



UNITED STATES DEPARTMENT OF COMMERCE
 National Oceanic and Atmospheric Administration
 NATIONAL MARINE FISHERIES SERVICE
 Silver Spring, Maryland 20910

OCT 2 1992

MEMORANDUM FOR: Distribution*

FROM:

Don Leedy
for Joe P. Clem
 Chief, Plans and Regulations Division

SUBJECT: Amendment 26 to the FMP for Groundfish of the Gulf of Alaska

Attached is a copy of the subject amendment and the associated Environmental Assessment/Regulatory Impact Review prepared by the North Pacific Fishery Management Council for formal review under the Magnuson Fishery Conservation and Management Act.

The amendment would continue authority to establish time/area closures to vessels using bottom trawl gear in the Kodiak Island area to protect habitat areas used by depressed stocks of red king crab and Tanner crab. The authority to implement the closures will expire on December 31, 1992.

Please provide your comments (including "no comments") by November 6, 1992. If you have any questions, call Don Leedy at (301) 713-2341.

Attachments

*Distribution

F/CM
 F/CM1 - Fricke
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 F/CM3 - Magill
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FORM CG-14 (2-76) Prescr. by DAO 214-2	U.S. DEPT. OF COMM.	DATE
TRANSMITTAL SLIP		10/2/92
TO:	Fricke-F/CM1	REF. NO. OR ROOM, BLDG.
FROM:	Leedy-F/CM2	REF. NO. OR ROOM, BLDG.
ACTION		
<input type="checkbox"/> NOTE AND FILE	<input type="checkbox"/> PER OUR CONVERSATION	
<input type="checkbox"/> NOTE AND RETURN TO ME	<input type="checkbox"/> PER YOUR REQUEST	
<input type="checkbox"/> RETURN WITH MORE DETAILS	<input type="checkbox"/> FOR YOUR APPROVAL	
<input type="checkbox"/> NOTE AND SEE ME ABOUT THIS	<input type="checkbox"/> FOR YOUR INFORMATION	
<input type="checkbox"/> PLEASE ANSWER	<input checked="" type="checkbox"/> FOR YOUR COMMENTS	
<input type="checkbox"/> PREPARE REPLY FOR MY SIGNATURE	<input type="checkbox"/> SIGNATURE	
<input type="checkbox"/> TAKE APPROPRIATE ACTION	<input type="checkbox"/> INVESTIGATE AND REPORT	

COMMENTS:





**CHANGES TO THE FMP FOR THE GULF OF ALASKA
GROUND FISH FISHERY**

1. On pages 4-13 and 4-14, Section 4.3.1.2.3, under "Central Area," the part "Time/area closures and gear restrictions to control king crab bycatch" is amended by revising the first and fourth paragraphs to read as follows:

A time/area closure scheme has been developed to help protect and rebuild the Kodiak king crab resource. The number of red king crab in the waters around Kodiak Island are at historically low levels. Most of these crab are old and sexually mature. There has been no sign of significant recruitment since 1979. As a result, the Kodiak king crab fishery has been closed since 1983 in an attempt to rebuild the stocks. During this same period a developing domestic groundfish fishery using a variety of gear has displaced all foreign fisheries. While the cause for the decline of king crab is not known, most researchers believe that the decline can be attributed to a variety of environmental factors which independently or in combination led to the depressed condition of the resource. The extent to which the king crab decline is due to commercial fishing, either directed or incidental, is unknown.

* * *
* * *

These area designations have been established for purposes of protecting king crab stocks are described in Figure 4.1 and Table 4.3.

- On Page 4-16, Table 4.3 is amended by revising discussion of the length of continuance of recruitment event closures to read as follows:

For purposes of implementing a Type III area, a "recruitment event" is defined as the appearance of female crab in substantially increased numbers. A substantially increased number is defined as occurring when the total number of females estimated for a given district equals the number of females established as a threshold criteria for opening that district to commercial crab fishing. In any given year a recruitment event may occur in one or more of the Kodiak management districts as indicated by the standardized Kodiak crab survey conducted by the Alaska Department of Fish and Game. A type III area recruitment event closure will continue until either (1) a commercial crab fishery opens for that district, or (2) the number of crabs drops below the threshold level established for that district. Implementation of the Type III area closures would be accomplished by regulatory amendment.



DRAFT FOR SECRETARIAL REVIEW

ENVIRONMENTAL ASSESSMENT/REGULATORY IMPACT REVIEW

FOR
AMENDMENT 26
TO THE FISHERY MANAGEMENT PLAN FOR
THE GROUND FISH FISHERY OF THE GULF OF ALASKA AREA

Prepared by
the Staff of the North Pacific Fishery Management Council

Anchorage, Alaska

September 14, 1992

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1.0 INTRODUCTION

1.1 Management Background

The domestic and joint venture groundfish fisheries in the exclusive economic zone (3-200 miles offshore) in the waters off Alaska are managed under two Fishery Management Plans (FMP); one for the Bering Sea/Aleutian Islands (BSAI), and the second for the Gulf of Alaska (GOA). These FMPs were developed by the North Pacific Fishery Management Council (Council) under the Magnuson Fishery Conservation and Management Act (Magnuson Act). The GOA groundfish FMP was approved by the Secretary of Commerce and became effective in 1978.

The Council solicits public recommendation for amending the GOA or the BSAI groundfish FMPs on an annual basis. Amendment proposals are then reviewed by the Council's GOA and BSAI groundfish FMP Plan Teams (PT), Plan Amendment Advisory Group (PAAG), Advisory Panel (AP), and Scientific and Statistical Committee (SSC). These advisory bodies make recommendations to the Council on which proposals merit consideration for plan amendment.

Amendment proposals and appropriate alternatives accepted by the Council are analyzed by the Groundfish Plan Teams or other staff analytical teams for their efficacy and for their potential biological and socioeconomic impacts. After reviewing this analysis, the Council, Advisory Panel (AP), and Scientific and Statistical Committee (SSC) will make recommendations as to whether the amendment alternatives should be changed in any way, whether and how the analysis should be refined, and whether to release the analysis for general public review and comment. If an amendment proposal and accompanying analysis is released for public review, the AP, SSC, and the Council consider subsequent public comments before the Council decides whether to submit the proposals to the Secretary of Commerce for approval and implementation.

This document analyzes proposed Amendment 26 to the GOA groundfish FMP. This amendment package is being developed as part of the Council's annual amendment cycle. Initially, Amendment 26 addressed two issues established by the Council during its January 1992 meeting. These were:

1. Prohibit trawl gear from fishing for groundfish in waters east of 140 degrees West longitude in the eastern Gulf of Alaska.
2. Re-establish the crab protection time/area closures around Kodiak Island.

After reviewing the draft amendment package at its April 1992 meeting, the Council voted to release the amendment package for public review. At its June meeting, the Council determined that additional analysis should be developed for the first issue. Therefore, the draft EA/RIR for Amendment 26 to the GOA groundfish FMP addresses just the Kodiak Island crab protection time/area closures. At the June meeting, the Council also identified its preferred alternative for this issue. If the Council's preferred alternative is approved by the Secretary, changes to the regulations should be in place for the start of the 1993 fishery.

1.2 Purpose of the Document

This document provides background information and assessments necessary for the Secretary of Commerce to determine if the Amendment is consistent with the Magnuson Act and other applicable law. It also provides the public with information to assess the alternatives that are being considered and to comment on the alternatives. These comments will enable to Council and Secretary to make more informed decisions concerning the resolution of the management problems being addressed.

1.2.1 Environmental Assessment

One part of the package is the environmental assessment (EA) that is required by NOAA in compliance with the National Environmental Policy Act of 1969 (NEPA). The purpose of the EA is to analyze the impacts of major federal actions on the quality of the human environment. The EA 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 environmental impact study (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 review period, the Council could determine that the proposed changes will have significant impacts on the human environment and proceed directly with preparation of an EIS.

1.2.2 Regulatory Impact Review

Another part of the package is the Regulatory Impact Review (RIR) that is required by the National Marine Fisheries Service (NMFS) for all regulatory actions or for significant Department of Commerce or NOAA policy changes that are of significant 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 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 the head of an agency must certify that the regulatory and record-keeping requirements, if promulgated, will not have a significant effect on a substantial number of small entities or provide sufficient justification to receive a waiver.

This RIR analyzes the impacts of proposed changes to the BSAI bycatch management regime. The SAFE document and its appendix provide a description of and an estimate of the number of vessels and processors (small entities) to which regulations implementing these amendments would apply.

1.3 Description of the Groundfish Fisheries

The most recent description of the groundfish fishery is contained in the Draft Economic Status of the Groundfish Fisheries off Alaska, 1991, an appendix to the Draft SAFE documents for the GOA groundfish fisheries for 1992. The draft includes information on the catch and value of the fisheries, the numbers and sizes of fishing vessels and processing plants, and other economic variables that describe or affect the performance of the fisheries.

2.0 RE-ESTABLISH THE CRAB PROTECTION TIME/AREA CLOSURES AROUND KODIAK ISLAND

2.1 Description of and Need for the Action

In recent years, the bycatch of king crab off Kodiak Island has been a major management issue. Amendment 15 to the Gulf of Alaska FMP, adopted in 1986, established time and area restrictions on non-pelagic trawling around Kodiak Island to protect king crab resources for three years. This bycatch control measure was developed by the Council to provide an environment conducive to the recovery of king crab stocks around the island at a time of developing groundfish bottom trawl fisheries. The time/area closure scheme afforded protection to king crab in some areas during their molting or soft-shell period while in other areas it protected crab from bottom trawls year-round. These measures were considered vital if the severely depressed king crab stocks were to recover in this area.

Amendment 15 established two types of trawl closures. Type I areas are those king crab stock rebuilding areas where a high level of protection is provided to the king crab by closing the area year-round to bottom trawling. Type II areas are those areas sensitive for king crab populations and in which bottom trawling is prohibited during the softshell season. Fishing with bottom trawl gear is prohibited in Type II areas from February 15 to June 15.

Because Amendment 15 sunsetted on December 31, 1989, the Council and Secretary of Commerce renewed the trawl closure zones as part of Amendment 18 to the Gulf of Alaska FMP. In addition, Amendment 18 also added Type III trawl closure zones around Kodiak Island to protect juvenile king and Tanner crab when significant recruitment occurs. Type III areas are areas that have been identified as important juvenile crab rearing or migratory areas. The basis for such closures is the belief that the area inhabited by crab would increase if there is particularly strong recruitment and that protection would, thus, be appropriate for larger areas.

The area designations currently defined in the Gulf of Alaska FMP are as follows (See Figure 2.1):

<u>Area Type</u>	<u>Definition</u>
I	Type I areas are those king crab stock rebuilding areas where a high level of protection will be provided to the king crab by closing the area year-round to bottom trawling. Fishing with other gear would be allowed.
II	Type II areas are those areas sensitive for king crab populations and in which bottom trawling will be prohibited during the soft-shell season (February 15 - June 15). Fishing with other gear would be allowed and fishing with bottom trawl gear would be allowed from January 1 - February 14 and June 16 - December 31.
III	Type III areas are those geographic areas adjacent to a Type I or Type II area that have been identified as important juvenile king crab rearing or migratory areas. These areas only become operational following a determination that the "recruitment event criteria" has occurred. The NMFS Regional Director will classify the expanded area as either Type I or II depending on the information available.

For purposes of implementing a Type III area, a "recruitment event" is defined as the appearance of female king crab in substantially increased numbers. A substantially increased number is determined to have occurred when the total number of females estimated for a given district equals the number of females established as a threshold criteria for opening that district to commercial crab fishing. The threshold levels determined by the Alaska Department of Fish and Game for the four Kodiak red king crab management districts are: Northeast District - 1.93 million crabs, Southeast District - 0.72 million crabs, Southwest District - 2.28 million crabs, and Shelikof District - 0.19 million crabs. In any given year a recruitment event may occur in one or more of the Kodiak management districts as indicated by the standardized Kodiak crab survey conducted by the Alaska Department of Fish and Game. A recruitment event closure will continue until either a commercial crab fishery opens for that district or the number of crab drops below the threshold level established for that district. The Type III area closures would be implemented by regulatory amendment. ADF&G currently conducts annual surveys in the districts encompassing the proposed Type III areas. Typically the survey would detect a recruitment event two years prior to the time that it would result in the opening of a king crab fishery. Because some Type III areas are adjacent to both Type I and Type II areas, the NMFS Regional Director will classify the expanded area as either Type I or II depending on the information available.

In developing these time/area closure measures, the Council recognized that the future of the king and Tanner crab resource is dependent on the ability of existing brood stock to successfully produce crab. Scientific data presented in both Amendment 15 and Amendment 18 show that the existing closure areas provide protection to 85% of the Kodiak red king crab stocks, protect about 75% of the Tanner crab stocks, protect the most highly concentrated crab areas all year round, yet may provide for groundfish fishing opportunities necessary to support the economic base of Kodiak communities. The Council also recognized that once areas have been closed to fishing, there is often a reluctance to open those areas when circumstances may have changed.

Additional action is being considered at this time because the crab protection time and area closures established under Amendment 18 will expire December 31, 1992 unless the FMP is amended. This bycatch control measure was developed and implemented by the Council and the Secretary in 1986 and reestablished in 1989 to provide an environment conducive to the recovery of king crab stocks around the island at a time of developing groundfish bottom trawl fisheries and also provide protection for Tanner crab stocks. The time/area closure scheme afforded protection to crab in some areas during their molting or soft-shell period, while in other areas it protected crab from bottom trawls year-round. The expiration date allows the Council to review the situation, the status of the crab resource, the effectiveness of the time/area closures, and any other relevant information. As requested by the Council, staff re-evaluated the time/area closures as a possible bycatch control measure for king and Tanner crab. Utilizing the analysis presented as part of this amendment package, the Council can determine whether this approach to the king and Tanner crab bycatch problem should be continued or abandoned.

2.2 The Alternatives

2.2.1 Alternative 1: Status Quo - Do nothing.

Under the status quo there would be no specific bycatch controls for the groundfish fishery in the EEZ of the Gulf of Alaska to protect king crab after December 31, 1992. The current time/area closure scheme would expire. The retention of king and Tanner crab would remain prohibited in all groundfish fisheries. This alternative would provide no specific protection to crab around Kodiak Island and, therefore, does not meet the Council's objective of continuing such protection in anticipation of king crab stock rebuilding in the Gulf of Alaska.

2.2.2 Alternative 2: Extend existing time/area closure measures for another three years.

This alternative would extend the Type I, II and III time/area closures implemented by Amendment 18 for another three years (until December 31, 1995). Type I areas are closed to bottom trawling year-round. Type II areas are closed to bottom trawling during the crab soft-shell period, identified as February 15 - June 15. Type III areas are closed to bottom trawling when a significant recruitment event occurs.

2.2.3 Alternative 3: (Preferred Alternative) Implement a permanent time/area closure scheme for non-pelagic trawling.

This alternative would renew the existing time/area closures indefinitely. Under this alternative, modifying or deleting this protection measure would require a change to the GOA FMP. This alternative would not necessitate a periodic review of these measures. The Council would need to direct staff to initiate an analysis of these closures through the annual FMP amendment process.

2.3 Biological and Physical Impacts

The Kodiak red king crab population remains at historic low levels, and most are old, sexually mature animals. There has been no sign of significant recruitment since 1979. As a result, the Kodiak commercial king crab fishery has been closed since 1983 in an attempt to rebuild the stocks. While the cause for the decline of king crab is not known, most researchers believe that the decline can be attributed to a variety of environmental factors which independently or in combination led to the depressed condition of the resource. Whether the king crab decline is due in part to commercial fishing, either directed or incidental, is unknown.

Beginning in 1987, ADF&G begin conducting an island-wide trawl survey to assess both king and Tanner crab stocks. The 1987 survey results indicated a continuation of the decline in red king crab abundance that had been noted since 1982. The annual surveys since 1987 have continued to document the depressed condition of red king crab abundance. Trawl surveys from 1989, 1990 and 1991 indicate the following red king crab population estimates:

<u>Year</u>	<u>Population Estimate</u>
1989	355,195 animals
1990	258,059
1991	219,420

Trawl survey data indicate that the stocks continue to experience little or no recruitment. However, the 1991 ADF&G trawl survey captured more small crab than in recent years.

King crab are known to concentrate in certain areas around Kodiak Island during the year. In the spring they migrate inshore to molt and mate. Approximately 70% of the female red king crab stocks are estimated to congregate in two areas, known as the Alitak/Towers and Marmot Flats. The Chirikof Island and Barnabas areas also possess concentrations of king crab but in lesser amounts. Past studies by ADF&G have shown that most king crab around Kodiak mate and molt in the March-May period, although some molting crab can be found from late-January through mid-June. Adult female king crabs must molt to mate and extrude eggs. After molting, their exoskeleton (shell) is soft, and crabs in this stage are known as soft-shell crabs. The new exoskeletons take 2-3 months to harden fully. During the soft-shell period, the crabs are particularly susceptible to injury and mortality from handling and from encounters with fishing gear. Because many of the present and potential groundfish trawling grounds overlap with the mating grounds of king crab, the potential exists for substantial king crab mortality.

While it is generally assumed that king crab mortality during the soft-shell phase can be high with any gear type, incidental mortality of hard-shell crab as a result of encounters with fishing gear is not known. Trawl fishing could kill or injure king crab in two ways. First, crabs caught in the net can be crushed during the tow or injured as the catch is unloaded in the fishing vessel. Study of survival and mortality of king and Tanner crabs taken as bycatch in a 1987 yellowfin sole Joint Venture trawl fishery in the eastern Bering Sea indicate overall survival was 21 percent for king crabs and 22 percent for Tanner crabs (Stevens, 1990). Second, crabs might be struck with parts of the gear (e.g., trawl doors, towing cables, groundlines, roller gear) as the trawl is towed along the bottom.

On December 31, 1992 time/area closures designed to protect king and Tanner crab in the vicinity of Kodiak Island expire. These measures may be necessary to permit the severely depressed king crab stocks to recover in this area. The stocks have experienced little or no recruitment in recent years, and are subject to high mortalities from bottom trawls while in the soft-shell condition. The expiration date was selected to necessitate a review of the status of the crab stocks, and determine whether these measures are effective and should be continued.

2.3.1 Alternative 1: Status Quo - Do nothing.

With this option, no specific management measure would be implemented in this plan for the control of king crab bycatch in the non-pelagic trawl groundfish fisheries within the EEZ of the Gulf of Alaska after December 31, 1992. Incidental catches and subsequent mortalities would continue wherever concentrations of king crab occur, and at all times of the year when non-pelagic trawling is conducted. This alternative affords very limited protection to the king crab resource in the EEZ. It is not known whether this would prevent a recovery of the king crab resources. Fewer king crab in the marine food system would be present as a prey species for predators. Known predators include halibut, Pacific cod, and sculpins, which feed on juvenile king crab; herring and capelin feed on larval king crab.

Predators also include marine mammals. Interaction between king crab and marine mammals is generally minimal. Exceptions are interactions with sea otters. The sea otter feeds on any size of king crab, including commercial sized crab. The sea otter is also a benthic feeder and regularly dives to 30 fathoms in search of food. Sea otters have been recorded at depths as great as 50 fathoms. No documentation exists on the importance of king crab in the sea otter diet, and sea otter mortality resulting from interactions with the crab fisheries is believed to be rare.

Also under this alternative, fewer king crab would be in the system to feed on other marine life. King crab are bottom foragers, feeding on a wide range of food items, including dead organisms. Crab larvae feed on sponges, hydroids, and algae during the transition to their demersal mode of life. Brittle stars are an important food item for newly molted king crab. King crab also feed on mollusks, polychaete worms, isopods, young Tanner crab, starfish, and sea urchins. With fewer king crab, more of these organisms would be available for consumption by other organisms.

With the status quo, commercial fishing for groundfish by trawl gear would be conducted in the areas proposed to be closed seasonally and year-round by Alternatives 2 and 2. Commercial fishing for groundfish in these closure areas by non-trawl gear types (hook & line and pots), currently occurs. Because of this, it is uncertain how much more, if any, groundfish will be removed from those areas by all gear types relative to Alternatives 2 and 2. Therefore, the long-term predator/prey relationships that exist in local areas which have adjusted to the low abundance of king crab and current level of groundfish fishing would not be expected to change. The overall environmental impacts of this alternative compared with Alternatives 2 and 3 are not well understood but are believed to be insignificant. The Gulf of Alaska ecosystem is so complex that the environmental impacts as a result of this amendment are undetectable given the background variability of the system.

2.3.2 Alternative 2: Extend existing time/area closure measures for another three years.

Adoption of this alternative would provide the positive benefits of protecting the majority (85%) of Kodiak Island king crab resource from non-pelagic trawls during their soft-shell period (February 15-June 15); protecting the most concentrated king crab areas (Alitak Flats and Towers), or 70% of the existing resource year-round; and still providing non-pelagic trawl fishing opportunities close to established processing and support facilities (Dana Schmidt and Dave Jackson, ADF&G, personal communication). Injury or mortality as a result of non-pelagic trawling would be reduced.

Compared to the status quo alternative, Alternative 2 would increase the probability of a king crab population recovery. A review of 1985 non-pelagic trawl groundfish harvests (the last year before implementing the closure areas) indicate that only 1% of the harvest would have been lost if the time/area closures had been in effect. It is likely that the foregone groundfish catch consisting of sablefish, Pacific cod, and flatfish would have been taken from other areas around Kodiak Island. Therefore, the impacts of this alternative on groundfish stocks is insignificant.

As king crab stocks recover, more king crab will enter the ecosystem. The predator/prey relationship in the closed or restricted areas would change. More king crab would consume prey species that otherwise may have been consumed by other species. In turn, more king crab will be available to be preyed on by other predators, including marine mammals. Local fishing mortality would be reduced as groundfish fishing is closed or restricted.

Fewer or no groundfish would thus be removed from the system, which would then contribute to the current food web in these areas. The balanced predator/prey relationships that has adjusted to the low abundance of king crab and current level of groundfish fishing would change. The overall environmental impacts of this alternative compared with the status quo alternative are not well understood but are believed to be insignificant compared to natural perturbations in the environment.

This alternative would also afford protection to 75% of the known Tanner crab stocks in the Kodiak vicinity. This resource is also depressed, and only limited fisheries have been allowed. To the degree that time/area closures benefit Tanner crab, a more rapid rebuilding of this valuable resource might occur.

2.3.3 Alternative 3: Implement a permanent time/area closure scheme for non-pelagic trawling.

Adoption of this alternative would have all the conservation benefits as described for Alternative 2. The only difference from Alternative 2 is that, if recommended, Alternative 3 would not require Council review after three years because this alternative does not contain a sunset provision. If the Council, at a future date, would like to review the effectiveness of this protective measure, the Council would need to direct staff to initiate an analysis of these closures through the annual FMP amendment process.

2.4 Socioeconomic Impacts

The alternatives to the status quo will affect those who harvest and process groundfish and other species including king crab.

If areas in which bottom trawlers would normally fish are closed, fishermen would have to alter their fishing patterns. If we assume that the unconstrained distribution of effort is optimal for the bottom trawlers, they would face a potential decrease in profits as the result of not being able to fish in the most preferred areas. The closure of preferred fishing areas will decrease profits if cost per unit of catch is higher in the areas that remain open, and/or if the catch that is foregone in the closed areas is not completely offset by increased catch in other areas.

The largest reduction would occur if none of the catch that would have been taken in the closed areas can be taken elsewhere. In this case, gross ex-vessel revenue would be reduced by an amount equal to that which would have been earned in the closed areas. However, profits would decrease by less than this because the cost of harvesting groundfish in the closed areas would also be foregone. There is not sufficient harvesting cost information to estimate to what extent the reduction in gross ex-vessel earnings would overstate the reduction in profits in this extreme case.

Because the no-trawl closures have been in effect since 1986, obtaining current estimates of groundfish catch within the closure zones is not possible. Therefore the best available catch information is from 1985, the last year uncontrolled bottom trawling was allowed around Kodiak Island. If the Types I and II closures had been in effect in 1985, and if the catch from these areas could not have been made up elsewhere, approximately \$17,000 of gross ex-vessel earnings would have been foregone (Table 2.1). The percent of the Central GOA trawl catch taken from the closure areas prior to the closure implementation was quite small. Alaska Department of Fish and Game fish ticket data indicate that in 1985, only 0.56%, 1.42% and 12.28% for sablefish, Pacific cod and Rocksole, respectively, was taken from within the Types I and II no-trawl areas.

Given the increase in ex-vessel prices that has occurred since 1985, and assuming the catch composition and amount for 1985 would be the same for 1991, the foregone value in 1991 due to the no-trawl closures would have been approximately \$27,500.

Had the Type III closures been in effect during 1988, and had bottom trawl fishermen been unable to make up the catch from these areas, the additional foregone catch and value would have been approximately 2,200 mt and \$692,000, or \$943,705 for 1991, assuming 1988 catch from within the Type II closure areas (Table 2.2).

The catch figures used to estimate the potential reductions in catch and value are based on catch data by Alaska Department of Fish and Game Statistical Area. Because the proposed closures include only part of some statistical areas, and because catch is often not accurately reported by statistical area, the estimates of catch in the proposed closures may be very rough approximations of the actual catch.

As noted above, the potential foregone catch and value assuming no redirection of fishing effort to the areas that remain open are upper bounds on the adverse effects of the proposed closures. At the other extreme, all the catch would be made up in other areas without increasing fishing costs and the closures, therefore, would have no adverse effects on the bottom trawl fisheries. It is not known where the actual effects would fall within this range.

What is known is that the Central GOA TACs for the species historically caught within the closure areas have been taken since this measure has been implemented. This indicates that these crab conservation measures have not detracted from achieving OY, and the small percentages of the TACs harvested within the closure areas probably do not negatively impact the trawlers. In addition, other operations utilizing non-trawl gear types, notably hook & line and groundfish pots, fish within the closure areas for groundfish.

It is even more difficult to determine the probable benefits of the closures. The closures will tend to provide protection for king and Tanner crab stocks; however, it is not known how the probability or timing of recoveries by these stocks would be affected by these closures. The benefits of the closures would be minimal if the probability of recovery is very low whether or not the closures are implemented, or if a similar recovery would occur regardless of the closures. Conversely, the benefits would be substantial if a full recovery of the stocks would only be prevented by the absence of the proposed closures. The factors affecting the potential for stock recoveries are not sufficiently well understood to

Table 2.1 1985 and 1991 value of groundfish harvested within Type I and II trawl closures in 1985.

<u>Species</u>	<u>Quantity (mt)</u>	<u>Percent of Central Gulf Trawl Catch</u>	<u>Value</u>	<u>Value</u>
Sablefish	2	0.56%	\$1,460	\$3,959
Pacific	27	1.42%	\$7,799	\$13,095
Rocksole	39	13.28%	\$7,568	\$10,489
			\$16,827	\$27,543

Catch figures in the area were provided by ADF&G and prices used were annual average trawl prices in the Central Gulf of Alaska as reported in the May 12, 1985 and December 11, 1991 PacFIN report.

Table 2.2 1988 and 1991 value of groundfish harvested in proposed Type III bottom trawl closures in 1988.

<u>Species</u>	<u>Quantity (mt)</u>	<u>Percent of Central Gulf Trawl Catch</u>	<u>Value</u>	<u>Value</u>
Pollock	416	0.81%	\$71,000	\$105,463
Pacific Cod	1341	6.10%	\$438,000	\$650,372
Flatfish	224	3.11%	\$63,000	\$74,071
Rockfish	192	2.35%	\$111,000	\$102,430
Other	27	9.64%	\$9,000	\$11,369
			\$692,000	\$943,705

Catch figures in the area were provided by ADF&G and prices used were annual average trawl prices in the Central Gulf of Alaska as reported in the February 10, 1989 PacFIN report for 1988 value and December 11, 1991 PacFIN report for 1991 value.

determine which case is more likely. The types of information needed to make more specific statements concerning the expected benefits of the closures include the following:

- (1) The bycatch rate of king and Tanner crab in the bottom trawl fishery by area and season.
- (2) The percent mortality of that bycatch as it is returned to the sea by area and season.
- (3) The natural mortality and growth rates, migration patterns, reproductive potential of these "saved" crab.
- (4) The natural mortality (including susceptibility to predation), growth rates, migration patterns, and recruitment of these offspring.

We are unable to estimate any of these four items with reliable precision, but can only infer that protection of some stocks of younger crab will eventually lead to additional recruitment.

A historical perspective implies that there would be significant benefits should the red king crab stocks recover to past levels of abundance. During the last five years that the fishery was open in the Kodiak region (1978-1983), annual catch averaged about 16 million pounds, which at \$4/lb. (ex-vessel) was worth \$64 million. The extent to which the proposed closures would enhance that recovery cannot be ascertained given our current knowledge of crab biology.

Since implementation of this protection measure in 1986, ADF&G survey data indicate that little or no recruitment has occurred to the red king crab stocks. The Kodiak red king crab population remains at historic low population levels. This does not indicate that these closures are not effective. Rather, it indicates the difficulty in managing this crab fishery and the high costs of foregone revenue when a stock is in a depressed state.

2.4.1 Reporting Costs

The proposed alternatives to the status quo would not increase the reporting burden on fishermen or processors. The closed areas have been in place for six years and are enforced using at-sea enforcement, not by catch reporting. Therefore, relative to the status quo, the proposed time/area closures should not change the reporting costs of any participant in the fishery.

2.4.2 Administrative, Enforcement, and Information Costs and Benefits

The proposed alternatives close areas to bottom trawling year-round or during part of the year. In response to this change, enforcement officials can do one of two things: (1) obtain an increase in funding to maintain the status quo enforcement capability by increasing surveillance flights and cruises, or (2) reallocate enforcement activity from other areas and, thus, decrease the enforcement capabilities elsewhere.

2.4.3 Impacts on Consumers

The potential decrease in trawl catches is such a small percentage of the Alaska groundfish total that consumer prices should not be affected by the closures. If the closures contributed to the return of healthy red king crab and Tanner crab stocks around Kodiak, there would be benefits to consumers who purchase these crab. The benefits would appear in the form of lower prices and/or increased availability.

2.4.4 Redistribution of Costs and Benefits

The costs of the proposed time and area closures are borne by the harvesters and processors of bottom trawl-caught groundfish. There may also be increased enforcement costs from the adoption of this regulation. The benefits will accrue to those who harvest, process, market, and consume king or Tanner crab.

2.4.5 Benefit-Cost Conclusion

There will be costs to the bottom trawl fisheries in terms of increased operating costs or slightly lower catches if effort patterns that include fishing within the closure zones are optimal. The benefits associated with the time/area closures depend upon the level of bycatch of prohibited species associated with the redistributed effort. Benefits also depend on the ability of the red king crab and Tanner crab stocks to recover given the protection afforded by the closures. The magnitudes of the potential costs and benefits are only known within large ranges.

Under Alternative 2, the closures would be in effect for three years only and will be reevaluated at the end of that period. If, at that time, the Council takes no further action with regard to the problem of king crab bycatch by non-pelagic trawlers in the vicinity of Kodiak Island the provisions of Alternative 2 will expire at the end of 1995. The benefits and costs of the closures that were established for 1986 through 1992 are difficult to evaluate. Although there are no clear signs of improved recruitment, such improvements may not be measurable for several years.

2.5 References

- Alaska Department of Fish & Game (ADF&G). 1991. Annual Management Report for the Shellfish Fisheries of the Westward Region. Regional Information Report No. 4K92-9. Kodiak, Alaska.
- Alaska Department of Fish & Game (ADF&G). 1991. A Bottom Trawl Survey of Crab and Groundfish in the Kodiak Island, Alaska Peninsula, and Dutch Harbor Areas. Draft Technical Fisheries Report 92-xx. Juneau, Alaska.
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- North Pacific Fishery Management Council (NPFMC). 1989. Amendments 18 and 13 to the Gulf of Alaska and Bering Sea/Aleutian Islands Groundfish Fishery Management Plans and associated Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis. Anchorage, Alaska.
- North Pacific Fishery Management Council (NPFMC). 1986. Amendment 15 to the Gulf of Alaska Groundfish Fishery Management Plan and associated Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis. Anchorage, Alaska.
- Stevens, Bradley G. 1990. Survival of King and Tanner Crabs Captured by Commercial Sole Trawls. Fishery Bulletin, U.S. 88:731-744.

3.0 EFFECTS ON ENDANGERED AND THREATENED SPECIES AND ON THE ALASKA COASTAL ZONE

None of the alternatives are expected to have any adverse effect on endangered or threatened species or their habitat. Thus, formal consultation under Section 7 of the Endangered Species Act is not required.

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

4.0 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 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 would 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, costs to state and federal fishery management agencies will increase.

These amendments should not have an annual effect of \$100 million, since although the total value of the domestic catch of all groundfish species is over \$100 million, these amendments are not expected to substantially alter the amount of distribution of this catch.

5.0 IMPACT OF THE AMENDMENTS RELATIVE TO THE REGULATORY

FLEXIBILITY ACT

The Regulatory Flexibility Act (RFA) requires that impacts of regulatory measures imposed on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions with limited resources) be examined to determine whether a substantial number of such small entities will be significantly impacted by the measures. Fishing vessels are considered to be small businesses. Over 2,000 vessels may fish for groundfish off Alaska in 1993, based on Federal groundfish permits issued by NMFS. While these numbers of vessels are considered substantial, regulatory measures will only affect a smaller proportion of the fleet.

6.0 FINDINGS OF NO SIGNIFICANT IMPACT

For the reasons discussed above, neither implementation of the status quo nor any of the alternatives would significantly affect the quality of the human environment, and the preparation of an environmental impact statement on the final action is not required under Section 102(2) (c) of the National Environmental Policy Act or its implementing regulations.

7.0 LIST OF PREPARERS

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