prohibited species.

2.2.3 Alternative 3: The emergency rule as recommended by the Council.

This is not a framework measure and the specific restrictions and limits would therefore remain in effect until modified by plan amendment.

Closed area. The closed area between 160°W and 162°W longitude, as described in Alternative 2, is also established by this alternative.

Eycatch limitation zones. Zones 1 and 2 as described in Alternative 2 are also established by this alternative.

Observer requirement. Domestic (DAH) trawling on Pacific cod shall be allowed in waters of 25 fathoms or less in the closed area described, providing NMFS approved observers are on all DAP fishing and all JVP processing vessels engaged in the fishery.

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

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

Incidental catch limits. Measures to close the fishery shall be implemented by NMFS if catches exceed two red king crab per ton of fish caught, as measured per 1,000 mt of groundfish taken, in those waters of 25 fathoms or less within the 160°-162° closed area.

In the area defined as that portion of the Pot Sanctuary west of 162°W longitude, there shall be a PSC limit of 25,000 halibut on all yellowfin sole/other flatfish joint venture operations. In the area east of 160°W longitude there shall be a PSC limit of 15,000 halibut in the yellowfin sole/other flatfish fishery. The total catch of halibut in all yellowfin sole/other flatfish joint ventures in the Bering Sea may not exceed 250,000 fish.

The incidental catch (PSC) of red king crab in all yellowfin sole/other flatfish joint ventures in the Bering Sea in Zone 1 shall not exceed 135,000 crab and shall not exceed a cap (in number of crab) of 1 red or blue king crab per metric ton multiplied by the JVP allocation tonnage on yellowfin sole/other flatfish caught outside Zone 1.

Joint venture bottom trawling for yellowfin sole and other flatfish will cease in Zone 1 when a cap of 80,000 C. bairdi Tanner crab (based upon an average of two animals per metric ton of yellowfin sole and other flatfish) is taken.

Joint venture trawling for yellowfin sole and other flatfish in Zone 2 will cease when a cap of 326,000 C. bairdi Tanner crab are taken (based on an average of 2.25 animals per metric ton of yellowfin sole and other flatfish).

Caps on halibut, red and blue king crab and C. bairdi Tanner crab catches shall apply to yellowfin sole/other flatfish joint ventures in the aggregate. When the cap for any of the 3 species is reached in any of the areas described, all yellowfin sole/other flatfish joint venture operations will end in that area for the remainder of the fishing year.

These C. bairdi caps are based on a total population size of 72 million animals. The bycatch limits for both JVP and TALFF operations shall be reduced proportionately to the difference between this figure and the results of the annual summer trawl survey.

The foreign PSC limit of C. bairdi in Zones 1 and 2 equals 64,000 crab.

Effect on foreign fisheries. The effect on foreign fishing is identical to Alternative 2, with the addition that when a DAP halibut PSC is reached, TALFF yellowfin sole/other flatfish fishing will close simultaneously with the DAP fishery.

2.2.4 Alternative 4: A framework based on the Council's emergency rule recommendation.

This framework will allow the Council to establish crab and halibut bycatch limits for the joint venture yellowfin sole/other flatfish fishery annually without FMP amendment.

Closed area. The closed area between 160°W and 162°W, as described in Alternative 2, is also established by this alternative, except that DAP fishing for Pacific cod is allowed south of a line approximating the 25-fathom curve beginning May 15. On July 31 or when 6,000 mt of groundfish has been taken, whichever occurs first, this area shall close for the remainder of the year. Check in/check out procedures and weekly catch reporting requirements specified in 50 CFR 46072 (November 6, 1985) will be in effect for all DAP vessels operating within the excepted area.

Bycatch limitation zones. Zones 1 and 2 as described in Alternative 2 are also established by this alternative. In addition, a Halibut Protection Zone (HPZ) is established which is the area drawn by connecting the following geographical coordinates in the order listed:

(54°30'N, 165°00'W)
(52°50'N, 170°00'W)
(56°00'N, 170°00'W)
(56°00'N, 165°00'W)
(54°30'N, 165°00'W)

Observer requirements. None for DAP vessels.

Incidental catch limits. Each year the Council shall review current bycatch regulations and determine if any modifications are necessary as the result of changes in stock status or fisheries associated with crabs, halibut, or flatfish species. The PSC limits for the DAP and JVP fisheries for yellowfin

sole and other flatfish will be based on bycatch rates and numbers in Table 2.2. The PSC limits were calculated by applying the bycatch rates in Table 2.2 by the anticipated target tonnages specified below. Only the Table 2.3 numbers are to be considered in establishing annual PSC limits.

Anticipated target tonnages:

65,000 mt yellowfin sole/other flatfish in Zone 1
145,000 mt yellowfin sole/other flatfish in Zone 2
6,000 mt Pacific cod and other groundfish in 160°-162°

Adjustments within the PSC table (Table 2.3).

The Council will review the status of each bycatch species and the DAF flatfish fisheries each year when TACs and apportionments are established for the upcoming year. The Council will determine the appropriate PSC limits from Table 2.3 based on the following considerations:

- (a) The status of the crab or halibut stocks relative to recent historical levels (the current year, preceding year, or other recent time period).
- (b) The status of the various flatfish stocks and fisheries.
- (c) The status of the Pacific cod stock and fishery.
- (d) The need to promote domestic harvesting and/or processing of Pacific cod or any species of flatfish or sole.
- (e) The conservation benefits of applying PSC limits to DAP fisheries.
- (f) The ability to monitor and enforce PSC limits for DAP fisheries.

PSC limits for the joint venture yellowfin sole/other flatfish fishery:

- (a) When the joint venture fishery for yellowfin sole/other flatfish reaches its PSC limit for king or Tanner crab in Zone 1, that area will be closed to all joint venture yellowfin sole/other flatfish fishing for the remainder of the fishing year.
- (b) When the joint venture fishery for yellowfin sole/other flatfish reaches its PSC limit for Tanner crab in Zone 2, that area will be closed to all joint venture yellowfin sole/other flatfish fishing for the remainder of the fishing year.
- (c) When the joint venture fishery for yellowfin sole/other flatfish reaches its PSC limit for halibut in the entire BSAI management area, Zone 1 and the Halibut Protection Zone will be closed to all joint venture yellowfin sole/other flatfish fishing for the remainder of the fishing year.

PSC limits for the DAP yellowfin sole/other flatfish fishery:

No PSC limits or observer requirements will be established for DAP vessels fishing for yellowfin sole/other flatfish until the annual harvest or expected annual harvest by that fishery reaches 10% of the total DAF yellowfin sole/other flatfish harvest. At that time the Council will consider the need for PSC limits for the DAP fishery and may apportion to DAP a part of the PSC

Table 2.2 Allowable bycatch rates for determining annual PSC limits for DAH fisheries.

Relative Status of Bycatch Species				
	HIGH	AVERAGE	LOW	DEPRESSED
Red King Crab				
Nos. in Zone 1	170,000-305,000	135,000-236,000	120,000-170,000	120,000-150,000
Red King Crab/mt (DAH 160°-162°)	2.5 - 4.5	2.0 - 3.5	1.8 - 2.5	1.8 - 2.2
C. bairdi/mt				
Zone 1	2.5 - 4.5	2.0 - 3.5	1.8 - 2.5	1.2 - 2.0
Zone 2	2.5 - 5.0	2.2 - 4.0	2.0 - 3.0	2.0 - 2.5
Halibut in total BSAI	200,000-325,000	150,000-275,000	100,000-225,000	50,000-175,000

Table 2.3 Halibut, king crab, and Tanner crab PSC limits (in number of individuals) for DAH fisheries for yellowfin sole and other flatfish, based on condition of the bycatch species and target fishery.

	Relative Status of Bycatch Species			
	HIGH	AVERAGE	LOW	DEPRESSED
Red King Crab				
Zone 1	170,000-305,000	135,000-236,000	120,000-170,000	120,000-150,000
Red King Crab (DAH 160°-162°)	15,000-27,000	12,000-21,000	11,000-15,000	11,000-13,000
<u>C. bairdi</u>				
Zone 1	163,000-293,000	130,000-228,000	117,000-163,000	117,000-143,000
Zone 2	362,500-725,000	319,000-580,000	290,000-435,000	290,000-363,000
Halibut in total BSAI	200,000-325,000	150,000-275,000	100,000-225,000	50,000-175,000

Definitions of Stock Status Levels

High:

C. bairdi: 756+ million crabs and no identified recruitment or stock problems.

Red king crab: 274+ million crabs and no identified recruitment or stock problems.

Halibut: $\geq B_{MSY} \times 1.5$; no identified recruitment or stock problems.

Average:

C. bairdi: 504-756 million crabs and generally healthy stock.

Red king crab: 182-274 million crabs and generally healthy stock.

Halibut: $\geq B_{MSY}$ to $< (B_{MSY} \times 1.5)$; generally healthy stock.

Low:

C. bairdi: 251-504 million crabs, or higher abundance with moderate recruitment or other problems identified.

Red king crab: 91-182 million crabs, or higher abundance with moderate recruitment or other problems identified.

Halibut: $\geq B_{MSY} \times 0.67$ to $< B_{MSY}$; moderate recruitment or abundance problems identified.

Depressed:

C. bairdi: 251 million crabs, or higher abundance with severe recruitment or other problems identified.

Red king crab: 91 million crabs or higher abundance with severe recruitment or other problems identified.

Halibut: $< B_{MSY} \times 0.67$; severe recruitment or abundance problems identified.

Table 2.4 Prohibited Species Catch Limits for Foreign Groundfish Trawlers in the Bering Sea, 1986, based on a final TALFF of 567,847 mt.

Species	Bycatch Rate	PSC Limits
Halibut	.12 %	681 mt
King Crab	.53 crab/mt	300,960 crabs
Tanner Crab	9.22 crab/mt	5,224,192 crabs
Chinook Salmon		16,250 fish
Total Salmon		17,473 fish

Table 2.5 Joint Venture and Foreign Harvest of Prohibited Species in the Bering Sea, 1984 and 1985.

Prohibited Species Catch (mt)				
Species	<u>Joint Venture</u>		<u>Foreign</u>	
	1984	1985	1984	1985
Halibut	622	1151	2093	1933
Salmon	146	33	47	32
King Crab	267	838	289	209
Tanner Crab	124	204	537	393

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

limits for the joint venture fishery specified in Table 2.3. These PSC limits may be established in proportion to the relative amount of target allocation. Observers may be required to monitor those DAP bycatches. DAP closures will be implemented in the same manner as joint venture closures.

Effect on foreign fisheries. The effect on foreign fisheries is identical to Alternative 2, with the addition that when the DAH halibut PSC is reached, Zone 1 and the HPZ will close to both DAH and TALFF yellowfin sole/other flatfish fisheries simultaneously.

2.2.5 Alternative 5: Pot Sanctuary closure.

This is a year-round closure of Bristol Bay Pot Sanctuary to all groundfish fishing. It is not a framework measure and the closure would therefore remain in effect until modified by plan amendment. The Pot Sanctuary is the area that is encompassed by straight lines connecting the following points: 54°36'N - 164°55' 42"W, 55°16'N - 166°10'W, 56°20'N - 163°00'W, 57°10'N - 163°00'W, 58°10'N - 160°00'W, and 160°00'W where it intersects the Alaska Peninsula.

2.2.6 Alternative 6: The emergency rule as implemented by NMFS with a halibut PSC limit provision and a two-year expiration. (Council Preferred Alternative)

This is not a framework measure and the measures will remain in effect until December 31, 1988 or until modified by plan amendment.

During the September Council meeting Alternative 6 was suggested as a modification to Alternative 2 by the Council's Advisory Panel, and adopted as the preferred alternative by the Council.

Alternative 6 is identical to Alternative 2 with the exception of the addition of halibut bycatch controls for the joint venture flatfish fishery. A PSC limit of 828,000 Pacific halibut applicable to the JVP fishery for yellowfin sole and other flatfish in the entire Bering Sea/Aleutian Islands is established. Should this limit be reached, Zone 1 will be closed to that fishery.

2.3 Environmental Impact of the Alternatives

When bottom trawl gear is fished in areas where crabs and halibut are present, there is some degree of incidental catch of these species. Until this year, the only fisheries with bycatch limits were the foreign fisheries. These limits are specified in the bycatch rate reduction schedule in Section 14.5.2 of the FMP. The specified bycatch limits are shown in Table 2.4. The actual joint venture and foreign bycatch levels for 1984 and 1985 are shown in Table 2.5. 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. Preliminary figures for 1985 indicate the total joint venture bycatch of king crab in the Bering Sea was 969,800 crabs. Of this, approximately 894,000 crabs were taken in the yellowfin sole/other flatfish fishery. This high level of bycatch was within the rates adopted by an industry workgroup as voluntary limits for the 1985 fishery. The limits approved were (in numbers per metric ton of directed catch): halibut - 3.0,

king crab - 7.75, and Tanner crab - 5.75. An unanticipated increase in the joint venture directed fishery lead to this high bycatch. The JVP harvest of yellowfin sole was almost four times that taken in 1984, while the average annual increase in the JVP catch of this species from 1980 through 1984 was 36%. Coincidental to the growth of the DAF fisheries for groundfish in the Bering Sea has been the decline in the abundance of king and Tanner crab. The specific cause for this decline is unknown; it is not all due to fishing mortality. Careful control of fishing mortality, from fisheries targeting on these species of crabs and from fisheries catching them incidentally, however, is the conventional conservation response to such declines in stock abundance.

The following summary of the status of red king crab and C. bairdi Tanner crab stocks abundance is based on the latest of these annual surveys (Report to Industry on the 1985 Eastern Bering Sea Crab Survey, NMFS, Northwest and Alaska Fisheries Center Processed Report 85-20, November 1985).

2.3.1 Current Condition of the Stocks

2.3.1.1 C. bairdi

The abundance of this species has declined to its lowest level since 1975. Numbers of legal sized male animals are estimated to have decreased from about 210 million in 1975 to about 4.4 million in 1985, the lowest historical record for these estimates (Table 2.6). The estimated abundance of legal sized males declined 24% between 1984 and 1985 continuing on an almost steady trend over the past decade. The decrease in abundance from 1984 to 1985 was more severe in other segments of the population. Between these years the abundance of sub-legal males, mature females and immature females declined by 62%, 55% and 77%, respectively. Preliminary data from the commercial fishery indicate 3.3 million pounds of C. bairdi were landed in 1985. Based on the NMFS survey, the 1986 harvest would be in the range of 2.0 to 4.0 million pounds, had it occurred. These harvest levels are substantially below the optimum yield range of 5.0 to 28.5 million pounds specified for C. bairdi in the fishery management plan for Tanner crab. For this reason, the Secretary delayed indefinitely the scheduled January 15 opening of the 1986 commercial fishing season for C. bairdi (51 FR 2892, January 22, 1986).

2.3.1.2 Red King Crab

Legal sized male red king crab abundance is low. Estimated numbers have dropped 78% from 1980 through 1985 (Table 2.7). Sublegal male animals have experienced an estimated 58% decrease in abundance during the same time period. The estimated abundance of female animals also is at a record low. Mature female crabs declined from about 17.6 million to 6.8 million from 1984 to 1985. This estimated abundance is substantially below the range of 20 million to 40 million fecund females considered optimal for future fishery production. Commercial catches of red king crab reflect the declining abundance estimates. In 1980, 130 million pounds were landed. This harvest decreased to 34 million pounds in 1982. The Alaska Department of Fish and Game closed the commercial red king crab in Bristol Bay in 1983 due to low abundance estimates. The fishery was reopened in 1984 and landed 4.2 million pounds. However, abundance estimates of legal males decreased again from 1984 to 1985 by 14%.

Table 2.6 Population estimates for eastern Bering Sea male
C. bairdi Tanner crabs from NMFS surveys (millions
of crabs).

Bristol Bay and Pribilof		
Year	Prerecruits ^{1/}	Legals ^{1/}
1973	140.5	66.9
1974	255.0	130.5
1975	207.0	209.6
1976	136.6	109.5
1977	116.3	92.1
1978	81.2	45.6
1979	47.7	31.5
1980	65.0	31.0
1981	24.0	14.0
1982	46.9	10.1
1983	32.0	6.7
1984 ^{2/}	21.2	5.8
1985 ^{2/}	9.4	4.4

1/ A legal size limit of 5.5" carapace width was imposed in 1976, but prior to this 5.0" was used in the "Legal" column. In parallel, prerecruit was 3.3" to 5.0" prior to 1976 and 4.3" to 5.5" since.

2/ Preliminary estimate subject to change upon further analysis.

Table 2.7 Population estimates for male Bristol Bay and Pribilof
Red King Crab from NMFS surveys (millions of crabs).

Year	Prerecruits ^{1/}	Legals ^{1/}
1969 ^{2/}	20.3	9.8
1970 ^{2/}	8.4	5.3
1972	8.0	5.4
1973	25.9	10.8
1974	31.2	20.9
1975	31.7	21.0
1976	49.3	32.7
1977	63.9	37.6
1978	47.9	46.6
1979	37.2	43.9
1980	23.9	36.1
1981	18.4	11.3
1982	17.1	4.4
1983	10.4	1.5
1984 ^{3/}	12.2	2.9
1985 ^{3/}	10.1	2.5

1/ The size groups 5.2" to 6.4" and 6.5" have been used for prerecruits and legals, respectively.

2/ Limited survey in 1971, not used for population estimates.

3/ Preliminary estimate subject to change upon further analysis.

The 1985 king crab fishery opened on September 25 to fishing on an estimated legal stock of 12.5 million pounds (approximately 2.5 million crabs). The fishery closed on October 2 with final landings exceeding 4.1 million pounds. These data show that from 1984 to 1985, the abundance of prerecruit and legal males decreased by 17% and 14% respectively, and that the 1985 legal male abundance was the second lowest since 1969.

2.3.1.3 Pacific Halibut

Halibut is also a bycatch species of concern, although currently the overall stock abundance is high. Most of the stock status information comes from regions farther south in the Gulf of Alaska and North Pacific Ocean. Abundance of halibut in the Bering Sea/Aleutian Islands is currently under review. However, preliminary calculations show halibut here to be at or below MSY through 1984, while the 1985 harvest was apparently above MSY. The Bering Sea continental shelf area, especially just north of the Alaska Peninsula and into Bristol Bay, is known to be a nursery area of major importance for juvenile halibut, and this is in the area where joint venture yellowfin sole/other flatfish fishing is taking place.

Halibut caught incidentally in the Bering Sea are mainly juveniles aged 3-4, that will not recruit to the directed fishery until 5-8 years later. Halibut of this age migrate extensively, and juveniles from the Bering Sea contribute to the Gulf of Alaska as far south as British Columbia and Washington. These young fish grow substantially before recruiting and produce more biomass than is lost through natural mortality. The lost production of incidentally caught halibut is about 50% more than the biomass actually caught as bycatch.

2.3.2 Physical Impact

All of the alternatives considered primarily affect the use of trawl gear for catching certain species of groundfish, primarily yellowfin sole, flounders and other flatfish that reside on or near the sea bottom. Fishing for these species involves towing or dragging the trawl gear (including the net, otter doors, and various cables) along the sea bottom. Physical perturbations on the sea bottom occur as a result including disruption of surface materials and temporary displacement of the associated biota. To the extent that the final action or any alternative decreases or disperses such trawl gear fishing relative to the status quo alternatives, benefits from reduced physical impacts from the trawl gear would result. These potential benefits cannot be quantified with available information. However, in a qualitative sense, the potential benefits probably are insignificant since the physical impacts of status quo use of trawl gear are considered insignificant and mostly immeasurable.

2.3.3 Biological Impact

None of the alternatives, including the status quo, contemplate a reduction in the amount of yellowfin sole and other flatfish harvested with trawl gear. Consequently, the total amount of time that trawl gear, in the aggregate, will be deployed is assumed to remain relatively constant among all alternatives. The effect of all alternatives instead is presumably limited to the distribution of fishing effort using trawl gear to catch yellowfin sole and other flatfish. Hence, the biological impacts of a continued harvest on the

target species of the fishery, other finfish, predator/prey relationships, marine mammals and birds, and nutrient changes due to capture and processing of fish and dumping of waste will not be measurably different in the Bering Sea under any alternative.

The principal effect of any alternative will be on incidental fishing mortality of red king crab, C. bairdi Tanner crabs, and Pacific halibut. Currently, the only way of estimating fishing mortality of crabs from trawl gear is from data compiled by the NMFS observer program. Halibut mortality estimates have been developed by the International Pacific Halibut Commission (IPHC). Observers have monitored the catches of foreign trawl fishing since 1977 and the catches received by JVP processing vessels since 1980.

The discussion of environmental impacts of the bycatch alternatives has been organized such that the common features of all the alternatives (e.g. king crab PSC limits) are grouped together. The individual specified limits may not be the actual limits for any species because a different species could trigger a closure of a particular zone. For example, if the joint venture 135,000 C. bairdi PSC limit is reached before the 80,000 king crab limit, the actual king crab mortality will not reach 80,000. Thus, the impacts discussed in the following subsections should be viewed as "worst case" impacts, and the actual impacts will be somewhat less.

2.3.3.1 Environmental Impact of the Status Quo

Incidental crab catches by foreign trawlers are composed mostly of species other than red king crab, while those of JVP are composed almost entirely of red king crab and Tanner crab. The reason for this difference is due to prohibitions on foreign trawling in areas of high red king crab abundance that have not been applicable to JVP trawlers. The average number of red king crabs observed in Bristol Bay JVP trawl catches from 1980 through 1984 is 500,000 crabs. The mortality rate for crabs caught in trawl nets is high. Based on crab viability data collected by the NMFS observer program, the proportion of dead crabs and those in poor condition to the total number of crabs examined varies from 30% to 84%, but has an average of 70%.

In addition to those crabs killed by being captured in the trawl net, an unknown number is killed by contact with the trawl doors, cables, and other noncapturing parts of the trawl. Estimates of this unobserved incidental mortality range from "substantial" to "minimal," but the actual unobserved mortality is unknown. Estimates of the maximum number of red king crabs encountered by JVP trawl gear have been made by multiplying assumed crab densities in certain areas by the total area swept by trawl gear. These estimates range from 3.1 million to 11.7 million crabs (with an average of 7.9 million) as the maximum numbers of crabs encountered by JVP trawl gear annually from 1980 through 1984. An estimate of the crab mortality caused by these encounters is based on a calculation of the percent mortality likely to occur from the capturing and noncapturing parts of the trawl gear. Weighted average mortality rates used ranged from 13% to 100% and were applied to annual fishery data for the years 1980 through 1984. Trawl-induced mortality estimates generated by this method range from 1.0 to 7.9 million crabs, depending on the mortality rate assumption used. However, assuming the lowest mortality rate (13%), an estimated one million red king crab were killed annually by encounters with JVP trawl gear annually during the five-year

period; this is twice the average annual observed incidental catch of red king crabs by JVP trawl gear. Similar trawl-induced mortality estimates for C. bairdi Tanner crabs have not been made. This species is distributed throughout much of the same area as the red king crab. If relative abundance is also similar, then the rate of C. bairdi encounters with JVP trawl gear may be similar to that of red king crab.

Bycatch of halibut occurs in three main fisheries: the foreign fishery, the DAH groundfish fishery, and other domestic fisheries (Table 2.8). Foreign bycatches have generally declined as TALFF was reduced. JVP groundfish fisheries have expanded rapidly since 1981 and DAP groundfish fisheries are beginning to make a significant presence. Bycatch from domestic crab and shrimp fisheries currently adds a small amount, but was significantly larger during the peak of the crab fisheries. Estimates of bycatch are available from observers for foreign and JVP fisheries; other domestic fishery bycatch estimates must be made indirectly. The mean halibut bycatch from 1982-85 in the BSAI area (3,200 mt) is about twice the directed halibut fishery during these years and is comparable to the directed BSAI halibut catch limit of 3,050 mt set for 1986.

Not all halibut caught as bycatch die from the experience. Time out of water, onboard handling, and volume of other species in the net, for example, affect the proportion of halibut survival rates. Mortality rates have been estimated for each major fishery type based on observer information, results from research surveys, and assumptions about the conduct of the fisheries. The estimated mortality rates for major fisheries are: (1) foreign trawl-50%; (2) foreign longline-25%; (3) joint venture-100%; (4) domestic crab and shrimp fisheries-100%; and (5) domestic trawl-50%.

2.3.3.2 Environmental Impact of the Closure of 160°-162°

Based on the most recent annual survey of the eastern Bering Sea crab populations, almost all (95% or more) of the red king crab resource is distributed in the area south of 58°N latitude and east of 165°W longitude. The focus of the highest concentrations of mature female red king crabs appears to be in this area between 160°W and 162°W longitude. The survey indicates that the legal male and large female C. bairdi Tanner crab are concentrated within this area also. This species is distributed more widely than red king crab and can also be found in significant numbers within a band stretching from the west end of Unimak Island to the Pribilof Islands.

Option 1: No closure of the 160°W-162°W area (status quo).

The "no action" option would provide no protection to the depleted crab resources within the area of their highest concentrations. This option would place the red king and C. bairdi Tanner crabs in the otherwise closed area at the greatest risk of encountering JVP trawl gear and associated fishing mortality. Foreign trawling already is prohibited from most of this area.

Zone 1 as described under this action encompasses practically all of the red king crab resource and a substantial part of the legal male and large female C. bairdi Tanner crab resource.

Table 2.8 Halibut bycatch in various fisheries and target catch by the halibut longline fishery, 1982-85 (in metric tons).

Year	JVP	DAP*	Crab & Shrimp*	Foreign	Total	Directed
82	564	100	709	1,580	2,953	250
83	439	100	641	1,865	3,045	1,427
84	618	100	512	2,127	3,358	1,328
85	1,146	100	483	1,870	3,599	1,634
82-85 mean	692	100	586	1,860	3,239	1,160

*Estimated without observer data.

Option 2: 160°W-162°W area closure without DAP Pacific cod exception.

This option would provide the greatest protection for trawl gear encounters to red king and C. bairdi Tanner crabs in the area of their greatest mutual concentrations. Total prohibition of trawl gear in this area with no exceptions would assure virtually no incidental catches of these crab species. Trawl gear use displaced from this area will increase fishing effort in other areas. However, these other areas are likely to have lower concentrations of crabs and, therefore, lower probability of crab encounters with trawl gear.

Option 3: 160°W-162°W area closure with DAP Pacific cod exception. (Included in Alternatives 2, 3 and 6)

This option provides somewhat less protection from trawl gear to crabs in the area of their greatest concentrations. However, the trawling that would be allowed in the excepted area would be done under some mitigating conditions. First, trawling would be allowed for cod fishing only. This involves towing the net slightly higher in the water column than it would be if the target species were flatfish. Second, trawling would be allowed only within a corridor roughly 80 miles long and 20 miles wide at its widest part. This corridor encompasses waters generally shallower than 25 fathoms. Third, a special PSC limit of 12,000 red king crabs, two red king crabs per metric ton of groundfish, would apply within the excepted area. This amount of crabs is considered sufficiently small to prevent undue risk to the red king crab population while it would allow the DAP fishery to harvest an expected 6,000 mt of groundfish that would be otherwise unavailable to the fishery. Monitoring of the incidental crab catches in the excepted area and closure of the cod fishery, if necessary, would be dependent on the use of onboard observers.

Option 4: Area closure with DAP Pacific cod exemption from May 15 through July 31, or a groundfish catch limit of 6,000 mt, whichever comes first. (Included in Alternative 4)

If a DAP observer program is not implemented then there will be no way to accurately monitor incidental catches of crabs and halibut by DAP vessels. This option places a limit on the groundfish catch in order to limit these bycatches. The option is based on the assumption that the bycatch rate of red king crab is two crab per metric ton of groundfish (all species). Preliminary information from the 1986 DAP cod fishery in this area indicates that the actual bycatch rate may be far below two crabs per metric ton. Thus, crab mortality is expected to be less than the PSC of 12,000 crabs allowed under Options 2 and 3.

2.3.3.3 Environmental Impact of the Red King Crab PSC Limit

Option 1: No PSC limit for red king crab (status quo).

Establishing no red king crab PSC limit in Zone 1 would negatively impact red king crabs. By comparison with Option 2 below, an estimated 109,000 additional red king crabs (i.e., 244,000-135,000) may be harvested by trawl gear. In addition, some degree of additional mortality will occur to crabs which are struck by trawl gear but not captured in the net. Estimates of crabs potentially encountered by trawl gear under this option range from very

few to as many as 1.7 million. There is currently no valid method of verifying any of these estimates.

Option 2: DAH PSC limit of 135,000 red king crab applicable to the yellowfin sole/other flatfish fishery with closure of the area when the limit is reached. (Included in Alternatives 2, 3 and 6)

Based on historic average incidental catch rates, the DAH flatfish fishery in this area would be expected to catch between 122,000 and 244,000 crabs. The PSC limit of 135,000 red king crabs in Zone 1 is likely to be a constraint on the DAH trawl fishery for flatfish and the fishery will be forced to move outside the area at some point during the year. Because nearly all of the red king crab population resides within this area, very little additional bycatch of red king crab is anticipated when the fleet moves outside. This option is likely to provide a degree of protection to the red king crab resource which could be substantial if the DAH fishery continues to expand at recent rates.

Option 3: Adjustable PSC limit for red king crab (Included in Alternative 4).

Under this option the PSC limit for red king crab would be adjusted upwards as the stock status improves. The protection provided under the current stock status would be similar or identical to that provided by Option 2. This option would be less protective than Option 2 under higher stock status conditions but is expected to provide sufficient relief from trawl-related mortality to allow the stock to rebuild. The rate of rebuilding would be slower than that provided by Option 2 but faster than under the status quo.

2.3.3.4 Environmental Impact of the C. Bairdi PSC Limits

Option 1: No PSC limits for C. bairdi (status quo). (Included in Alternative 1)

The status quo option fails to provide any additional protection to depressed C. bairdi stocks. Without PSC limits the DAH and foreign bycatch could approach 1.5 million animals, which could retard the ability of the stock to rebuild at low population levels such as those presently being experienced.

Option 2: PSC limit of 80,000 C. bairdi for the DAH yellowfin sole/other flatfish fishery in Zone 1; PSC limit of 326,000 C. bairdi applicable to the same fishery in Zone 2; no PSC limit outside; foreign yellowfin sole/other flatfish fishery PSC limit of 64,000 C. bairdi in combined Zones 1 and 2. (Included in Alternatives 2, 3 and 6)

Analysis of this proposal indicates a potential savings of about 894,000 C. bairdi from the status quo, which is a bycatch of about 1.3 million C. bairdi. This option provides the additional biological benefit, not provided by the other options, of a restrictive PSC limit of 80,000 C. bairdi applied to the area of highest concentration of legal male and large female C. bairdi Tanner crabs. Because these crabs represent a major reproductive resource, this additional protection will benefit the rebuilding of the stock.

Option 3: Adjustable PSC limits for C. bairdi crab (Included in Alternative 4)

Under this option the PSC limits for C. bairdi Tanner crab would be adjusted upwards as the stock status improves. The protection provided under the current stock status would be similar or identical to that provided by Option 1. If stock status declines, more restrictive PSC limits are allowed under this option, and thus slightly more protection to the C. bairdi stock. This option would be less protective under higher stock status conditions but is expected to provide sufficient relief from trawl-related mortality to allow the stock to rebuild. The rate of rebuilding would be slower than that provided by Option 2 but faster than under the status quo.

2.3.3.5 Environmental Impact of the Halibut PSC Limit

Option 1: No PSC limits for Pacific halibut (status quo).

The Pacific halibut stock in the BSAI area is currently at a higher than average abundance level and not in any immediate danger of overfishing. The 1981-85 average bycatch by all gear types is approximately 3,200 mt, of which 692 mt is taken by JVP fisheries. Should the halibut resource decline or the JVP bycatch increase, the status quo option will fail to provide an additional protection to the halibut stock.

Option 2: Halibut bycatch Zone 1 with PSC limit. (Included in Alternative 3)

The southern portion of Zone 1 has been identified as part of the major halibut juvenile rearing area in the Bering Sea. The PSC limit of 40,000 halibut (the combined individual caps of 15,000 and 25,000) for the yellowfin sole/flounder fishery would reduce the bycatch in that area by approximately 55,000 from the estimated 1986 bycatch of 95,000. However, a major portion of the rearing grounds lies outside Zone 1 and if Zone 1 were closed, fishing effort would shift to outside areas and the total bycatch of halibut could actually increase.

Option 2 also includes a PSC limit of 250,000 halibut for the yellowfin sole/other flatfish fishery in the entire Bering Sea management area (INPFC areas I, II, and III). If this limit is reached the entire Bering Sea would be closed to further yellowfin sole/flounder fishing for the remainder of the year. Other bottom trawl fisheries and longline fisheries would continue to take halibut, so the PSC limit could be exceeded. The 250,000 halibut PSC limit is equivalent to approximately 450 mt. This limit represents 13.9% of the total status quo halibut bycatch (3,229 mt) and 65% of the JVP status quo (692 mt) in the Bering Sea.

Option 3: Zone 1 and the Halibut Protection Zone (HPZ) with adjustable Bering Sea-wide PSC limits. (Included in Alternative 4)

Under this option halibut caught in the DAH yellowfin sole/other flounder fishery anywhere in the Bering Sea/Aleutians would be counted against the total PSC limit, and closure of Zone 1 and the Halibut Protection Zone to yellowfin sole/flatfish trawling would be triggered when the PSC limit is reached. A large proportion of the halibut bycatch would remain unlimited by

this proposal. However, the combined Zone 1 and HPZ encompasses the majority of the known nursery ground for juvenile halibut in the management area. The majority of the halibut stock would be protected from additional fishing mortality when the closure is triggered, even if the bycatch had come from areas outside the protection zone. This option provides a greater degree of protection to the halibut stock. PSC limits under this proposal would be adjusted downward in case of a decline in halibut biomass. If the resource declined to the "depressed" level the protection zone would provide conservation protection required to help maintain and/or help rebuild the stock. The Council's emergency rule alternative (Alternative 2) sets limits on halibut bycatch that do not change as the halibut abundance changes and the PSC limit of 250,000 halibut would therefore remain in effect even under depressed stock conditions. Whenever the halibut stock abundance is below the "high" category, adjustable limits will provide less protection for the halibut resource.

Option 4: Bering Sea-wide PSC limit of 828,000 animals in joint venture yellowfin sole/other flounder with subsequent closure of Zone 1 to joint venture yellowfin sole/other flounder trawling. (Included in Alternative 6)

The PSC limit of 828,000 halibut for the joint venture yellowfin sole/other flounder fishery is higher than the PSC limits established by any of the other options, and is therefore less restrictive. It is approximately a status quo option in that it is based upon the total allowable bycatch for the non-directed fisheries in the Bering Sea/Aleutians area (accepted by the industry in 1986) and an expected status quo catch for each of the major fisheries. This option is non-restrictive since Zone 1 would in all likelihood have already been closed due to king or Tanner crab bycatch.

Each option which sets PSC limits will provide more protection to the halibut resource than that provided by the status quo alternative. The Pot Sanctuary closure will also provide more protection to the halibut stock than the status quo, but since no overall PSC limit is set it may be much less beneficial to the halibut stock than an option which set limits.

2.3.3.6 Environmental Impact of the Pot Sanctuary Closure

The Pot Sanctuary encompasses a major portion of the known distribution of red king crab and juvenile halibut. Closure of this area to all fishing will reduce the fishing mortality to zero within the boundaries and thus provide the maximum protection for that particular area. However, for that portion of the resource outside the Sanctuary this alternative provides no protection and in fact may increase fishing mortality. This is because vessels may have to fish harder to catch their yellowfin sole/other flatfish quotas and in the process may drag their nets longer or fish in areas where crabs or halibut are more abundant than average. Since the majority of the C. bairdi Tanner crab stock is outside the Pot Sanctuary this alternative may tend to increase C. bairdi bycatch compared to the status quo.

2.3.4 Environmental Impact Summary

The status quo is the least protective alternative for king crab and halibut. Alternatives 2, 3 and 6 (the emergency rule alternatives) are identical for crabs, while the Council's recommended rules are more protective for halibut.

These three alternatives may be slightly less protective for crabs than the framework (Alternative 4) under depressed stock conditions because under the framework PSC limits can be adjusted lower. However, Alternatives 2, 3 and 6 keep the crab PSCs low even when the stocks are healthy, and therefore may be overprotective under that condition. The Pot Sanctuary closure (Alternative 5) provides more protection than the status quo for king crab and halibut but does not set a limit on the total mortality. The Pot Sanctuary closure may increase C. bairdi bycatch. Therefore it provides potentially less protection than the other alternatives, except within the closed area itself.

2.4 Regulatory Impact of the Alternatives

This section is an assessment of the probable economic and socioeconomic impacts of five solutions to the problem of excessive bycatches of king crab, Tanner crab, and halibut in the Bering Sea. Table 2.1 lists the main provisions of each alternative. Completion of this analytical evaluation has been complicated by the rapid evolution and expansion of these domestic fisheries. Therefore, historic patterns of participation, as well as distribution and levels of effort may not be representative of these fisheries in future years.

All proposed alternatives to the status quo, except Alternative 5, focus primarily on the joint venture yellowfin sole/other flatfish fishery. Since that fishery has developed so rapidly in the past two years it is necessary to use the most recent data in describing that fishery and in examining the consequences of the proposed Alternatives. Therefore, the analysis focuses on the 1985 fishery as a proxy for what would happen in 1987 given no regulations (the status quo) and on the 1986 fishery. Data for both 1985 and 1986 are still preliminary and the data for 1986 are incomplete.

These limitations place bounds on our ability to examine all facets of each Alternative, but the alternative of using data from 1981-84 when the fishery was very much smaller is even more unattractive. Moreover, the data from 1981-84 is not currently in a form which allows analysis of area closures other than closures of INPFC areas. The perspective taken will be one of comparing the 1986 joint venture flatfish fishery, operating under the emergency rule (Alternative 2), against the 1985 joint venture flatfish fishery (the status quo-Alternative 1) with an appropriate adjustment for the different levels of effort in the two years. The 1986 fishery performance is in fact an example of what would happen under Alternative 2. In particular the performance of the fleet, at least in 1986, indicates that when these specified areas are closed to flatfish trawling the flatfish catch can be made up in the remaining open areas.

We therefore examine redistribution of effort under the assumption that the fleet will be able to harvest the remaining flatfish in open areas. This redistribution of effort will result in some changes in groundfish catches and in the bycatches of crab and halibut. These changes in directed and incidental harvests are translated to values through the use of per animal and per weight values developed by Joe Terry of the NWAFC in "A Biological and Economic Analysis of By-Catch of Prohibited Species in the Bering Sea Area I Joint Venture Flounder Fishery", Jerry Reeves and Joe Terry, Northwest and Alaska Fisheries Center, National Marine Fisheries Service, Jan. 1986.

2.4.1 Fishery Costs and Benefits

The joint venture flatfish fishery has grown rapidly over the past five years, with a 34% increase in 1985, a 46% increase projected for 1986, and has not yet stabilized in terms of total harvest, fishing grounds, and fishing techniques. Thus, it is impossible to predict exactly how fishermen will respond to PSC limits and the closures associated with those limits. The assumption on redistribution of effort means that eventually DAF will be reached and that bycatch rates for each subarea will remain the same as during the base period. Thus, there is no change in gross revenue, but increases in operating costs will reduce net profit. No data are available to estimate increased costs although we may infer how much costs would have to increase to equal the value of the bycatch savings.

The Status quo: Cumulative monthly catch data for the 1985 joint venture flatfish fisheries indicate that the joint venture flatfish fishery took a total of 216,000 mt of groundfish, 157,000 of which was flatfish (Table 2.9). The 1986 fishery has taken 205,000 mt of groundfish and 170,000 mt of flatfish through the end of July (Table 2.10). NMFS projects a 1986 total catch of 280,000 mt of groundfish for this fleet of which 229,000 mt is expected to be flatfish. Therefore, the overall harvest of groundfish is expected to be 30% greater in 1986 than in 1985.

Alternative 2: The emergency rule implemented by NMFS. The emergency rule as described in Alternative 2 was implemented by NMFS effective June 3. The Tanner crab limits of 80,000 crabs was exceeded and Zone 1 was closed to joint venture flatfish trawling on June 17 with effort then moving to Zones 2 and 3. Projections through the remainder of 1986 (Table 2.10) indicate that the C. bairdi harvest in Zone 2 will be 122,000 animals, considerably below the catch limit of 326,000 crabs and therefore it is unlikely that Zone 2 will be closed to flatfish trawling in 1986.

We compare Alternative 2 with the status quo in three ways: 1) in terms of impacts in particular areas with respect to the bycatch species of concern; 2) in terms of overall fishery performance; and 3) in terms of increased operating costs.

Area impacts. Closed Areas: Closure of the 160°-162°W area to all trawling would be expected to result in substantial changes in distribution of groundfish fishing effort. Historically, a relatively large part of the joint venture yellowfin sole/other flatfish fishery has taken place within the area proposed for total closure. The 1985 joint venture harvest of yellowfin sole and other flatfish taken within the proposed closed zone accounted for 47% of the total Bering Sea Area I directed domestic harvest of these species.

Most foreign fishing in this area is prohibited under provisions of the 1978 Foreign Fishing Regulations, CFR 611.93, which established a pot sanctuary free of foreign trawling. However, this alternative closes an additional small area in the northwest corner of the larger area as well. In 1985 approximately 7 metric tons of groundfish were harvested by foreign trawlers in this area, which represents only a fraction of one percent of the total BSAI foreign groundfish catch. This could easily have been made up elsewhere, and, therefore virtually no adverse impacts to foreign groundfish fleets are expected.

Table 2.3. The 1985 round-venture flatfish fishery, Bering Sea Area 1

Cumulative Catches - 1985

Species	Month							Total (lbs)	Percent Caught (%)
	Apr	May	Jun	Jul	Aug	Sep			
GROUND FISH SPECIES - MT									
Flatfish	10,240	46,352	75,760	103,955	130,199	147,741	157,146	4,94,102	
Pollock	1,756	3,710	12,334	22,211	29,612	37,098	48,937	1,13,816	
Ground	1,162	2,141	5,412	10,585	14,798	17,876	19,234	64,125	
Blackfoot	0	1	1	1	1	1	1	40	
Rockfish	11	16	47	78	129	192	261	1,313	
Other Flatfishes	0	0	0	0	1	7	7	40	
Other Rockfish	0	0	0	0	1	1	1	40	
Unidentified	9	9	9	9	17	20	26	44	
Total Groundfish	13,178	52,229	93,571	136,839	174,758	202,931	215,582	4,42,162	
NUMBERS OF ANIMALS									
GROUND SPECIES									
Long cod	90,560	277,350	490,350	733,050	851,550	885,836	891,540	1,14,94,466	
Rockfish crabs	09,745	274,854	485,937	726,451	843,886	877,877	885,107	4,00,764	
GROUND SPECIES									
Pollock	29,980	99,460	226,260	356,860	479,960	576,260	663,960	1,14,94,466	
Blackfoot	15,488	51,381	116,886	184,354	247,947	297,696	363,727	1,14,94,466	
Rockfish	14,480	48,039	109,284	172,363	231,621	278,134	321,412	1,14,94,466	
Unidentified	9,620	47,290	118,100	176,500	240,240	249,866	265,836	1,14,94,466	
Total Ground	10.5	111.6	276.7	453.5	640.7	667.3	739.4	8,11,114	
							10,000	1,14,94,466	

TABLE 2.10 The 1986 joint venture flatfish fishery.

Cumulative Catches - 1986											
Species	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Projected Total	Actual Total
GROUNDFISH SPECIES - MT											
Flatfish	1	1,508	137	0	21,435	65,490	65,515	65,515			
	2	3,810	8	0	38,751	43,347	60,338	65,611		88,009	
	3	0	0	0	0	571	14,973	37,887		75,042	
TOTAL											168,843
Pollock	1	5,318	145	0	60,186	109,408	140,826	168,813			
	2	419	80	0	1,918	3,410	3,415	3,415			
	3	1,595	0	0	4,918	5,168	6,598	6,634		8,020	
TOTAL											14,043
P. cod	1	2,014	60	0	6,836	8,668	11,494	12,344			
	2	818	459	0	1,712	6,764	6,766	6,766		14,014	
	3	513	6	0	3,242	4,391	9,879	10,084		11,562	
TOTAL											27,920
H. haddock	1	1,331	485	0	4,960	11,420	20,739	21,846		30,532	
	2	0	0	0	0	0	0	0		0	
	3	0	0	0	0	0	0	0		0	
TOTAL											30,532
Turbot	1	0	0	0	0	0	0	0		0	
	2	0	0	0	0	0	0	0		0	
	3	0	0	0	0	0	0	0		0	
TOTAL											0
P.O.P. complex	1	3	0	0	3	3	3	3		3	
	2	0	0	0	0	0	0	0		0	
	3	0	0	0	0	0	0	0		0	
TOTAL											3
Other rockfish	1	0	0	0	0	0	0	0		0	
	2	0	0	0	0	0	0	0		0	
	3	0	0	0	0	0	0	0		0	
TOTAL											0
Sablefish	1	0	0	0	0	0	0	0		0	
	2	0	0	0	0	0	0	0		0	
	3	0	0	0	0	0	0	0		0	
TOTAL											0
Other fish	1	85	16	0	255	400	401	431		1,094	
	2	93	1	0	649	710	1,109	1,138		1,640	
	3	0	0	0	0	15	402	720		5,004	
TOTAL											7,642
Total Groundfish	1	2,830	672	0	25,320	76,064	76,097	76,097		75,422	
	2	6,015	15	0	47,564	53,520	77,328	83,491		77,095	
	3	0	0	0	6	941	20,945	45,638		61,855	
TOTAL											211,970
NUMBERS OF ANIMALS											
Red king crab	1	11,116	0	0	23,052	125,093	125,146	125,146		125,547	
	2	3	0	0	1,776	2,061	2,349	2,389		2,246	
	3	0	0	0	0	28	501	1,264		2,591	
TOTAL											3,936
C. bairdi	1	11,119	0	0	24,838	127,182	127,996	128,796		130,984	
	2	8,579	2,550	0	15,522	113,897	113,951	113,951		114,959	
	3	4,496	166	0	48,087	53,645	100,369	101,059		92,094	
TOTAL											343,136
C. opilio	1	13,075	2,716	0	65,609	169,146	224,048	225,002		220,455	
	2	7,756	2,186	0	19,646	54,351	54,373	54,373		54,304	
	3	4,717	0	0	144,105	441,706	3,014,235	3,014,235		3,014,235	
TOTAL											3,302,869
Halibut	1	12,453	2,186	0	163,751	520,546	4,357,714	4,391,165		4,397,200	
	2	12,820	9,952	0	17,043	95,400	95,441	95,441		95,370	
	3	6,237	201	0	12,934	24,346	64,894	65,875		57,499	
TOTAL											4,650,068
Halibut, wt	1	19,057	10,153	0	29,977	122,318	200,399	222,621		254,309	
	2	15	11	0	27	255	256	256		256	
	3	12	0	0	42	80	196	204		194	
TOTAL											510,004
										1,096	1,096

Effects on king crab bycatch can also be estimated using NMFS observer data for all JVP fisheries in the area during 1985. If the total reported Bering Sea Area I bycatch of red king crab in the JVP groundfish fishery in 1985 is distributed in the same way as the flatfish harvest, 47% of the interception occurred within the area proposed for closure. There is evidence that the red king crab are more densely distributed in the proposed closed area, so the proportion saved could be considerably higher. This area was closed to trawling in 1986 and the total Bering Sea Area I bycatch of red king crab was substantially reduced (Tables 2.10, 2.11).

Closure of the 160°-162°W area is not expected to substantially impede the harvest of groundfish target species, with the possible exception of the Pacific cod resource. The 1985 JVP fishery took approximately 98% of the BSAI pollock harvest and more than 56% of the flatfish harvest outside the closure area. Furthermore, NMFS trawl surveys indicate equivalent or higher concentrations of yellowfin sole and other flatfish outside the area as those found within. Therefore, the probable cost to groundfish fishermen, and particularly DAP yellowfin sole and other flatfish fishermen, as reflected in potential reductions in catch, may be much less than past catch distributions imply. The relative impacts of Alternative 2 in this closure area can be estimated from information gathered from the 1986 fishery (which operated under the emergency rule).

Vessels fishing for Pacific cod would be allowed to fish in waters of 25 fathoms or less if they have a scientific data gatherer on board. This fishery has a PSC limit of 12,000 red king crab. This bycatch cap should not unduly constrain the DAP Pacific cod fishery, which took approximately 2,830 mt in that area in 1985. Assuming the same ratio of Pacific cod to other groundfish species harvested in this fishery in 1985, this would result in a 1986 total groundfish catch in this DAP cod fishery of approximately 6,000 mt. Utilizing 1985 price data for the Bering Sea groundfish fishery, the exvessel value of the Pacific cod landed would be approximately \$786,000. The remainder of the catch landed with the target Pacific cod would be expected to represent about \$705,600 in exvessel revenue to the fleet, for a total value of \$1.5 million. This is an estimate of the revenue that would accrue to DAP fishermen as a result of the Pacific cod exception in this area.

While providing substantial benefit to the DAP cod fishery, Alternative 2 does impose costs associated with the onboard observer requirement. All costs associated with the provision and maintenance of required observers will be borne by the individual DAP vessel. Preliminary information suggested that as many as eight DAP vessels would take advantage of the exemption provision during the two-month fishery. NMFS Observer Program data indicate that the average cost per observer month is \$5,400. Therefore, the cost to eight DAP cod trawlers associated with the scientific data gatherer provision could reach \$86,400 under 100% coverage, or an average cost per vessel of \$10,800, assuming two full months of directed fishing.

With this exemption, Alternative 2 would not impose upon the predominantly DAP cod operations the cost of relocation to unfamiliar and presumably more distant fishing sites, with all the concomitant costs of exploration, increased transit time, etc.

Table 2.11 Summary and comparison: the 1985 versus the 1986 joint venture flatfish fishery

Species	CATCH		EXPENSES		BYCATCH		BYCATCH		BYCATCH	
	1985	1986	1985	1986	1985	1986	1985	1986	1985	1986
Flatfish	157,000	229,000	24,000	72,000	35,000	\$11,000				
Total Groundfish	216,000	280,000	32,100	64,000	44,000	\$11,900				
		(Cwt)								
Red king crab	886,000	130,000	10,800	(\$56,000)	700	(\$10,100)	5.5	0.6	1,292,000	130,000
C. bairdi	344,000	281,000	150	(\$28)	122		2.2	1.2	502,000	281,000
C. opilio	321,000	4,897,200	10	4,576,200	147	\$137	3.0	21.4	468,000	4,897,200
Halibut	256,000	324,000	2,900	58,000	3,600	\$700	1.2	1.4	388,000	324,000

Note: 1986 catches are projected from catch-to-date (August) based on a predicted total catch of 228,560 mt of groundfish and a predicted 15 fishery days.

* Under Alternative 2 up to 12,000 red king crab could be killed, which could have an economic impact on the king crab fishery. Depending on fecundity assumptions and sex ratios observed during the base period, the discounted present exvessel value loss of 12,000 king crab would be approximately \$54,800 for the low fecundity case, and \$134,000 for the high fecundity case.

While benefits in the form of PSC savings are anticipated from the closure, the action will also impose costs. The closure of an area which has been such a central part of developing DAH groundfish fisheries, particularly those for yellowfin sole and other flatfish, will require changes and adjustments on the part of the affected operators which cannot be fully anticipated. The closure will require fishermen to leave preferred and familiar grounds. This will impose costs in the form of exploration time to locate new grounds, perhaps extended running time in transit between port and prospective fishing areas, logistical adjustments to coordinate refueling, transferring of crews and observers, etc. While all of these represent costs directly attributable to the proposed action, no experience exists within the industry upon which to judge the magnitude of these likely impacts. The rapidity with which new fishing patterns, exploration of unfamiliar grounds, and development of logistical and support networks can be achieved will determine the size and duration of these costs.

Zones 1 and 2: Alternative 2 also establishes a PSC limit or cap of 135,000 red king crab and a cap of 80,000 C. bairdi Tanner crab for the DAH directed yellowfin sole/other flatfish fishery within Zone 1.

When the DAH yellowfin sole/other flatfish fishery reaches either PSC limit within Zone 1, all further DAH yellowfin sole/other flatfish fishing will be prohibited within this area for that fishing year. Catch distribution data for the 1985 yellowfin sole/other flatfish fishery indicate that approximately 27% of the total harvest of these species occurs outside Zone 1. Catch outside this area is characterized by relatively low rates of red king crab bycatch and relatively higher catch rates of Tanner crab, particularly C. opilio.

Closure and subsequent redistribution of effort in response to exceeding the cap would impose some costs upon the fishery associated with relocation and transit time. Mr. Phil Chitwood of Marine Resources Company suggests that the total seasonal cost of moving from port to fishing grounds outside of 165°W-58°N and back again to resupply, change crews, change observers, etc., could be two to three times greater than equivalent costs of fishing inside 165°W-58°N. No empirical data yet exist with which to measure these potential costs. There seems little doubt, however, that if the DAH flounder fishery is unable to fish within the zone at sufficiently low bycatch rates of red king crab, costs will be imposed by adoption of the proposed action.

There may be other costs attributable to this alternative as well, assuming the 135,000 king crab PSC limit is exceeded. To the extent that DAH vessels tend to be relatively small, the greater distance from port and more exposed ocean environment may increase fishing costs and risks. Some may be forced to stop fishing when the Zone 1 closure is triggered rather than relocate to areas outside of this area. The extent to which this may occur cannot be anticipated given existing information, but nonetheless represents a potential cost.

Benefits accruing from this alternative are primarily associated with potential red king and C. bairdi Tanner crab savings. Obviously, until the 135,000 king crab PSC limit is reached this action results in neither costs nor benefits, except perhaps insofar as the PSC limit may induce DAH flounder fishermen to increase their effort to avoid red king crab.

This part of Alternative 2 is expected to save crabs in comparison to the status quo. Based upon the 1986 fishery, including the closure of 160°W-162°W, the savings will be approximately 756,000 king crab in the joint venture fishery. The estimated discounted present value of these red king crab, based upon the weighted average value per crab (developed in Reeves and Terry, cited above), would be approximately \$4 million for the low fecundity valuation, and \$9 million for the high fecundity valuation, at exvessel.

Additional savings of crabs will result from closures of the foreign flounder fishery when either the red king crab or the C. bairdi Tanner crab PSC limit is reached. No estimate of this savings, if any, can be made at this time.

Similarly, benefits from reduced bycatches of other prohibited species by both foreign and domestic operations may accrue from PSC limits if a closure is triggered. These may be offset to the extent that redistribution of effort outside Zone 1 results in additional prohibited species losses. However, neither impact is quantifiable at present.

Alternative 2 provides a mechanism whereby the Council's goal of C. bairdi conservation, through a reduction in trawl bycatch mortality, can be achieved without substantial adverse impact upon directed yellowfin sole/other flatfish fisheries. Specifically, Zones 1 and 2 are believed to encompass fully 98% of the total Bering Sea Aleutian Island management area bairdi resource, including females and sublegal males. Therefore, the PSC limits established within these zones will provide significant savings in bycatch mortality and comprehensive protection of the reproductive potential of the resource.

Based upon projected DAH directed flatfish fishery landing of 229,000 mt and historic rates of bairdi interception in these areas, it was projected that the total 1986 DAH bycatch could exceed 500,000 bairdi under the status quo alternative. Under the PSC limits in Zones 1 and 2 in Alternative 2, the maximum bairdi loss to DAH flatfish trawls in these areas would be limited to 406,000 crab, or a bairdi savings under this alternative of 44,000 animals. The discounted present value of this saving would be approximately \$19,000, exvessel.

In 1985 the foreign bycatch of bairdi in the Bering Sea Aleutian Island flatfish fishery was estimated to be 287,00 crabs. A reduction in the loss to 64,000 animals would represent a saving of 223,000 bairdi with a discounted present value at exvessel of approximately \$100,000.

Fishery performance: The effect of Alternative 2 relative to the status quo can also be examined from the perspective of overall fishery performance. The 1985 and 1986 fishery data presented earlier in Tables 2.9 and 2.10 are summarized and compared in Table 2.11. The 1986 fishery is not yet complete so year-to-date data (through July 26) was expanded based upon the NMFS

projection that the final 1986 joint venture harvest of flatfish would be 228,560 mt and based on the assumption that all additional effort would occur in Zones 2 and 3 with effort between zones distributed proportionally to the harvest in these zones in June and July. Imposition of the emergency rule is projected to result in substantial savings in the bycatch of red king crab, reductions in the harvest of C. bairdi, an increase in the harvest of halibut (58,000 animals), and a large increase in the harvest of C. opilio.

Most importantly, flatfish harvest and total groundfish harvest were not adversely impacted by imposition of the emergency rule, but in fact increased in 1986 relative to 1985 by a total harvest of 64,000 mt and in exvessel revenue by \$11.9 million.

Since the 1985 and 1986 fisheries are not the same size, that is, are not expected to catch the same amount of flatfish or total groundfish, it is useful to standardize performance for purposes of comparison. This can be done in terms of bycatch rates or in terms of equivalent catches. Both comparisons are illustrated in Table 2.11. The bycatch rate for red king crab declined by 90%, the C. bairdi Tanner crab catch rate declined by 44%, the halibut catch rate declined by about 17%, and the C. opilio catch rate increased some 10 fold when the fleet moved out of Zone 1.

If the 1985 catch is expanded to the projected 1986 catch level it is possible to compare the predicted performance of the 1986 fishery with that which would have occurred under the status quo. Obviously, our assumptions on redistribution imply that there would be no reduction in exvessel revenue for the fleet. This assumption is validated by the 1986 fleet performance.

The bycatch savings, however, are considerable. If the emergency rule had not been in effect in 1986 and had the fleet made no attempt to redistribute effort or minimize bycatch relative to 1985, they would have harvested 1,292,000 red king crab, 502,000 bairdi Tanner crab, 468,000 opilio Tanner crab, and 368,000 halibut. Imposition of the emergency rule therefore resulted in a savings of 1,162,000 red king crab, 221,000 bairdi and 64,000 halibut and a loss of 4,429,000 opilio. In terms of exvessel value these bycatch differences translate to between \$6.1 and \$14.1 million for red king crab; \$96,000 for C. bairdi and \$613,000 for halibut. The increased bycatch of C. opilio is worth approximately \$159,000 at the exvessel level.

In sum, we would predict that adoption of Alternative 2 would result in a total savings of between \$6.7 and \$14.7 million in crab and halibut at exvessel. The equivalent wholesale values range from \$8.9 to \$19.5 million.

Operational Costs. We have argued above that operational costs are likely to increase under adoption of Alternative 2. A quantitative assessment of these costs is impossible without cost data from the fishery, nevertheless the savings calculated above can be used to draw some inferences about how much costs would have had to increase to offset the predicted savings in bycatch.

Given the current harvest levels and present size of the fleet, exvessel revenue is approximately \$44 million. The few cost studies that have been done indicate that fuel costs are roughly 10% of gross revenue or, in this case, \$4.4 million. Other costs, which include crew wages, gear replacement,

maintenance and repair, boat maintenance, insurance (vessel and P&I), and transportation of the crew to the grounds, are not expected to increase under Alternative 2 except insofar as vessels purchase new doors (estimated at \$8,000 per set) or new nets (estimated at \$8,000 per net).

Based on our assumption of total fuel costs of \$4.4 million and the lower estimate of total bycatch savings of \$6.7 million, it is clear that fuel costs would have to more than double to offset the bycatch savings. Using the higher estimate of value of bycatch saved (\$14.7 million) implies that fuel costs would have to more than quadruple to raise operational costs by the amount of bycatch saved.

Increases in fuel costs of \$6.7 million and \$14.7 million translate total costs of 19% and 42%, respectively, assuming net revenue equals 20% of gross revenue. If total operational costs have actually increased more than these amounts society is worse off under Alternative 2 with the converse being true if total cost increases are less. Of course, the distribution of costs and benefits differs from the status quo with the flatfish fleet incurring increased costs and the harvesters of crab and halibut realizing the benefit.

Alternative 3: An extension of the emergency rule as adopted by the Council.

In its January and March meetings the Council approved a package of controls for an emergency rule to limit bycatch of crabs and halibut in the Eastern Bering Sea by the domestic and foreign flatfish fleets. In almost all respects that package (Alternative 3) is identical to that implemented by NMFS (Alternative 2). There are important distinctions, however, particularly with regard to limitations on the harvest of halibut by the joint venture flatfish fleet.

Before presenting and analyzing these halibut bycatch controls we briefly discuss the remaining differences between Alternatives 3 and 2. The Pacific cod exemption discussed under Alternative 2 is also part of this alternative, the only distinction being that the Council specified a zone between 160°-162°W landward of the 25 fathom contour and NMFS specified an exemption for the zone south of a straight line approximating the 25 fathom curve. Because these two lines are nearly identical and because the geographical resolution of the available catch data does not allow us to distinguish between the two areas we cannot determine any differential impact between the two alternatives with respect to the Pacific cod exemption.

With regard to red king crab provisions, these alternatives are nearly identical. Under Alternative 3 when the catch of red king crab exceeds two animals per metric ton in the cod exemption zone the area is closed to all fishing. Alternative 2 implements this restriction by predicting a harvest of 6,000 mt of groundfish and applying the two crab/mt bycatch rate to arrive at a catch limit of 12,000 red king crab. Adoption of Alternative 3 would require a similar assumption to make the rule operational.

There is an additional king crab provision in Alternative 3 not found in Alternative 2, namely, that there be a PSC limit of one red or blue king crab per metric ton of apportionment of flatfish not taken in Zone 1. If this provision had been part of the emergency rule in 1986 it would translate to a PSC limit of approximately 155,000 red or blue king crab. We do not have

estimates of blue king crab catch in 1986 but the red king crab harvest by the joint venture flatfish fleet outside of Zone 1 is expected to be about 5,300 animals. Data from the 1985 joint venture fishery indicate that 99.1% of the king crab in Bering Sea Area I (western boundary 170°W) were red king crab although most of that fishery took place in the area now known as Zone 1. Area I includes the eastern half of Zone 2 and most of that portion of Zone 3 where fishing took place in 1986, so if the distribution seen in 1985 is representative of the entire area it seems unlikely that the combined cap for red and blue king crab would be exceeded, at least in those portions of Zones 2 and 3 that lie within Area I.

There is a distinction between Alternative 2 and 3 with regard to additional controls on the fully domestic flatfish fishery in the eastern part of Zone 1 (east of 160°W). Alternative 3 requires observers on all DAP fishing vessels operating in that zone. We have no data to indicate whether any fishing occurred in the area nor any information to allow prediction of any future fishing in the zone. If Alternative 3 is adopted we may infer that observer costs for vessels operating in this area will be as estimated under Alternative 2, that is, \$5,400 per vessel-month.

Lastly, there is an important distinction between the two alternatives regarding the scope of the PSC limits. Under Alternative 2 PSC limits for red king crab and C. bairdi apply to the DAP fishery in the aggregate, whereas the Council, in suggesting Alternative 3, specified PSC limits as applicable to JVP only (with exceptions to DAP as noted above). It follows that the PSC limits under Alternative 2 are more restrictive than those under Alternative 3 since more fishermen contribute to that PSC limit. Therefore, Alternative 2 potentially imposes a greater relative cost to the flatfish fleet than does Alternative 3, since, all else equal, Alternative 2 will result in an earlier closure than would occur under Alternative 3.

The absence of a domestic observer program, however, confounds our ability to assess this distinction in costs. First, without past performance data it is impossible to quantify the relative restrictiveness of Alternative 2 over Alternative 3. Second, the absence of bycatch monitoring in the wholly domestic fleet makes attainment of an aggregate PSC limit for DAP and JVP impossible to predict. In sum, in the theoretical sense, Alternative 2 is more restrictive than Alternative 3, but, in practical terms, the relative restrictiveness of PSC limits between the two alternatives may be indistinguishable.

All remaining distinctions between the two alternatives relate to halibut catch limits. Alternative 2 imposes no restrictions on halibut bycatch as NMFS implements an emergency rule for conservation emergencies only and the halibut resource is such that no conservation emergency was deemed to exist.

Halibut provisions in Alternative 3 include a PSC limit of 25,000 animals in that part of Zone 1 west of 162°W and within the pot sanctuary, a PSC limit of 15,000 animals in that part of Zone 1 east of 160°W, and a Bering Sea-wide limit of 250,000 fish; all to be applied to the joint venture flatfish fishery.

Available data do not allow one to identify catch as originating from particular subareas within Zone 1, but it is clear, at least in terms of the 1986 fishery, that an overall PSC limit of 40,000 halibut in Zone 1 would have closed Zone 1 sometime in May (Table 2.10), or approximately one month earlier than actually occurred. It is unclear whether this earlier closure would have adversely affected the fleet's ability to harvest the remaining allocation of flatfish in Zone 2 and Zone 3. Certainly red king crab bycatch would have been reduced relative to actual 1986 projections. Also, the 1986 data indicate that the halibut bycatch rate increased when the fleet moved out of Zone 1 resulting in less protection of the resource relative to Alternative 2.

The bycatch of halibut in the 1986 fishery should reach the Bering Sea-wide limit of 250,000 before the end of the fishing year. Under Alternative 3, when this occurs all joint venture and foreign flatfish fishing must cease. If this limit were reached in August, as the 1986 rates imply, joint venture exvessel revenue may fall by some \$12 million. The foreign fleet would be more severely impacted. In 1985 more than 50% of the total groundfish harvest for the foreign flatfish fleet occurred after August. If this seasonal distribution of effort were to occur in 1987 and beyond the fleet would take roughly 50% of the status quo harvest of groundfish. Of course, this fleet would attempt to adjust the timing of their fishery so as to mitigate these negative impacts.

On the benefit side, a Bering Sea-wide closure in August would reduce the bycatch and save (relative to Alternative 2) some additional 70,000 halibut, 50,000 *C. bairdi*, and approximately 500,000 *C. opilio* in the joint venture fleet with additional bycatch savings for these species in the foreign fleet. At exvessel the present discounted value of these savings translate to a total value of approximately \$690,000.

Alternative 4: A framework of the emergency rule. This alternative is another variation on the 1986 emergency rule action and thus, in a general sense, does not differ from the previous two alternatives.

There are several important differences in the provisions for Alternative 4, however, the major distinction being that the PSC limits are not fixed as in the previous alternatives but, instead, may be modified annually based on the current stock status of the bycatch species. Thus, this alternative makes some attempt to strike a balance between the need to limit the incidental catch of non-groundfish species and the desire to allow expansion and development of domestic flatfish fisheries.

There are additional variations in Alternative 4 relative to Alternatives 2 and 3 that have important economic impacts on the fishery. First, this alternative does not require observers on board DAP vessels. This implies that this fleet would not have to pay the estimated \$86,400 for placing observers on Pacific cod vessels in the exempted part of the area between 160°-162°W south of 58°N and would not incur the additional expense of funding observers should they fish in that part of Zone 1 east of 160°W. Of course, if the observer program is funded by NMFS the savings identified above will go to the U.S. Government. The observer requirement is waived by recognizing that (1) the DAP flatfish fishery currently constitutes some 3% of the total DAH flatfish harvest and is a new fishery, and (2) the red king crab PSC limit

of 12,000 crab for the Pacific cod fishery exempted part of the Zone 1 closed area can be indirectly controlled by limiting the harvest for all groundfish including Pacific cod to 6,000, and by limiting the season for this fishery to the period May 15-August 1.

The halibut provisions of Alternative 4 differ from the previous alternative not only with regard to frameworking the PSC limit but also in the areas closed when the Bering Sea-wide limit is reached. Under Alternative 4 no PSC limits within Zone 1 are established, and only Zone 1 and an area designated as the Halibut Protection Zone (HPZ) are closed when the Bering Sea limit is attained. This is likely to have a minimal impact on the flatfish fisheries, at least under current fishing patterns, since Zone 1 is likely to be already closed due to reaching either the red king crab or C. bairdi PSC limit and since there has been little joint venture flatfish fishing in the area designated HPZ.

The PSC limit table (Table 2.3) indicates the possible range of harvest limits for red king crab, C. bairdi Tanner crab and halibut given four possible stock classifications of relative stock assessment. The midpoints of the range specified under the current depressed status for red king and C. bairdi crab are 135,000 red king crab in Zone 2; 12,000 red king crab in the exempted part of Zone 1; and 130,000 C. bairdi in Zone 1 and 326,000 C. bairdi in Zone 2. These limits are identical to those specified in Alternatives 2 and 3 with the exception of the C. bairdi limit in Zone 1 which is increased from 80,000 to 130,000 animals. Likewise the midpoint of the specified halibut PSC range at current high stock levels is approximately 250,000 fish - the same limit specified under Alternative 3.

The increase in the PSC limit for C. bairdi in Zone 1 will not likely materially affect the timing of the Zone 1 closure if the fleet operates as in 1986 but will potentially increase the harvest of these crab by 50,000 animals valued at \$20,000 exvessel. Therefore, other than the distinction drawn earlier regarding the impact of halibut protection provisions, and the waiving of the observer requirement, adoption of Alternative 4 will impact the fishery in the same way as Alternative 3 assuming the mid-points of the currently relevant intervals are chosen.

Alternative 4, however, allows considerable latitude in the selection of PSC limits. It is useful, therefore, to examine, in an approximate way, the bounds on possible impacts to the fishery given adoption of either 1) the most restrictive set of PSC limits, or 2) the least restrictive set of limits.

Thus, if crab stocks remain at the relative depressed level and if the halibut stock were also relatively depressed and if the Council chose the minimum PSC in each range the limits in effect would be as shown in Table 2.12. Conversely, if all species of concern were at high relative stock status the maximum PSC limits could be chosen (Table 2.12).

Table 2.12. Possible range of PSC limits under Alternative 4.

<u>Species/Zone</u>	<u>Minimum-all stocks</u>	<u>Maximum-all stocks</u>
	<u>depressed</u>	<u>high</u>
Red king crab - Zone 1	120,000	305,000
Zone 1-DAH cod	11,000	27,000
<u>C. bairdi</u> - Zone 1	117,000	293,000
Zone 2	290,000	725,000
Halibut BSAI	50,000	325,000

It is impossible to assess the impacts of these limits on a future fishery because as stock status changes areal distribution and, most importantly, bycatch rates change. Thus, it is inappropriate to examine the minimum and maximum set of limits from the perspective of the 1985-86 fisheries. All that can be said is that higher PSC limits will allow a higher groundfish catch if bycatch rates do not increase and that lower PSC limits imply that the opposite will occur. There is no way to assess the actual performance of the fishery under these limits without better ability to predict the stock sizes, distributions, and inter-species relationships for all species of concern, both bycatch species and groundfish species.

Alternative 5: Closure of the Pot Sanctuary to all fishing.

This alternative is quite different from the previous three alternatives. It expands the total closure incorporated in the other alternatives from the area between 160°W and 162°W longitude and south of 58°N latitude to that area defined as the pot sanctuary. It also expands the gear groups that would be prohibited from fishing in the closed area. Where the previous alternatives were limited to bottom trawling, this alternative would close the pot sanctuary to all commercial groundfish fishing. This would include all domestic longlining and pot fishing for groundfish. The portion of the analysis which estimates the costs of this closure will be underestimated since we have no data on the domestic effort that would be removed from the pot sanctuary. Other than the closure, there are no provisions to insure bycatch reduction of C. bairdi Tanner red king crab. NMFS survey information indicates substantial populations of C. bairdi Tanner crab and, to a lesser extent red king crab, outside of the pot sanctuary. Redistribution of effort could result in substantial bycatches of these species and halibut.

With regard to the foreign trawl fleet, adoption of this alternative has no impact as the area is already closed to trawling. Available information also indicates that the foreign longline fishery does not fish in this area.

In 1985 almost all of the joint venture harvest of groundfish and the catch of the prohibited species of king crab, Tanner crab, and halibut occurred in Bering Sea Area I (Table 2.13). The Pot Sanctuary is a small part of Area I although other evidence from the 1985 fishery indicates that most effort did occur either within or in the vicinity of the Sanctuary. To date in 1986

Table 2.13 Harvests in BSAI Areas in 1985 and 1986

	Groundfish (mt)	Halibut	King crab	Total Tanner crab	Bairdi Tanner crab	Other Tanner crab
1985						
BSAI 1	567,365	422,270	990,090	831,840		
All BS	578,399	423,290	990,170	845,940		
1986						
Zone 1	195,446	134,711	134,010	215,476	134,711	80,763
Zone 2	524,483	191,052	2,921	4,104,950	191,052	1,913,898
Zone 3	46,423	60,322	1,422	1,331,412	3,989	1,321,423
All BS	766,352	386,085	138,353	5,651,838	335,752	1,316,084

25.5% of the total Bering Sea joint venture harvest has occurred in Zone 1. Of this total, 66% occurred in the flatfish fishery, therefore, approximately 67,000 mt was harvested by vessels other than those targeting on flatfish. All of this catch (195,500) mt would be unavailable should Alternative 5 be chosen. Whether this catch can be made up in areas other than the Pot Sanctuary will depend on the particular fishery and on the vessel's ability to locate new sources of target species. Clearly then, this measure is more restrictive with regard to fishing in the area of Zone 1.

It is also clear that virtually 100% of the bycatch in Zone 1 is coming from those vessels targeting on flatfish (Table 2.13 and Table 2.10), thus there are no significant bycatch savings with regard to these species in this area.

Finally, Alternative 5 offers no protection to halibut, king and Tanner crab outside of the Pot Sanctuary. Evidence from the 1986 joint venture fishery indicates that red king crab bycatch would be greatly reduced relative to the status quo, but that halibut and C. bairdi catches may increase, and that the bycatch of C. opilio will most likely greatly increase, again, relative to the status quo.

Alternative 6: The emergency rule with a halibut PSC limit (Council preferred alternative)

The revised Alternative 2 differs from the original Alternative 2 in two ways. First, it contains a sunset clause which limits the effective period of the bycatch control mechanisms to two years, that is, these measures expire on December 31, 1988. This requires no further analysis as the impacts of all other alternatives are measured on a per year basis in terms of present value. Second, Alternative 6 includes a halibut cap of 828,000 animals, measured Bering Sea wide, but which closes only that area designated as Zone 1.

It is unlikely that this cap will be reached, as 266,000 halibut were caught in the 1985 joint venture flatfish fisheries and the 1986 bycatch to date is 254,000 animals (Tables 2.9, 2.10). Furthermore, even in the unlikely event that the cap of 828,000 animals is reached, Zone 1 will, in all likelihood, have already been closed due to the attainment of either the Tanner or king crab bycatch caps. Therefore, no additional constraints on the joint venture flatfish fisheries would result from the implementation of this halibut PSC limit. For the same reasons it is unlikely that there would be any additional halibut savings Bering Sea wide nor any additional protection to halibut in Zone 2 under Alternative 6 relative to Alternative 2 unless, of course, domestic fishermen make adjustments to reduce the rate of halibut bycatch.

2.4.2 Reporting Costs

None of the alternatives should increase the reporting cost burden on the harvesting sector. Because of the imposition of more area boundaries, however, fishermen will need to be more cognizant of those boundaries while prosecuting these fisheries.

There would be an increase in the reporting burden under Alternative 4 for those DAP vessels (other than catcher/processors) choosing to fish in the Pacific cod exemption zone because of the check-in and check-out provisions of that alternative.

The costs of observers on the DAP fleets which are borne by the vessel owners under Alternatives 2 and 3 are not considered reporting costs in our analysis but were addressed in the analysis in the fishery costs and benefits section.

2.4.3 Administrative, Enforcement, and Information Costs and Benefits

While implementing the actual emergency rule in 1986, certain costs were realized. First, there was a substantial amount of computer reprogramming which was necessary when a new area was defined and restrictions within that area applied. The NWAFC estimated that two man-months were required to reprogram in order to segregate data by the areas specified in the emergency rule. The estimated cost (salaries and benefits) for this year's reprogramming effort was \$12,000 based on 340 man-hours. This figure does not include any additional time for weekly reformatting of data prior to entry into the computer. Since the programming has already been done for the emergency rule, Alternative 2 should not increase programming costs but the weekly data reformatting costs would continue. Alternative 3 would increase the reprogramming costs because of the differences between the Council and NMFS versions of the emergency rule regarding halibut zones. Alternative 4 would require a greater amount of reprogramming since it introduces an additional area and Alternative 6 will require monitoring the halibut bycatch in the joint venture flatfish fishery.

Enforcement costs would be expected to increase under each alternative to the status quo. As more and more boundaries are drawn in the Bering Sea, the potential for fishing in a closed area increases. If enforcement and surveillance measures are not increased, the incentive to fish in a closed area increases because the probability of getting caught decreases. Therefore, enforcement costs would probably increase if the federal government wishes to maintain the same level of compliance. However, the JVP fleet in general has been very responsive to voluntary measures. Costs would increase for enforcement measures necessary under Alternative 4 to monitor the check-in and check-out in the Pacific cod exemption zone.

Information costs in the form of processing observer information in a time frame sufficient to close fisheries will increase as more and more fisheries need to be shut down in response to the attainment of bycatch limits. Alternatives that have PSC limits for the most species place the largest burden on information gathering and processing (Alternatives 2, 3, and 4).

Under Alternative 4, it will be necessary to formally determine the status of the crab and halibut stocks. This information for crab stock status has been prepared annually in the past so no additional costs are anticipated. Some additional cost for preparation of halibut stock status information will occur.

2.4.4 Impact on Consumers

Price effects at the final demand level (consumer demand) will probably be minimal or zero. This is because the impact of the proposed alternatives on the amount of groundfish and of halibut, king crab, and Tanner crab supplied to consumers is small in relation to the total U.S. supply. 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 prices

change 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, but are expected to be minimal.

2.4.5 Redistribution of Costs and Benefits

The status quo may result in greater protection for crabs and halibut to the extent that yellowfin sole/other flatfish fishermen reduce bycatches voluntarily. However, all the alternatives to the status quo are expected to provide greater protection for king crab, and all but Alternative 2 (the NMFS emergency rule) protect halibut. All the alternatives to the status quo except the Pot Sanctuary closure will provide greater protection to C. bairdi Tanner crab. Bycatch reductions are expected to result in increased abundance of these species and, therefore, an increase in benefits to crab and halibut fishermen. Significant short-term costs may be imposed on trawl fishermen to achieve those benefits. However, to date the directed crab and halibut fishermen have borne much of the conservation burden, and each Alternative to the status quo tends to redistribute that burden more equitably across all fisheries that may harvest crab and halibut.

2.4.6 Benefit-Cost Conclusion

The quantitative assessments made earlier provide estimates of the assessable costs and benefits under each of six management alternatives proposed as solutions to the problem of excessive bycatches of halibut and king and Tanner crab in the Bering Sea.

All alternatives impact the domestic and foreign fishery in different ways although all proposed alternatives (other than the status quo) afford some measure of protection to the bycatch species of concern.

Experience in 1986 indicated that adoption of Alternative 2 would lead to greatly reduced bycatches without concomitant reductions in groundfish harvests. Presumably, Alternatives 4 and 6 would provide similar protection and similar ability to harvest the target fisheries. Alternative 3 provides the same level of protection to crab as Alternatives 2 and 4 but is more protective of halibut. The increased protection suggested may lead to a Bering Sea-wide closure prior to the end of the fishing year. The closure of the Pot Sanctuary may or may not increase protection for species other than red king crab. Alternative 5 will also impact fisheries other than flatfish fisheries even though there is evidence that this portion of the fleet contributes little to the bycatch problem.

As a synthesis we provide a relative ranking of the alternatives with regard to protection of the crab and halibut resources, and relative revenue and cost changes (Table 2.14). A strict quantitative assessment is probably not only undesirable, but is also impossible given our inability to quantitatively assess all aspects of all alternatives.

Table 2.14 A relative comparison of five alternative solutions to the Bering Sea incidental catch problems.

Relative Protection to the Resource				Relative Changes in		
Solution	Red King Crab	<u>C. bairdi</u>	Halibut	Groundfish Revenue	Costs to directed Groundfish Fisheries incl. Observer Costs	
Alternative 1: Status Quo	None	None	None	N/A	N/A	
Alternative 2: Emergency Rule (NMFS)	High	High	None	Little Change Likely	Increase + Observer Costs (could be less than 100% coverage)	
Alternative 3: Emergency Rule (Council)	As in 2	As in 2	High	Decreased	Increase + Observer Costs (100% coverage)	
Alternative 4: Framework*	As in 2	As in 2	High	Intermediate between 2 & 3	Increase, but no Observer Cost	
Alternative 5: Closure of the Pot Sanctuary	High	Indeterminate	Low	Decreased	Increase	
Alternative 6:	As in 2	As in 2	Low	As in 2	As in 2	

*Assessments will depend on relative stock status of bycatch and target species. In this table current stock level status is assumed.

3.0 DESCRIPTION OF MANAGEMENT PROBLEM ? AND ENVIRONMENTAL AND REGULATORY IMPACTS OF PROPOSED ALTERNATIVE SOLUTIONS: INADEQUATE REPORTING REQUIREMENTS IN DAP FISHERIES

3.1 The Management Problem

Current reporting requirements for operators of fishing vessels are of two types. First, operators of any fishing vessel are responsible for the submission to the Alaska Department of Fish and Game of an accurately completed State of Alaska fish ticket for each sale or delivery of groundfish caught in any Bering Sea/Aleutians regulatory area. Second, operators of any catcher/processor or mothership vessel that freezes or dry-salts any part of its catch on board that vessel and retains that fish at sea for a period of more than 14 days from the time it is caught, or which receives groundfish at sea from a domestic fishing vessel and retains that catch for a period of more than 14 days from the time it is received, must submit to the Regional Director, Alaska Region, NMFS a weekly catch or receipt report for each weekly period, Sunday through Saturday during which groundfish were caught or received at sea.

This latter requirement was necessary to aid management agencies in the inseason monitoring of groundfish catches. More timely catch and effort information was needed because large catches from onboard catcher/processor and mothership vessels were not being reported until weeks or months later through the normal fish ticket submission process. Without timely reporting, management agencies risked closing fisheries based on incomplete and unsatisfactory information that might cause either underharvesting or overharvesting of groundfish stocks.

One year's experience with the catcher/processor and mothership reporting system has revealed certain problems that reduce the effectiveness of the weekly reporting system. The most critical problem is the exemption from the weekly reporting requirement granted any vessel that lands its catch within 14 days. When a vessel which has been reporting weekly stops reporting or omits a report during one or more weekly periods because its catch was landed within a 14-day period, three problems are created. First, the absence of weekly catch reports for certain periods and vessels results in an incomplete accounting of catches for that segment of the fleet, which has led to inaccurate forecasts of quota achievement. The catch data submitted on fish tickets by catcher/processors and motherships often enter the management system too late to be useful for filling these data gaps in real time. Second, the reconciliation of fish tickets with weekly catch reports, where reporting periods often overlap, has resulted in significant delays in compiling catch information due to the time spent resolving discrepancies in the data. Finally, inseason enforcement of the weekly reporting requirements has been rendered nearly impossible. When a vessel which has been reporting weekly stops reporting or skips one or more periods, enforcement agents are unable to act because of the possibility that the vessel lawfully reported by fish ticket.

3.2 The Alternatives

3.2.1 Alternative 1: Do nothing (the status quo).

Vessels currently are required to report their landings via fish tickets to the Alaska Department of Fish and Game. Catcher/processor and mothership/processor vessels (defined as those vessels that salt or freeze their catch at sea) are required to file weekly reports with NMFS if their trip length exceeds 14 days. Those catcher/processors that land fish in 14 days or less are not required to submit a report to the Regional Director but must report to the Alaska Department of Fish and Game within seven days.

3.2.2 Alternative 2: Reporting requirement modification. (Council preferred alternative)

Under this alternative, any vessel that processes any part of its catch on board that vessel would be required to report its catches regardless of how many days there are between landings, where processing means the preparation of fish to render it suitable for human consumption or use or long-term storage including, but not limited to, cooking, canning, smoking, saling, drying and freezing. Reports would be required for each Sunday through Saturday period. The reports would be required even though that vessel had reported its catch through the State of Alaska's fish ticket system. This alternative would make inseason management of the fisheries more effective by: (1) eliminating time needed to resolve fish ticket discrepancies resulting from double counting; and (2) eliminating time lost due to delays in receiving fish ticket data. Inseason catches by catcher/processor vessels and catches received by mothership/processor vessels would be tabulated from just one source--the weekly report. Ease of monitoring the fishery inseason would increase and management decisions made during the course of the fisheries would be more accurate.

3.3 Environmental Impact of the Alternatives

3.3.1 Environmental Impact of the Status Quo Alternative

Under the status quo alternative, operators of catcher/processor and mothership/processor vessels would only be required to report directly to NMFS if they did not make deliveries within 14 days or less. Inseason management would continue to be jeopardized by double accounting of catches or delayed receipt of catch data. Management decisions made to open or close fisheries may be made erroneously, resulting in the possibility of exceeding or failing to reach the TAC of a groundfish species. In some fisheries which proceed rapidly, e.g., the fishery for sablefish, real time management would be jeopardized if large quantities of fish that catcher/processor and mothership/processor vessels may have on board are not reported in a timely manner. Recent experience has shown that the sablefish hook-and-line fleet alone can harvest 200 mt or more per day. If only a few hundred tons are left in a quota, then the risk of exceeding a quota is increased. As a result of exceeding the quota, the abundance of that species may be reduced in the following year. In most cases this reduction will not result in harm to the stock, and corrective action in the form of reduced TACs can be taken at that time. There are "ripple effects" through the ecosystem due to the change in abundance, i.e., the relative abundance of species in predator-prey relation-

ships may change and available nutrients may change due to changes in processing effluents, etc. However, these impacts are difficult to quantify but are considered to be insignificant when compared to naturally occurring perturbations that occur in the environment. To avoid exceeding a TAC, managers may close a fishery on the basis of estimates that result in substantial underharvests. There is no biological danger from failing to achieve a TAC, and in fact this would result in allowing the ecosystem to move towards its natural (unfished) state.

3.3.2 Environmental Impact of Alternative 2

Under Alternative 2, operators of catcher/processor vessels would be required to report their catches regardless of the number of days they had fished. Operators of motherships would be required to report the amounts of fish received from each catcher vessel. Reports would be for each Sunday through Saturday period. This alternative is superior to the status quo alternative, because inseason management would no longer be jeopardized by double accounting of catches. Management decisions to open or close fisheries would be made on the best available data. Risks of exceeding or failing to achieve groundfish TACs and the associated consequences described above for the status quo alternative could be reduced.

3.4 Regulatory Impact of the Alternatives

3.4.1 Fishery Costs and Benefits

Alternative 2 requires weekly reporting for all domestic catcher/processors and motherships. The reporting requirements as specified in this alternative would improve the ability of NMFS to monitor all catch and thus reduce the probability of exceeding or failing to achieve a TAC. The costs of exceeding TACs are that excessive catches could lead to reduction in the population and lead to lower harvests in subsequent years. The costs therefore are potentially reduced exvessel revenue in future years. If we assume that these overharvests constitute a relatively small proportion of the total TAC, it is very likely that any subsequent reduction in the TAC due to this overharvest will be masked by subsequent fluctuations in the stock levels.

The benefits to the fishery of an overharvest is an immediate increase in exvessel revenue. If, for example, the sablefish TAC in the Bering Sea is exceeded by 2% or 125 mt, the fleet would realize an increase in exvessel revenue of \$132,300 (at \$.48/lb., all gear, domestic, exvessel). The fleet would realize, however, losses in subsequent years due to the direct absence of those fish and their reproductive potential.

The cost of failing to achieve a TAC results from foregone harvests in any year. The cost to the industry would equal the profit lost by not being able to harvest and sell the fish. As above, a 2% shortfall in the sablefish harvest would cost \$132,300 in exvessel revenue. It is important to note, however, that the ability to adjust TACs inseason through reserve releases give the RD the authority to eliminate this shortfall.

3.4.2 Reporting Costs

Catcher/processors would have to increase their catch reporting under Alternative 2. Since the infrastructure of the reporting process is already in place, this should not substantially increase costs. Some catcher/processors, however, avoid the status quo reporting requirements by landing on the 13th day. It would seem that the lost fishing time and increased traveling time involved in landing catches more frequently would increase costs above the costs of reporting catches to NMFS. It is not possible to estimate these costs, but the fact that some fishermen avoid reporting implies that reporting costs may be substantial. However, note that vessels may be landing catch in less than 14 days for reasons that have nothing to do with the current reporting requirements (e.g. marketing commitments, price fluctuations, etc.).

3.4.3 Administrative, Enforcement, and Information Costs and Benefits

The infrastructure for NMFS reporting requirements already exists, thus Alternative 2 should not substantially increase the administrative costs. By eliminating double counting, NMFS would eliminate the costs of finding and adjusting double counted catches.

Enforcement costs may increase to ensure that reporting requirements are adhered to by catcher/processors. This cost is not necessarily exclusive to Alternative 2 as there are improvements that should be made in enforcement of the status quo. At-sea enforcement costs should not increase under Alternative 2.

3.4.4 Impact on Consumers

The alternatives proposed should not affect retail price paid or product quality.

3.4.5 Redistribution of Costs and Benefits

The benefits of Alternative 2 do not accrue to any specific sector of the industry. If overharvesting is prevented all participants benefit proportionately in the long run. If underharvesting is prevented all participants benefit proportionately in the short run.

The costs from adoption of Alternative 2 take the form of potential increased reporting costs borne by domestic catcher/processors.

3.4.6 Benefit-Cost Conclusion

Alternative 2 is proposed to eliminate a problem with the reporting requirements implemented in Amendment 9. Participants should benefit from a decreased probability of both exceeding and failing to achieve a TAC. The distribution of benefits to the participants in the fishery is expected to be similar to that intended in Amendment 9.

Adoption of Alternative 2 increases reporting costs. Out-of-pocket costs will differ little from the status quo. However, if fishermen find the additional reporting requirements particularly burdensome (for nonquantifiable reasons) out-of-pocket costs may understate the true costs.

4.0 DESCRIPTION OF MANAGEMENT PROBLEM 3 AND ENVIRONMENTAL AND REGULATORY IMPACTS OF THE PROPOSED ALTERNATIVE SOLUTIONS: INADEQUATE AUTHORITY FOR INSEASON REAPPORTIONMENT AMONG DOMESTIC FISHERIES.

4.1 The Management Problem

Currently the FMP and regulations authorize the Regional Director (RD) 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. However, both the regulations and the FMP are silent on transfers within DAP, i.e., from DAP 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. This is a technical correction to the original FMP proposed to prevent potential legal problems associated with the current allocation process. The proposed language and regulations are similar to that currently existing in the Gulf of Alaska FMP.

4.2 The Alternatives

4.2.1 Alternative 1: Do nothing (status quo).

Reapportionments within DAP have been made in the past even though not explicitly authorized by the FMP and the implementing regulations. There is little doubt that this is consistent with the intent of the respective statutes.

4.2.2 Alternative 2: Explicit authorization to reapportion. (Council preferred Alternative)

This alternative authorizes the Regional Director to reallocate TAC from DAP to JVP inseason should DAP be unable to fully utilize its allocation. It would amend the FMP and regulations to include a new section. The proposed FMP text follows:

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

The Regional Director may assess the DAP and JVP at any time and apportion to them any amounts from the reserve that he finds will be taken by U.S. vessels. As the fishing season progresses, should the initial DAP exceed subsequent expectations of actual harvest, the Regional Director shall reapportion the excess to JVP, if needed, or to TALFF.

If the initial JVP exceeds subsequent expectations of actual harvest, the Regional Director shall reapportion the excess to DAP, if needed, or to TALFF.

The Regional Director shall apportion to TALFF as soon as practicable after April 1, June 1, and August 1, and on such other dates as he determines appropriate any portion of JVP and/or DAP that he determines

will not be harvested by U.S. fishing vessels during the remainder of the fishing year.

When the Regional Director determines that apportionment is required on dates other than those scheduled or that immediate action is necessary to increase DAP, JVP, or TALFF, he may decide that such an adjustment is to be made without affording a prior opportunity for public comments. Public comments on the necessity for, and the extent of this apportionment shall then be submitted to the Regional Director for a number of days after the effective date that will be specified in a notice announcing such action.

4.3 Environmental Impact of the Alternatives

Since Alternative 2 is a technical correction and formalization of a procedure already used in the Bering Sea in past years, no change in the amount of harvest or distribution of fishing effort is anticipated. 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.

4.4 Regulatory Impact of the Alternatives

Alternative 2 is proposed as a technical amendment to the FMP. Under the status quo the RD is not explicitly authorized to transfer fish from DAP to JVP but only from DAH to TALFF. Nonetheless, reallocations to JVP from DAP have been made by the region in the past. Alternative 2 is proposed to articulate and formalize this reallocation authority.

Alternative 2, if adopted, would also bring the Bering Sea FMP in conformance with similar language in the Gulf of Alaska FMP.

Amendment 11 to the Gulf FMP which was approved in October 1983, included the language listed above (Section 5.2.2.3). Regulations adopted for the Gulf [50 CFR 672.20(c), particularly 50 CFR 672.20(c)(3)] could also be implemented for the Bering Sea.

4.4.1 Fishery Costs and Benefits

Since Alternative 2 is a formalization of a procedure already used in the Bering Sea in past years, no change in allocation to DAP and JVP relative to the status quo is predicted.

Inseason management authority would, however, remove any ambiguity or confusion about the allocative authority, thus reducing potential uncertainty in the fishery.

If language identical to that in the Gulf of Alaska FMP is adopted for the Bering Sea, a management regime similar to the Gulf is predicted.

4.4.2 Reporting Costs

There are no additional reporting costs or paperwork burdens to U.S. fishermen or processors associated with Alternative 2.

4.4.3 Administrative, Enforcement, and Information Costs and Benefits

If the current process of reallocating unused DAP to JVP, i.e., retention of the status quo, were challenged in court, there would be a significant cost to the government for legal defense regardless of the outcome of the litigation. However, adoption of Alternative 2 does not preclude legal challenge and the accompanying costs, but rather enhances the legal position of the government.

4.4.4 Impact on Consumers

Costs and supply to consumers should not be affected by the proposed rule because costs and supply to the harvesters are not expected to change. In the absence of this alternative and the revocation of the informal practices, consumers could potentially experience losses to the degree that harvestable surpluses were not taken due to an inability to reallocate excess initial allocations among domestic operators.

4.4.5 Redistribution of Costs and Benefits

There are no expected redistributive effects within the harvesting, processing, or consumption sectors associated with adoption of this alternative.

4.4.6 Benefit-Cost Conclusion

Approval and implementation of Alternative 2 will result in no undesirable adverse impacts on the fishery sectors. Retention of the status quo could potentially result in costs to the U.S. government attributable to litigation over current allocation methods. While current practice is fully consistent with the intent of the subject regulations, adoption of Alternative 2 would remove any residual ambiguities or uncertainties about the reallocation of DAH, reduce the potential for costly litigation, and assure the full and efficient utilization of harvested surpluses by DAH.

5.0 DESCRIPTION OF MANAGEMENT PROBLEM 4 AND ENVIRONMENTAL AND REGULATORY IMPACTS OF THE PROPOSED ALTERNATIVE SOLUTIONS: INADEQUATE INSEASON MANAGEMENT AUTHORITY

5.1 The Management Problem

The Regional Director (RD) is currently authorized by the FMP to make inseason apportionments of reserves to the TAC of any species, consistent with recent assessments of resource conditions, unless he finds that socioeconomic considerations or operational problems dictate otherwise. He may withhold reserves for conservation reasons, but not for socioeconomic reasons. The RD must also find that the release will not result in overfishing.

Emergency regulations in place during 1986, which have also been submitted as a regulatory amendment for 1987 and beyond, allow the RD to prohibit retention of a species when its TAC is reached while allowing fisheries targeting on other groundfish species to continue. The RD may, however, close or limit other fisheries to prevent overfishing of the species for which the TAC has been achieved.

The RD currently does not have the authority to effectively reduce TACs in cases of extreme resource emergency. The only mechanisms available at present to reduce a TAC are: (1) withholding unallocated TALFF or reserves, if any remain, or (2) implementing an emergency rule. Similarly he does not have the authority to effectively raise or lower PSCs in response to unanticipated resource surpluses or crises which may arise inseason. Any of these situations could occur if new information unavailable prior to the start of the fishing season indicated a major unanticipated change in the resource. The proposed alternative to the status quo addresses this situation and the Council's desire to bring the Bering Sea FMP and regulations into conformance with the authority proposed for the Gulf of Alaska Groundfish FMP.

5.2 The Alternatives

5.2.1 Alternative 1: Do nothing (the status quo).

Under this alternative the RD is authorized to make inseason adjustments to TACs by: (1) inseason reapportionment of reserves to increase TACs for conservation or socioeconomic reasons; (2) withholding unallocated TALFF and reserves for conservation reasons; and (3) prohibiting further targeting and/or retention of a groundfish species when its TAC is reached to allow other fisheries to continue, or to close or limit other nontarget fisheries to prevent overfishing of the groundfish species for which the TAC has been achieved. [NOTE: Item 3 is implemented temporarily by emergency rule and is expected to be implemented permanently by regulatory amendment prior to the 1987 fishing year.]

5.2.2 Alternative 2: Inseason management authority.

Inseason authorization for the Secretary, by means of his delegation to the Director, Alaska Region, NMFS, is provided to adjust gear restrictions, season opening and closing dates, and TACs and PSC limits. Such adjustments must be necessary to prevent overfishing or to change TACs or PSC limits which the

Regional Director finds, as a result of the best available stock status information, to have been incorrectly specified.

The Regional Director is constrained, however, in his choice of management responses to prevent potential overfishing by having to first consider the least restrictive adjustments to conserve the resource. The order in which the Regional Director must consider inseason adjustments to prevent overfishing are specified as: (1): Any gear modification that would protect the species in need of conservation protection, but which would still allow fisheries to continue for other species; (2) a time/area closure which would allow fisheries for other species to continue in non-critical areas and time periods; and, (3) total closure of the management area and season.

5.3 Environmental Impact of the Alternatives

5.3.1 Environmental Impact of the Status Quo Alternative

Under the status quo alternative, managers can not close individual fisheries by rule-related notice even for biological emergencies. Under the MFCMA, each FMP must prevent overfishing but the Bering Sea Groundfish FMP is currently deficient in not allowing managers to respond in a timely manner to changing circumstances. This lack of inseason authority prevents managers from using new information, thus potentially forcing an irrational decision to not close a fishery. This could lead to overfishing as discussed in Section 1.5 of this document; specifically, changes in relative abundance of predators and prey of the species in question, local changes in amounts of fish processing wastes, and the potential inability of that species to return to former abundance levels. Damage to the overfished species could be irreversible, but would probably not be the result of fishing activities alone. Most changes in relative abundance, nutrients, etc. which result from exceeding biologically acceptable catch levels are difficult to predict or measure. Impacts associated with these changes are difficult to quantify but are considered to be insignificant when compared to naturally occurring perturbations in the environment.

As a practical matter, managers would implement an emergency rule to prevent the impacts associated with overfishing. There could be a significant delay in initiation of such measures, however, due to the bureaucratic requirements of this procedure.

5.3.2 Environmental Impact of Alternative 2

Under Alternative 2, the Secretary, through the Regional Director, would be authorized to make inseason adjustments to harvest levels, gear restrictions and season opening and closing dates by rule-related notice. Such adjustments must be necessary to prevent overfishing or to change TACs or PSC limits which the Regional Director finds, as a result of the best available stock status information, to have been incorrectly specified.

The RD is constrained, however, in his choice of management responses to prevent potential overfishing by having to first consider the least restrictive adjustments to conserve the resource. The order in which the RD must consider inseason adjustments to prevent overfishing are specified as: (1) any gear modification that would protect the species in need of

conservation protection, but which would still allow fisheries to continue for other species; (2) a time/area closure which would still allow fisheries for other species to continue in non-critical areas and time periods; and (3) total closure of the management area and season.

An example of potential gear restriction would be the closure of an area to non-pelagic trawling to prevent overfishing of a bottom dwelling species. Any adjustments to the specified TAC or PSC limit must be reasonably related to the change in stock status, and the Secretary may not make inseason adjustments based on any rationale other than a change in stock status.

If the TAC or PSC limit was based on factors other than the biological stock status of that species, however, the RD would not be able to make the determination that the TAC or PSC limit was incorrectly specified. For example, PSC limits for red king crab, C. bairdi, and halibut approved by the Council as part of this amendment were based primarily on negotiations among the fishing industry. In this instance, these PSC limits could not be adjusted inseason unless the best available stock status information indicates that such reduction is necessary to prevent overfishing. Currently the Regional Director is authorized to increase any TAC from the nonspecific reserve, which is 15% of the annual OY. The notice authority provided by this amendment is not intended to supersede the existing authority. Thus in the Bering Sea/Aleutian Islands area, the Regional Director could still adjust TACs through withholding or reserve releases even though the TACs are based on socioeconomic considerations. He may still reduce TACs by withholding unallocated reserves, although in the case of domestic fisheries he would need to utilize the inseason notice procedure.

The inseason adjustment authority provided by this amendment would allow the Regional Director to respond in a timely manner to changing environmental circumstances or stock conditions. He would thus be better able to prevent the overfishing of groundfish species, thus reducing the likelihood of the impacts discussed in Section 1.5 of this statement. No changes in the amounts of nutrients in the form of fish wastes discarded at sea are expected to occur. 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.

5.4 Regulatory Impact of the Alternatives

5.4.1 Fishery Costs and Benefits

Given the inherent flexibility of the Bering Sea FMP it is not anticipated that inseason management authority would be exercised except in rare cases where immediate drastic measures are required to either save the resource or correct a grossly inaccurate estimate of resource strength.

Alternative 2 allows the adjustment of TACs/PSCs upward or downward, the adjustment of season opening and closing dates, and the adjustment of gear restrictions. Under the status quo, such emergencies can be addressed annually (in the annual process of setting TACs or by FMP amendment, which takes longer than a year to implement) or within the year (by emergency rule). The proposed inseason authority is only intended to avoid delays in addressing resource emergencies.

An example of a potential gear restriction would be the closure of an area to non-pelagic trawling to prevent overfishing of a bottom dwelling species. The exercise of the Secretary's authority to adjust TACs or PSC limits requires that adjustments be made only as a function of the best available scientific information that the biological status or condition of a stock is different from that on which the currently specified TAC or PSC limits is based. Any adjustments to the specified TAC or PSC limit must be reasonably related to the change in stock status. The Secretary may not make inseason adjustments based on any rationale other than a change in biological stock status.

For example, a PSC limit for a crab stock derived from a specific level of the crab biomass could be adjusted upwards or downwards if the new stock status information showed that the crab biomass had changed. For a TAC or PSC limit based on factors other than the biological stock status of that species, however, the Regional Director would not be able to make the determination that the TAC or PSC limit was incorrectly specified. For example, the red king crab PSC limit in Zone 1 of the eastern Bering Sea in 1986 was a negotiated level between representatives of the crab and trawl fishermen. In this instance, any change in the stock status of red king crab could not result in exercise of this authority since the PSC limit was not based on the stock status of red king crab.

The fishery costs associated with the proposed inseason management authority are those costs that might occur prior to December 31. In this example the immediate economic cost to the groundfish industry would be borne primarily by nonpelagic trawlers. The magnitude of this short term impact will be determined by: (1) the severity of the resource problem, and (2) the severity of the action necessary to address the problem. The biological cost to the bottom dwelling species would range from merely slowing down any rebuilding to a permanent crash in the population. Biological costs to the population are eventually translated into economic costs to the target fishery, although these costs may be delayed several years due to the time that would have been necessary for the killed animals to grow to harvestable size.

Under the implementing regulations of the MFCMA the RD is required by law to prevent overfishing. One of the major underlying concerns these regulations address is that management not be so shortsighted as to allow short term benefits to accrue in a fishery at the expense of a continuing stream of benefits for future generations. Inseason measures to reduce a TAC or PSC limit would be taken to preserve future benefits of the fishery by preventing overfishing. This would only occur in cases where FMP flexibility is inadequate to deal with the situation.

When inseason management authority would be required to adjust a TAC or PSC limit upward, immediate benefits would be realized by the fishery due to the increased potential harvest in the target fishery and the sale of that harvest.

5.4.2 Reporting Costs

Alternative 2 contains no reporting requirements in addition to that required under the status quo.

5.4.3 Administrative, Enforcement, and Information Costs and Benefits

Administrative, enforcement, and information costs would not be expected to differ from that of the status quo under Alternative 2 since no additional data gathering effort or inseason monitoring is proposed.

5.4.4 Impact on Consumers

No impact on consumers is expected as no significant quantity or quality change in fisheries product at the retail sector is expected.

5.4.5 Redistribution of Costs and Benefits

That part of Alternative 2 that results in a closure, gear restriction, or downward adjustment of a TAC or PSC may result in an immediate short term revenue loss from that previously expected (relative to the status quo). This loss will be at least partially offset by potential harvest increases in future years. Conversely, that part of the alternative that opens a fishery, removes gear restrictions or adjusts a PSC upwards, will result in immediate gains in exvessel revenue and in other domestic sector profits. These gains may or may not be partially offset by potentially reduced future harvests.

5.4.6 Benefit-Cost Conclusion

Substantial benefits may accrue to the fisheries sector should such authority prevent a premature closure.

6.0 EFFECTS ON ENDANGERED SPECIES AND ON THE ALASKA COASTAL ZONE

None of the alternatives in the proposed FMP amendment is likely to jeopardize the continued existence of endangered or threatened species, or result in the destruction or modification of habitat critical to those species within the meaning of the regulations implementing Section 7 of the Endangered Species Act of 1973. Thus, consultation procedures under Section 7 on the final actions and their alternatives will not be necessary.

Also, for the reasons discussed in this document, each of the alternatives 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.

7.0 OTHER EXECUTIVE ORDER 12291 REQUIREMENTS

Executive Order 12291 requires that the following three issues be considered:

- (a) Will the Amendment have an annual effect on the economy of \$100 million or more?
- (b) Will the Amendment lead to an increase in the costs or prices for consumers, individual industries, Federal, State, or local government agencies or geographic regions?
- (c) Will the Amendment have significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of U.S. based enterprises to compete with foreign enterprises in domestic or export markets?

Regulations do impose costs and cause redistribution of costs and benefits. If the proposed regulations are implemented to the extent anticipated, these costs are not expected to be significant relative to total operational costs.

The Amendment should not have an annual effect of \$100 million or more since the total value of the domestic catch of all groundfish species is about \$99 million. Although the value of the groundfish harvested by DAP fishermen in 1985 was \$22 million with \$77 million taken by JVP fishermen, only a small fraction of this catch might be affected by regulations implemented under this amendment. This is because each bycatch alternative provides trawl fishermen with substantial area for redistributing fishing effort and harvesting the original amount of target allocation. Although operational costs are expected to increase upon redistribution of effort, they are not expected to exceed the benefits resulting from decreased bycatches.

The amendment will not have significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of U.S. based enterprises to compete with foreign enterprises in domestic or export markets.

The amendment should not lead to a substantial increase in the price paid by consumers, local governments, or geographic regions since no significant quantity changes are expected in the groundfish markets. Where more enforcement and management effort are required, the cost to state and federal fishery management agencies will increase.

8.0 IMPACT OF THE AMENDMENT RELATIVE TO THE REGULATORY FLEXIBILITY ACT

The Regulatory Flexibility Act requires the examination of the impacts on small businesses, small organizations, and small jurisdictions. In 1985 between 98 and 182 vessels participated in Bering Sea/Aleutian Islands groundfish fishing. Between 54 and 67 vessels participated in king crab fisheries and 152 to 186 vessels participated in Tanner crab fisheries. An unknown but probably large proportion of king crab vessels are included in the number of Tanner crab vessels. The impacts of the amendment do not favor large businesses over small businesses. Both large and small businesses are impacted by the proposed management measures.

Compliance costs are minimized since the amendment includes no mandatory permitting requirements. A modification of the catch reporting requirement approved in 1985 will correct an error in the reporting procedure by requiring a weekly report from every domestic vessel that processes product on board. The additional burden is expected to be minimal. However, some bycatch measures would require implementation of an observer program for domestic vessels, which would cost as much as \$86,400 for eight vessels fishing two months. Other compliance costs should be relatively insignificant relative to the total costs of fishing because fishing activities will generally be allowed in some area at all times. Marginal costs for transportation and increased safety equipment may increase if fishermen are forced to fish farther offshore or away from ports currently available for repairs, safe harbor, etc.

9.0 FINDINGS OF NO SIGNIFICANT ENVIRONMENTAL IMPACT

For the reasons discussed above, implementation of any of the alternatives would not significantly affect the quality of the human environment, and the preparation of an environmental impact statement on the final action is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations.

Assistant Administrator for Fisheries, NOAA

Date

10.0 COORDINATION WITH OTHERS

The following persons were consulted during the preparation of this document: Jim Branson and Steve Davis, North Pacific Fishery Management Council, Anchorage, Alaska; Janet Smoker, National Marine Fisheries Service, Alaska Region, Juneau, Alaska; Patrick J. Travers, Alaska Regional Counsel, NOAA, Juneau, Alaska; Fritz Funk, Alaska Department of Fish and Game, Juneau, Alaska; Russ Nelson and Janet Wall, National Marine Fisheries Service, Northwest and Alaska Fisheries Center, Seattle, Washington.

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12.0 REFERENCES

The Fishery Management Plan for the Bering Sea/Aleutian Islands Groundfish, North Pacific Fishery Management Council.

Draft Environmental Assessment for Amendment 15 to the Fishery Management Plan for the Groundfish Fishery of the Gulf of Alaska, July 1986. Plan Team and NPFMC staff.

Draft Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Amendment 15 to the Fishery Management Plan for the Groundfish Fishery of the Gulf of Alaska, July 1986. Plan Team and NPFMC staff.

Environmental Assessment of an Emergency Interim Rule to Close an Area of the Bering Sea to Trawling and Establish Prohibited Species Catch Limits, June 1986 (NMFS). NMFS-Alaska Region, Juneau

13.0 CHANGES TO THE FMP

Amendment 10 was approved by the Council at its September 24-26, 1986 meeting. The amendment makes the following changes to the FMP:

(a) Establishes area closures and prohibited species catch (PSC) limits for U.S. fishermen fishing for yellowfin sole and other flatfish.

(b) Revises catch reporting requirements for at-sea processor vessels.

(c) Establishes explicit authority for reapportionment between DAP and JVP fisheries.

(d) Establishes inseason management authority.

II. CHANGES TO THE RELEVANT SECTIONS OF THE FMP

A. In the Table of Contents, beginning on Page 1-1, revise to accommodate the amendments described in this document.

B. In Section 2.1, "History and Summary of Amendments", page 2-4, add the following at the end:

Amendment 10, implemented _____:

(1) Established Bycatch Limitation Zones for domestic and foreign fisheries for yellowfin sole and other flatfish (including rock sole); an area closed to all trawling within Zone 1; red king crab, C. bairdi Tanner crab, and Pacific halibut Prohibited Species Catch (PSC) limits for DAP yellowfin sole/other flatfish fisheries; a C. bairdi PSC limit for foreign fisheries; and a red king crab PSC limit and scientific data collection requirement for U.S. vessels fishing for Pacific cod in Zone 1 waters shallower than 25 fathoms.

(2) Revised the weekly reporting requirement for catcher/processors and mothership/processors.

(3) Established explicit authority for reapportionment between DAP and JVP fisheries.

(4) Established inseason management authority.

C. In section 11.5, "Reapportionment of Reserve and Unneeded DAP," page 11-4, delete Section 11.5 and replace it with a new section 11.5 "Reapportionment of Reserve and Unneeded DAP and JVP" as follows:

"The Regional Director may assess the DAP and JVP at any time and apportion to them any amounts from the reserve that he finds will be taken by U.S. vessels. As the fishing season progresses, should the initial DAP exceed subsequent expectations of actual harvest, the Regional Director shall reapportion the excess to JVP, if needed, or to TALFF.

If the initial JVP exceeds subsequent expectations of actual harvest, the Regional Director shall reapportion the excess to DAP, if needed, or to TALFF.

The Regional Director shall apportion to TALFF as soon as practicable after April 1, June 1, and August 1, and on such other dates as he determines appropriate any portion of the reserve, JVP and/or DAP that he determines will not be harvested by U.S. fishing vessels during the remainder of the fishing year.

When the Regional Director determines that apportionment is required on dates other than those scheduled or that immediate action is necessary to increase DAP, JVP, or TALFF, 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 apportionment shall then be submitted to the Regional Director for a number of days after the effective date that will be specified in a notice announcing such action."

D. In Section 14.4.2 "Prohibited Species" (for Domestic fishery), part "B. Objective," page 14-5, in the first line insert "king crab", after Tanner crab and delete the last sentence of the paragraph which reads "Upon implementation of the Bering Sea/Aleutians King Crab FMP, these species will include king crab."

In part "D. Policy," page 14-5, in the second paragraph, delete the second sentence which reads "To avoid any unnecessary impediments to that development, the Council will not at this time recommend any regulations of the domestic fishery specifically designed to protect 'prohibited' species."

E. In Section 14.4.2 "Prohibited Species" (for Domestic fishery), page 14-6, insert a new part "E. PSC limits and Time/Area closures for DAH fisheries.

The PSC limits and area closures for DAH fisheries expire on December 31, 1988."

14.4.2.1 Bycatch Limitation Zones

A. Zone 1 is that area bounded by 165°W longitude and 58°N latitude extending east to the shore.

B. Zone 2 is that area bounded by 165°W longitude, north to 58°N, then west to the intersection of 58°N. and 171°W. longitude, then north to 60°N., then west to 179°20'W. longitude, then south to 59°25'N. latitude, then diagonally extending on a straight line southeast to the intersection of 167°W longitude and 54°30'N latitude, and then extending eastward along 54°30'N latitude to 165°W. longitude.

C. Crab and Halibut Protection Zone Domestic and foreign trawl fishing is not permitted in the EEZ north of the Alaska Peninsula, south of 58°N latitude, east of 162°W longitude, and west of 160°W longitude (Figure 27a).

14.4.2.2 Prohibited Species Catch Limits The PSC limits for C. bairdi Tanner crabs and red king crabs apply to domestic DAH (i.e. DAP plus JVP) fisheries for yellowfin sole and the "other flatfish" species group (including rock sole).

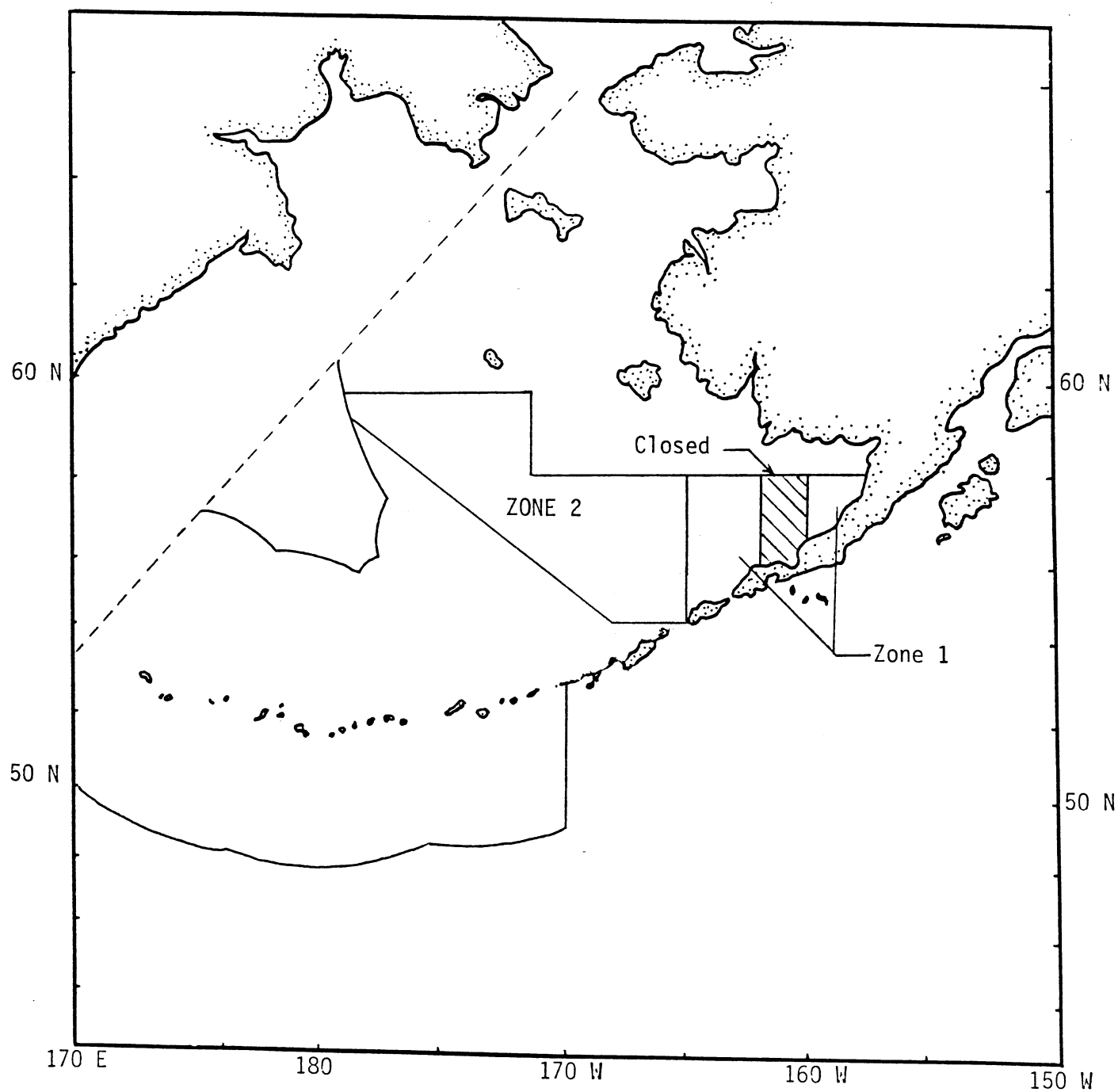


Figure 27a. Bycatch limitation Zones 1 and 2, and the crab and halibut Protection Zone (closed). These restrictions expire December 31, 1988.

A. The DAH fishery for Pacific cod south of a straight line approximating the 25 fathom curve in the Crab and Halibut Protection Zone identified in 14.4.2.1 C is limited to a PSC limit of 12,000 red king crabs.

B. The DAH fishery for yellowfin sole and other flatfish is limited to a PSC of 80,000 C. bairdi Tanner crabs and to a PSC of 135,000 red king crabs in Zone 1.

C. A PSC limit of 326,000 C. bairdi Tanner crab applicable to the DAH fishery for yellowfin sole and other flatfish is established Zone 2.

D. A PSC limit of 828,000 Pacific halibut applicable to the JVP fishery for yellowfin sole and other flatfish in the entire Bering Sea/Aleutian Islands is established. When this number of Pacific halibut is taken, Zone 1 will be closed to that fishery."

F. In Section 14.4.3 "Fishing Area Restrictions", subsection 14.4.3.2 "Trawl Fishery", page 14-6, add the following part "C. Crab and Halibut Protection Zone -- (as described in Appendix III and Figure 27a) -- Closed to all trawling from January 1 through December 31."

G. In subsection 14.4.3.4 "Modification of Time and Area Limitations", page 14-6, change the title to "Implementation of Time and Area Limitations", add the following:

"When the DAH fishery for yellowfin sole and other flatfish (including rock sole) in any area or zone is reached, no further directed fishing for yellowfin sole or other flatfish in that zone will be allowed for the remainder of the fishing year."

H. Add a new Subsection 14.4.3.5 "Discretionary authority of the Secretary" as follows: "When the fishing vessels of the United States to which a PSC limit applies have caught an amount of prohibited species equal to that PSC limit (but less than an amount which would constitute overfishing), the Secretary may allow some or all of those vessels to continue or resume directed fishing for yellowfin sole and other flatfish under conditions which will limit fishing by permissible gear, areas, times, and other appropriate factors, and subject to other provisions of this part. Such other factors may include delivery of a vessel's catch to United States fish processors. In authorizing and conditioning such continued or resumed directed fishing by those vessels, the Secretary will take into account the following considerations:

(a) A determination by the Regional Director of the risk of biological harm to Tanner and king crab stocks and of socioeconomic harm to authorized crab users posed by authorizing continued or resumed directed fishing for yellowfin sole and other flatfish.

(b) A determination by the Regional Director of the extent of incidental catches of Tanner and king crabs in specific areas.

(c) A determination by the Regional Director of the accuracy of the estimates of incidental catches of Tanner and king crabs.

(d) A determination by the Regional Director that adherence to the prescribed conditions can be assured in light of available enforcement resources.

(e) A determination by the Regional Director that continued or resumed directed fishing for yellowfin sole and other flatfish will not lead to overfishing of prohibited species."

I. In Section 14.4.5 "Reporting Requirements," page 14-8, delete part "D. Catcher/Processors", subpart "1. Reporting Requirements," and replace with the following:

"D. At-sea Processor Vessels

1. Reporting requirements. Vessels that catch and process groundfish at sea (catcher/processors) and vessels that receive catch from other vessels for processing (mothership/processors) have the ability to operate for extended periods without landing. To avoid delay in monitoring catches, catcher processors and mothership/processors are required to report to the Director, Alaska Region, NMFS, at regular intervals as specified in the regulations."

On page 14-9, add the following new section 14.4.6 and renumber the existing section 14.4.6 to become 14.4.7

"14.4.6 Domestic Observer Program

The Secretary shall approve a data gathering program designed to collect catch and effort statistics from U.S. vessels. This data collection program shall be sufficiently comprehensive to allow determination of CPUE of target and non-target species including prohibited and discarded species. In order to compile such data sets, the performance of individual vessels must be made available. Fishery data collected under this program may be similar to those collected under the U.S. observer program for foreign fisheries. Other data may also be necessary for establishing a historical data base and for monitoring the domestic fishery inseason. To accomplish this it may be necessary for individual vessels to take on board a scientific data gatherer (i.e. fishery observer) to collect the necessary information.

It shall be unlawful for any person to fish in that portion of Zone 1 south of a line approximating the 25 fathom line at any time when no approved data gathering program exists or after such a program has been terminated, or to fish with trawl gear in the area without complying fully with an approved data gathering program."

K. On page 14-9 add the following new Section "14.4.8 Inseason Adjustments" as follows:

"Harvest levels for each groundfish species or species group that are set by the Council for a new fishing year are based on the best biological, ecological, and socioeconomic information available. The Council finds, however, that new information and data relating to stock status may become available to the Regional Director and/or the Council during the course of a fishing year that warrants inseason adjustments in a fishery. Such changes in stock status might not have been anticipated or were not sufficiently

understood at the time harvest levels were being set. Such changes may become known from events within the fishery as it proceeds, or they may become known from new scientific survey data. Certain changes warrant swift action by the Regional Director to protect the resource from biological harm by instituting gear modifications or adjustments through closures or restrictions. Other changes warrant action by the Regional Director to provide greater fishing opportunities for the industry by instituting time/area adjustments through openings or extension of a season beyond a scheduled closure.

The need for adjustment may be related to several circumstances. For instance, certain target or bycatch species may have decreased in abundance. When current information indicates that a species has decreased in abundance, allowing a fishery to continue to a harvest level now known to be too high could increase the risk of overfishing that species. Likewise, current information relating to prohibited species, i.e., those species that must be returned to the sea, might become available that indicates their abundance has decreased. Conservation measures limited to establishing prohibited species catch (PSC) limits for such prohibited species may be necessary during the course of the fishery to prevent jeopardizing the well-being of prohibited species stocks.

When current information demonstrate a harvest level to have been set too low, closing a fishery at the annually specified harvest level would result in underharvesting that species, which also results in the fishery unnecessarily foregoing economic benefits during that year unless the total allowable catch were increased and the fishery allowed to continue.

Similarly, current information may indicate that a prohibited species was more abundant than was anticipated when (PSC) limits were set. Closing a fishery on the basis of the preseason PSC limit that is proven to be too low would impose unnecessary costs on the fishery. Increasing the PSC limits may be appropriate if such additional mortality inflicted on the prohibited species of concern would not impose detrimental effects on the stock or unreasonable costs on a fishery that utilize the prohibited species. However, adjustments to target quotas or PSC limits which are not initially specified on the basis of biological stock status is not appropriate.

The Council finds that inseason adjustments are accomplished most effectively by management personnel who are monitoring the fishery and communicating with those in the fishing industry who would be directly affected by such adjustments. Therefore, the Council authorizes the Secretary by means of his delegation to the Regional Director, NMFS, to make inseason adjustments to conserve fishery resources on the basis of all relevant information. Using all available information, he may extend, open or close fisheries in any or part of a regulatory area, or restrict the use of any type of fishing gear as a means of conserving the resource. He may also change any previously specified TAC or PSC limit if such are proven to be incorrectly specified on the basis of the best available scientific information or biological stock status. Such inseason adjustments must be necessary to prevent one of the following occurrences:

- (1) The overfishing of any species or stock of fish, including those for which PSC limits have been set.

(2) The harvest of a TAC for any groundfish, the taking of a PSC limit for any prohibited species, or the closure of any fishery based on a TAC or PSC limit which on the basis of currently available information is found by the Secretary to be incorrectly specified.

The types of information which the Regional Director must consider in determining whether stock conditions exist that require an inseason management response are described, as follows, although he is not precluded from using information not described but determined to be relevant to the issue.

(A) The effect of overall fishing effort within a regulatory area;

(B) Catch per unit of effort and rate of harvest;

(C) Relative abundance of stocks within the area;

(D) The condition of the stock within all or part of a regulatory area; and

(E) Any other factors relevant to the conservation and management of groundfish species or any incidentally caught species which are designated as a prohibited species or for which a PSC limit has been specified.

The Regional Director is constrained, however, in his choice of management responses to prevent potential overfishing by having to first consider the least restrictive adjustments to conserve the resource. The order in which the Regional Director must consider inseason adjustments to prevent overfishing are specified as: (1) Any gear modification that would protect the species in need of conservation protection, but which would still allow fisheries to continue for other species; (2) a time/area closure which would allow fisheries for other species to continue in non-critical areas and time periods; and (3) total closure of the management area and season.

The procedure which the Secretary must follow requires that the Secretary publish a notice of proposed adjustments in the Federal Register before they are made final, unless the Secretary finds for good cause that such notice is impracticable or contrary to the public interest. If the Secretary determines that the prior comment period should be waived, he is still required to request comments for 15 days after the notice is made effective, and respond to any comments by publishing in the Federal Register either notice of continued effectiveness or a notice modifying or rescinding the adjustment.

To effectively manage each groundfish resource throughout its range, the Regional Director must coordinate inseason adjustments, when appropriate, with the State of Alaska to assure uniformity of management in both State and Federal waters.

Any inseason time/area adjustments made by the Regional Director will be carried out within the authority of this FMP. Such action is not considered to constitute an emergency that would warrant a plan amendment within the scope of section 305(e) of the Magnuson Act. Any adjustments will be made by the Regional Director by such procedures provided under existing law. Any

inseason adjustments that are beyond the scope of the above authority will be accomplished by emergency regulations as provided for under section 305(e) of the Magnuson Act."

L. In section 14.5.2, Prohibited Species (for foreign fisheries), add a new part "B. C. Bairdi Tanner Crab PSC Limits" as follows and revise the subsequent parts of 14.5.2 to accommodate this addition.

"A limit of 64,000 C. bairdi Tanner crabs applicable to the foreign directed fisheries for yellowfin sole and other flatfish is established in the combined areas of Zones 1 and 2 as described in Appendix III."

M. In Section 14.5.3, Fishing Area Restrictions (for foreign fisheries), part B. Trawl Fishery, on page 14-18, add the following:

"2. Crab and Halibut Protection Zone -- No trawling year-round in the Crab and Halibut Protection Zone (as described in Appendix III and Figure 27a)."

N. In section 14.5.3, Fishing Area Restrictions, part "D. In-season Adjustment of Time and Area Restrictions", on page 14-18, change the title to "Inseason Adjustments" and add the following:

"(1) Inseason adjustments issued by the Secretary under this paragraph include:

(A) The closure, extension, or opening of a season in all or part of a management area;

(B) Modification of the allowable gear to be used in all part of a management area; and

(C) The adjustment of TACs or PSC limits.

(2) Any inseason adjustment under this paragraph must be based on a determination that such adjustments are necessary to prevent:

(A) The overfishing of any species or stock of fish or shellfish; or

(B) The harvest of a TAC for any groundfish species, the taking of a PSC limit for any prohibited species, or the closure of any fishing for groundfish based on a TAC or PSC limit which on the basis of the best available scientific information is found by the Secretary to be incorrectly specified.

(3) The selection of the appropriate inseason management adjustments under (1)(A) or (B) of this paragraph must be from the following authorized management measures and be based on a determination by the Regional Director that the management adjustment selected is the least restrictive necessary to achieve the purpose for the adjustment:

(A) Any gear modification that would protect the species in need of conservation protection, but which would allow fisheries to continue;

or

(F) A time/area closure which would allow fisheries to continue in non-critical areas and time periods; or

(C) Closure [or opening] of a management area to all groundfish fishing for the remainder of the fishing year.

(4) The adjustment of a TAC or PSC limit for any species under (1)(C) of this paragraph must be based on the best available scientific information concerning the biological stock status of the species in question and on the Regional Director's determination that the currently specified TAC or PSC limit is incorrect. Any adjustment to a TAC or PSC limit must be reasonably related to the change in biological stock status."

0. In Appendix III, page 19-12, add the following description of Zones 1 and 2 and the Crab and Halibut Protection Zone:

"4. Bycatch Limitation Zones 1 and 2 (Zones 1 and 2) shown in Figure 27a are defined as follows:

Zone 1 is that area bounded by 165°W longitude and 58°N latitude extending east to the shore.

Zone 2 is that area bounded by 165°W longitude, north to 58°N, then west to the intersection of 58°N. and 171°W. longitude, then north to 60°N., then west to 179°20'W. longitude, then south to 59°25'N. latitude, then diagonally extending on a straight line southeast to the intersection of 167°W longitude and 54°30'N latitude, and then extending eastward along 54°30'N latitude to 165°W. longitude.

5. The Crab and Halibut Protection Zone shown in Figure 27a is defined as that portion of Bycatch Limitation Zone 1 north of the Alaska Peninsula, south of 58°N latitude, east of 162°W longitude, and west of 160°W longitude."

