

MEMORANDUM

TO: Council, SSC and AP Members
FROM: Clarence G. Pautzke
Executive Director
DATE: April 10, 1996
SUBJECT: Crab Bycatch Issues

ESTIMATED TIME

6 HOURS

ACTION REQUIRED

- (a) NMFS report on crab bycatch in the Gulf of Alaska.
- (b) Report of Board of Fisheries activities.
- (c) Report from the Crab Rebuilding Committee.
- (d) Initial review of analysis on crab caps and closures in Bristol Bay.

BACKGROUND

Gulf of Alaska Crab Bycatch

In January 1996, the Council requested that NMFS provide crab bycatch data from the Gulf of Alaska groundfish fisheries to assess whether or not bycatch management measures for the GOA may be necessary. The current crab bycatch management measures in the Gulf include trawl closure areas to protect red king crab habitat around Kodiak Island. NMFS will provide a handout of GOA crab bycatch numbers during the meeting.

Board of Fisheries Activities

The Board of Fisheries (BOF) met in March to review statewide crab issues. The BOF adopted the following measures for Bering Sea crab fisheries:

1. new gear restrictions (escape rings or minimum mesh size) for brown king crab, Tanner crab, and snow crab fisheries;
2. regulations mandating that pots used in the Adak/Dutch Harbor area (combined to form Aleutian Islands king crab registration area) be longlined as a way to reduce lost pots;
3. changes to season opening dates (September 1 for Aleutians brown king crab) and closing dates (EO for St. Matthew king crab rather than fixed date);
4. changes regarding landing provisions and delivery times, pot storage areas, and tank inspection times.

The BOF also passed a resolution urging the NPFMC to close the Red King Crab Savings Area year-round to non-pelagic trawling, and to close all nearshore areas east of 162°W in the eastern Bristol Bay area to all trawling. Additional information on Board of Fisheries activities is included in the State Management Report (Tab B-2).

Crab Rebuilding Committee Report

In January 1995, the Council established a committee composed of members of the BSAI groundfish and crab plan teams to develop a rebuilding plan for the Bering Sea crab stocks. The Committee met for two days in 1995 and again on April 4-5, 1996. The minutes from the latter meeting are attached as Item C-2(a). The focus of the meeting was to review the EA/RIR on proposed crab bycatch management measures. Additionally, the Committee has prepared a Terms of Reference to define the Committee's membership, organization, focus, and function. The Council needs to review these terms and provide guidance to the Committee on developing the rebuilding plan. Council member/Committee Chair Dave Fluharty and staff coordinator Dave Witherell will summarize the Committee's report and provide the Committee's recommendations on the EA/RIR.

Initial Review of Proposed Crab Bycatch Management Measures

In January, the Council identified three potential management measures for the current crab bycatch management regime for Bering Sea trawl fisheries. Specifically, these management measures are:

1. Revise the trawl closure time period for the Bristol Bay Red King Crab Savings Area,
2. Modify existing crab PSC bycatch limits, and initiate bycatch limits for snow crab, and
3. Establish a trawl closure area in nearshore waters of Bristol Bay.

A draft Environmental Assessment/Regulatory Impact Review for these management measures was distributed on March 28, 1996. The executive summary is attached as Item C-2(b). The analysis was also reviewed by the crab plan team, and their recommendations are included in their minutes (Item C-2(c)). Staff will provide a presentation of alternatives and analysis at the meeting.

Note that management measure 1 examines changing the closure duration for the Bristol Bay Red King Crab Savings Area. The Council previously adopted a January 1 to March 31 closure for Amendment 37 in September, 1995. Though the amendment has not been sent to Secretarial review, it does represent a Council final action, and thus is considered status quo. No additional action would be required if the Council keeps these dates as the preferred option. If a change in closure duration is desired, the Council in June would need to rescind their previous action (by majority vote) before making a motion to modify Amendment 37. At this meeting, the Council will examine the analysis and consider releasing it for public review. Final action could be taken in June.

Management measures 2 and 3 are proposed as a separate amendment, tentatively identified as Amendment 41. The suite of management measures has been examined together in one package, so that the impacts of these proposed measures can be analyzed comprehensively. At this meeting, the Council will make an initial review of the document, and consider releasing it for public review. Final action could be taken in June. If adopted and approved, management measures would be implemented in January 1997.

- DRAFT -

**Crab Rebuilding Committee Report
April 1996**

Note: The Committee invites questions and suggestions from the Council and public regarding the focus of this Committee and development of a Rebuilding Plan. The Committee is scheduled to report to the Council on April 18-19, 1996.

North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, Alaska 99501

DRAFT AGENDA
Crab Rebuilding Committee:
8:00 a.m. - 5:00 p.m., April 4-5, 1996
Hilton Hotel, Anchorage, Alaska

**Estimated
Time**

- | | |
|---------|--|
| 15 min | I. Introduction
Dave Fluharty - Proposed direction and focus of meeting |
| 1 hour | II. Review Board of Fisheries Actions on Stock Conservation and Bycatch, Including Harvest Strategy for Bristol Bay Red King Crab [Griffin, Murphy, and Pengilly] |
| 15 min | III. Review of Recent Council Crab Bycatch Management Actions [Witherell] |
| | IV. Presentation and Review of the EA/RIR for Crab Bycatch Management |
| 2 hours | A. Review Proposed Management Measure 1: Extend Duration of Red King Crab Savings Area
1. Biological information [Witherell, Ackley]
2. Review of Bering Sea Bycatch Model [Ackley]
3. Economic information [Ackley] |
| 2 hours | B. Review Proposed Management Measure 2: Modify Crab Bycatch Limits and Establish Bycatch Limits for Snow Crab
1. Alternatives Considered [Witherell]
2. Environmental Assessment [Witherell]
3. Regulatory Impact Review [Ackley] |
| 2 hours | C. Review Proposed Management Measure 3: Close Nearshore Areas of Bristol Bay to Trawling
1. Alternatives Considered [Witherell]
2. Environmental Assessment [Witherell]
3. Regulatory Impact Review [Ackley] |

DAY 2

- | | |
|---------|--|
| 1 hour | V. Crab Plan Team Recommendations on EA/RIR |
| 1 hour | VI. Public Testimony
Alternatives for bycatch management
New ideas and information |
| 2 hours | VII. Recommendations from the Committee on Specific Alternatives and Management Measures |
| 1 hour | VIII. Additional Suggestions and Revisions to Improve Analysis |
| 2 hours | IX. Other Rebuilding Committee Discussion
Other management measures that should be considered
Research needs for crab rebuilding
Information synthesis |

Total time
14.5 hours

**DRAFT Minutes of the
Crab Rebuilding Committee
Meeting, April 4-5, 1996**

Members Present:

David Fluharty (NPFMC)
Dave Ackley (ADF&G)
Loh-lee Low (NMFS)
Dave Colpo (NMFS)
Ron Berg(NMFS)
Josh Greenberg (UAF)
Ken Griffin (ADF&G)

Rance Morrison (ADF&G)
Peggy Murphy (ADF&G)
Bob Otto (NMFS)
Doug Pengilly (ADF&G)
Jerry Reeves (NMFS)
Tom Shirley (UAF)
Dave Witherell (NPFMC)

The North Pacific Fishery Management Council's Crab Rebuilding Committee met in Anchorage, April 4-5 1996. Council member Dave Fluharty chaired the meeting, which was based on the attached agenda. The focus of the meeting was to review the draft EA/RIR on proposed crab management measures. Committee recommendations were developed through consensus rather than by vote. Active public participation and feedback were encouraged per SSC and AP concerns that industry be involved in the process. Background briefing materials were supplied to all Committee members and public. The meeting format was to hear staff reports on each item, followed by questions and discussion. These minutes provide a synopsis of each staff report and a summary of the discussion that followed.

The meeting began with discussion and preparation of a Terms of Reference guide to define the Committee's membership, organization, focus, and function. Much of this precipitated out of concern that the entire groundfish team was not present at the Committee meeting. After reviewing the areas of expertise of those members present, and the addition of the groundfish team economist, it was felt that representation by the groundfish team was suitable for Committee purposes. The Terms of Reference was drafted as follows:

Crab Rebuilding Committee Terms of Reference

Establishment: The NPFMC established the Crab Rebuilding Committee in January 1995 to develop a problem statement, objectives, and a rebuilding plan for king and hairdi crab. Committee determined that opilio crab was also within the scope of discussion.

Membership: The Committee includes all members of the BSAI crab and groundfish plan teams, working under the direction of a Council member (Dave Fluharty). All members need not be present for a quorum, however all areas of expertise (management, stock assessment, research, ecosystems, economics) should be represented from each team.

Meetings: The Committee will meet in person one or two times each year, depending on Council funding. Additional meetings may be conducted in person or by teleconference. Work groups may be developed to examine particular items of interest; this work will be accomplished via mail, e-mail, and telephone as necessary. Committee decisions will be reached by consensus, whenever possible. If consensus cannot be reached, the committee will report all points of concern.

Functions: The Crab Rebuilding Committee shall develop a crab rebuilding plan based on the following problem statement, objectives, and focus.

Problem Statement: Depressed status of red king crab, and low abundance of Tanner and snow crab in the BSAI.

Objective: Develop comprehensive plan to rebuild crab and reverse stock declines.

Focus: Examine interaction of crab and groundfish fisheries by evaluating sources of mortality and management measures to reduce it, including:

1. Closed Areas
2. Bycatch Management Regime
3. Ecosystem Impacts (predation, competition, habitat, etc.)

Other Considerations: The Crab Committee would take into consideration on-going programs and work done by NMFS, ADF&G, BOF, and others to avoid duplication of effort.

Review Board of Fisheries Action on Stock Conservation and Bycatch

Ken Griffin provided a summary of actions the Board of Fisheries (BOF) took at their March meeting, and previous actions taken to protect Bristol Bay red king crab. In March, the BOF adopted the following measures: (1) new gear restrictions (escape rings or minimum mesh sizes) for brown king crab, Tanner crab, and snow crab fisheries; (2) regulations mandating that pots used in the Adak/Dutch Harbor area (combined to form Aleutian Islands king crab registration area) be longlined as a way to reduce lost pots; (3) changes to season opening dates (September 1 for Aleutians brown king crab) and closing dates (E.O. for St. Matthew king crab rather than fixed date); (4) changes regarding landing provisions and delivery times, pot storage areas, and tank inspection times. The BOF also reaffirmed its earlier actions to protect Bristol Bay red king crab, including a 3" tunnel height opening for pots used in the Tanner crab fishery, as well as closing the area east of 162° W during years when the red king crab fishery is closed. Future issues for the BOF include: reducing the minimum size of Bristol Bay red king crab to 6" CW, establishing pot limits in the Aleutian Islands area, adjusting observer coverage, and possible changes gear regulations designed to reduce bycatch and handling mortality. It was noted that the BOF passed a resolution urging the NPFMC to close the Red King Crab Savings Area year-round to non-pelagic trawling, and to close all nearshore areas east of 162° in the eastern Bristol Bay area to all trawling. It was clarified that "nearshore areas" as defined by the BOF were those considered under the draft EA/RIR for Amendment 41.

Peggy Murphy summarized the new harvest strategy for Bristol Bay red king crab that was recently adopted by the BOF. The LBA model, which was originally designed to smooth out measurement error in the trawl survey abundance estimates, generated data necessary for a stock-recruit relationship. Stock projections under various harvesting strategies were made using assumptions on natural mortality, handling mortality, and density dependence (autocorrelated environmental effects on recruitment). Performance of the current harvest strategy, a suite of long-term harvest strategies and a rebuilding strategy were evaluated by the LBA model. Results of the modeling efforts indicated that:

- (1) the current threshold should be maintained at 8.4 million mature females which equates to an effective spawning biomass of 14.5 million pounds with the additional constraint that both number of mature female crabs and weight of effective spawners define threshold;
- (2) the mature male harvest rate should be lowered from 20% to 10% when the population is above threshold and when effective spawning biomass is below 55 million pounds and to 15% when the population is above threshold and the effective spawning biomass is at or above 55 million pounds; and
- (3) the maximum harvest rate on legal-sized male crabs should be lowered from 60% to 50%.

In March, the BOF adopted these three points as the new policy for management of the Bristol Bay red king crab fishery. Peggy clarified that the assumption of 20% handling mortality included mortality due to crab fishery discards, impacts of other fisheries, and other sources not accounted by natural mortality.

Review Recent Council Action on Crab Bycatch Management

Dave Witherell provided a brief review of recent Council action regarding crab management. In response to the Council request, and after reviewing the best available scientific information about the depressed status of red king crab stocks, NMFS implemented on January 20, 1996, an inseason adjustment to close the Red King Crab Savings Area, located between 162° to 164° W longitude and between 56° and 57° N latitude through March 31, 1996. The purpose of this action was to protect female red king crab during a time when the trawl fishery for rock sole was ongoing. This was the same measure that NMFS implemented by emergency rule early in 1995 on the basis of Council recommendation.

On February 2, 1996, after reviewing new information obtained during its January 30 meeting with the Alaska Board of Fisheries and additional information from the public as well as NMFS and ADF&G testimony, the Council recommended that an emergency rule be implemented to close an area in part of Bristol Bay to fishing by vessels using trawl gear through June 15, 1996. The particular area is located between 163° to 164° W longitude and 56° and 57° N latitude. This area is to the west of and immediately adjacent to Statistical area 516, which is closed under existing regulations from March 15 through June 15. A closure of the additional area to the west through June 15 would provide necessary protection for red king crab during the period they are in a softshell condition and are particularly susceptible to fishing mortality. NMFS also implemented this measure under its inseason adjustment authority.

In June 1995, the Council initiated analysis of an industry proposal for a BSAI groundfish plan amendment that would allow greater flexibility in management of Tanner crab bycatch limits established for Zones 1 and 2. Currently, the FMP establishes *C. bairdi* PSC bycatch limits for trawl fisheries at 1 million crab for Zone 1 and 3 million crab for Zone 2. In January 1996, based on recommendations from its advisory committees and testimony from the public, the Council decided not to pursue this proposal any further. It was felt that additional impacts on crab in Zone 1 were not warranted at this time given current crab stock conditions.

Review of Draft EA/RIR on Crab Bycatch Management

The Committee reviewed a draft EA/RIR of proposed crab bycatch management measures, dated March 28, 1996. Dave Witherell summarized the background of the three crab bycatch management measures discussed in the document. Management measure 1 considers alternative time periods for the Bristol Bay Red King Crab Savings Area trawl closure that was adopted under Amendment 37. Management measure 2 considers potential changes to crab PSC management, including proposed bycatch limits for snow crab. Management measure 3 considers alternative trawl closure areas in nearshore waters of Bristol Bay to protect juvenile red king crab habitat. Management measures 2 and 3 could be adopted separately as Amendment 41. In April, the Council will make initial review of the draft EA/RIR and determine if it can be sent out for formal public review. Final action could then be taken at the June Council meeting, such that regulations promulgated could be in place by January 1997. A summary of Committee discussion for each management measure is provided below.

Management Measure 1: Revise Time Period for Bristol Bay Red King Crab Savings Area

Bob Otto reviewed data available on molting time for red king crab in Bristol Bay. He noted a number of points for the Committee to consider. Red king crab generally molt from mid-January and into May and even June in some years. Figure 2.4 shows that the end of molting is highly variable from year-to-year. In several years, substantial numbers of crab had yet to molt during the NMFS trawl survey, which occurs during June in Bristol Bay. Larger crab tended to molt later in this time period, and females generally molted later than males. Tom noted that his data indicated that it took about 1 month for shells to harden into what would be considered hard shelled condition. The Committee thus determined that if the Council's objective was to reduce mortality on softshell crab, a closure through July 1 would provide more protection.

Bob also reviewed the historic distribution of red king crab in Bristol Bay. As abundance of red king crab began to decline in the late 1970's, crabs began to disappear from the edges of their distribution. The absence of crab was particularly apparent in the area north of Unimak Island. Bob hypothesized that crab in the Unimak area represented recruitment as a result of spawning in the Gulf of Alaska, as larvae drift with currents that head north. As the Gulf spawning stocks diminished, so did recruitment on the other side of Unimak pass. Bob noted however, that an alternative hypothesis that cannot be discounted is that trawling has affected crab habitat in the Unimak area.

Discussion then focused on the Bering Sea Bycatch Model that was used to analyze net benefits of alternative closure periods. Dave Ackley reviewed how the model works and its assumptions. In reviewing the Research Advance of the Bering Sea Fishery Simulation Model, Dave Colpo noted that there are three points that should be highlighted. First, there is no information on the crowding externalities that could occur as areas are closed and the fleet moves into open areas occupied by other vessels. One would expect CPUE to decrease as more vessels enter an area. In addition, there is no attempt to quantify changes in net revenues as vessels are forced out of preferred fishing areas into potentially less desirable areas. In general, if the open areas were more desirable, you would expect to see the fleet operating there, not in the areas the actions are trying to close. Finally, there is no mechanism within the model to allocate catch into areas where there is currently no activity. Josh Geenberg and Dave Colpo noted that these data would be difficult to model, even if they were available. However, in evaluating the economic impacts of management actions, they are crucial. An ongoing collection of economic data from the fleet may provide the author with tools to more adequately model this valuable resource. Another factor of net benefits that cannot be quantified are the costs of bycatch (and unobserved mortality) from trawl fisheries to directed crab fisheries, including foregone harvests and stock rebuilding. These costs may also be in the form of capital costs (crab vessels may have limited malleability). Crab industry representatives noted that the crab fishery has forgone lots of revenue in order to rebuild the red king crab stock. The Committee recommends that a full economic analysis of the tradeoffs among crab and groundfish fisheries should be performed if possible, and should be reviewed by the SSC. An ongoing collection of economic data from the fleet may provide the tools to more adequately model this valuable resource.

The committee discussed uncertainty associated with unobserved mortality and habitat impacts. One member felt that the closure area was essentially a means to reduce the numbers of crab taken as bycatch. If so, a different approach to closure areas might be to assign PSC limits and allow industry to prosecute its fishery during the normal seasons but with no restriction on location. Under such a system, the incentive would be placed on industry to reduce bycatch at the same time it maximizes catch by fishing on the most dense concentrations of the target species. Some factor for unobserved mortality could be included in the overall allowable bycatch limit. On the other hand, most committee members felt that the closing the Bristol Bay Red King Crab Saving Area was more than just a bycatch reduction measure. Rance and Jerry noted that the stock was at critical abundance levels, and that the bottom line was that mortality must be reduced to as low a level as possible. As Rance put it "death is not a degree of pain". Peggy and Doug further noted that there is lots of recruitment uncertainty, as well as uncertainty regarding trawl impacts on mortality and habitat.

The Committee concluded that a year-round closure could be justified as a way to protect habitat and reduce unobserved mortality. A 6-month closure (through July 1) would protect molting crab, but many committee members remained concerned about stock status, unobserved mortality, and habitat impacts. Regardless of what option is chosen by the Council, the Committee recommends that closure areas should be evaluated on a regular basis, as crab abundance and distribution change over time. It was felt that these things were monitored by the crab plan team, and a sunset date need not be included as part of the amendment package.

Management Measure 2: Modify Existing Crab PSC Bycatch Limits

Dave Witherell provided a brief presentation on alternative PSC limits for red king crab, Tanner crab, and snow crab. To measure the impact of crab bycatch removals, length frequency and mortality data were used to estimate removals in terms of adult equivalents. Dave noted that he had received some suggestions from others on input data (growth, mortality) and would incorporate them in the next draft, but that the results would not be much different. Ron suggested that the problem statement and list of Alternatives be presented separately for each crab species, and analyzed as such. Committee members concurred, and Dave W. and Dave A. thought it would be possible for the revised draft. Dave Ackley will be supplying bycatch model results for alternative bycatch limits for the Council meeting.

Committee discussion centered around potential limitations of Alternative 3 as proposed. Bob discussed how the Alternative is dependent upon the trawl survey index of all size groups. He didn't think this was the approach to take because minor changes in survey station or crab distribution can create major changes in the survey population estimate. This is because the population index is dominated by small animals (true for all 3 species) and survey estimates of small crab and their distribution are highly variable from year to year. Alternative 3 creates problems because annual PSC limits could be set disproportional to the abundance of the size of crab taken in trawl fisheries (which consists primarily of large crab). Of concern is the potential for a high PSC limit generated by large numbers of juveniles. A similar concern occurs at the opposite extreme where an artificially low PSC limit could needlessly constrain trawl fisheries. The Committee concluded that Alternative 3 would have less problems if PSC limits were based on the survey abundance of large crab, but noted that there would still be annual variability. Bob felt that PSC limits not based on abundance was therefore better, but acknowledged that a stairstep approach for PSC limits would resolve some of the problems associated with setting limits based on survey abundance indices. Committee members agreed that bycatch numbers should be negotiated by industry representatives. There are simply too many unknown economic variables for analysts to make allocative evaluations. Hence, the Committee felt that the current analysis was sufficient for industry negotiation purposes. Industry suggested that crab biology expertise be made available if such a negotiation were to occur.

Management Measure 3: A Trawl Closure Area in Nearshore Bristol Bay

The Committee reviewed the analysis of this management measure only with regards to crab stocks and bycatch tradeoffs for trawl fisheries. Although the proposed closure may affect marine mammals and seabirds, the Committee was primarily concerned with potential benefits to crab stocks and costs to trawl fisheries. Dave W. reviewed information on habitat requirements for juvenile red king crab, habitat distribution in the Bering Sea, and potential impacts of trawling on this habitat type. In general, nearshore areas of Bristol Bay (< 50 m) contain sporadic distribution of hard bottom areas that contain critical habitat for age-1 red king crab. Bob Otto considers this as critical habitat for the species. At 18 months of age, the juveniles leave the hard bottom habitat and form large pods in slightly deeper areas. Committee members agreed that it would be prudent to prohibit trawling from areas containing juvenile red king crab habitat.

The Committee reviewed information on the type of fisheries that occurred in the proposed closure areas. By far, the predominant fishery occurring in the area is the yellowfin sole trawl fishery. A total of 2% to 50% of the yellowfin sole observed catch was taken within the proposed closure area during the 1991 to 1994 fisheries. Dave Ackley presented some figures showing the distribution of haul locations within the area; a vast majority of these tows were located just west of Cape Constantine just outside of the 12 mile closure around Round Island. Industry representatives indicated that very little fishing effort occurs in area 508 due to the presence of ice early in the year, and PSC closures later in the year. Several members expressed concern that a closure area may preclude development of new fisheries in the area, however, it was noted that this could be accomplished through an experimental fishing permit.

In addition to target catch considerations, the Committee discussed bycatch of crab, herring, and halibut within the proposed closure areas. Data indicated that bycatch of red king crab was low throughout the nearshore areas. The Committee recommended that the EA/RIR also examine bycatch of Tanner crab and halibut, although bycatch of these species was thought to be low in the proposed closure areas. Bycatch of herring in the area can be relatively high for the yellowfin sole fishery, but generally low compared to pelagic trawl fisheries. The yellowfin sole fishery accounted for 5% to 28% (56-215 mt) of the total BSAI herring bycatch in the 1993-1995 groundfish trawl fisheries. Trawl industry representatives provided a presentation of the yellowfin sole fishery using the Sea State software program. The program plots distribution of catch and bycatch rates for target fisheries. Those present at the meeting felt it was useful to examine potential tradeoffs in crab and halibut bycatch under proposed closure areas.

After reviewing the above information on bycatch and crab habitat distribution, Committee members felt that it might be possible to reduce the size of the proposed northern Bristol Bay closure area. The Committee recommended that the area between 159° and 160° W, and north of 58°N be included as a suboption to continue trawling in this area. This suboption would apply to both alternative areas considered for trawl closure.

In a related issue, it was noted that regulations allow trawling for Pacific cod in the nearshore waters surrounding Port Moller, with NMFS permission and a bycatch limit of 12,000 red king crab. Committee members agreed that the Port Moller regulation was out of date given current crab abundance, and new information available on juvenile crab habitat requirements and habitat distribution. Dave W. noted that rescinding this regulation would require a regulatory amendment, but could be rolled into the EA/RIR for Amendment 41 without too much effort. The Committee concurred and recommended that the Council consider this housekeeping amendment.

Preparation of a Rebuilding Plan

Once the Committee's function and focus were determined, the Committee was in a position to discuss how a rebuilding plan might be developed. Dave Fluharty proposed a framework for the rebuilding plan. This was discussed by the Committee and revised accordingly. The Committee decided that a Rebuilding Plan would be developed for red king crab, Tanner crab, and to some extent snow crab based on the following matrix of mortality sources and steps taken to address these sources.

Rebuilding Plan

<u>Mortality Sources</u>	<u>Concern</u>	<u>Knowledge</u>	<u>Study</u>	<u>Council Action</u>	<u>Priority</u>
Crab Fishery					
Bycatch					
Other					
unobserved					
lost gear					
Predation					
Competition					
Parasites/Disease					
Habitat					
critical					
fishing impact					
physical env.					

The Committee agreed with this approach in that it was within the Terms of Reference and would not duplicate existing mechanisms for reviewing research needs. It was also a practical way to approach a rebuilding plan in

that it can be achieved and a useful product produced. Members identified areas of research needs and technology available to answer some of these questions. The issue of unobserved mortality and habitat impacts due to trawling was of primary interest. It was noted that Bob McConnaughey (NMFS-AFSC) was planning to conduct research this summer to examine habitat differences between open and closed areas. Another fertile area for research was bio-economic analysis, including collection of cost data necessary for evaluating net national benefits. The Committee also felt that mitigation approaches (such as transplants, hatcheries, and artificial habitat) should also be examined as possible methods to rebuild crab stocks. The Committee discussed whether or not it should examine Gulf of Alaska crab stocks, but decided against it barring further Council direction.

The Committee discussed future meeting options for development of the rebuilding plan. It was suggested that the Council should consider making this a priority when assigning staff tasking. Another idea was to have the Council contract out the rebuilding plan and have the Committee review it. Dave Fluharty suggested that we schedule presentations and feedback sessions to the industry at night during the Council meeting. The Committee concluded that they should meet more frequently, whether in person or via e-mail or other means. One suggestion to reduce costs was to have the Teams meet jointly in Seattle in November during the Groundfish Plan Team meeting week.

In summary, the Rebuilding Committee prepared a general outline of a crab rebuilding plan. Information on red king crab, Tanner crab, and snow crab will be collected and reported based on the framework developed at this meeting. The Committee plans on meeting formally at least once per year to review progress, and to hold feedback sessions with industry during Council meetings. The rebuilding plan will be fleshed out over time, focusing first on Bristol Bay red king crab, then Bering Sea Tanner crab. From this plan, the Committee will be able to provide advice on current status of knowledge, research that could be done, management action that could be taken, and a best professional judgement of relative priority of these issues as they relate to crab rebuilding. At this juncture, the Committee is looking for input from the Council regarding the following items:

- ▶ Is the Terms of Reference agreeable to the Council?
- ▶ Should the Committee examine GOA crab stocks?
- ▶ How should industry be involved in the Committee process?
- ▶ How should the rebuilding plan be approached, through staff preparation or contract?

Others in attendance were:

*Lisa Polito
Hazel Nelson
Fran Bennis
Jeff Stephan
Henry Mitchell*

*Laure Jansen
John Gauvin
John Hendershedt
Craig Cross
Brent Paine*

*Earl Krygier
Clarence Pautzke
Tom Casey
John Iani
Kaja Brix*

DRAFT FOR COUNCIL and REBUILDING COMMITTEE REVIEW

**Additional Analysis for AMENDMENT 37
(Bristol Bay Red King Crab Savings Area)**

and an
ENVIRONMENTAL ASSESSMENT/REGULATORY IMPACT REVIEW/
INITIAL REGULATORY FLEXIBILITY ANALYSIS
FOR

AMENDMENT 41:

**Management of Red King Crab (*P. camtschaticus*),
Tanner Crab (*C. bairdi*), and Snow Crab (*C. opilio*) Bycatch Limits
in Bering Sea Groundfish Trawl Fisheries
and
Establishment of a Trawl Closure Area in
Nearshore Waters of Bristol Bay**

a proposed
Amendment to the Fishery Management Plan
for the
Groundfish Fishery of the
Bering Sea and Aleutian Islands Area

Prepared by staff of the
North Pacific Fishery Management Council
Alaska Department of Fish and Game

NOTE: The analysts have made every effort to provide the Council and Rebuilding Committee with a complete document to review in advance of the Council meeting. For the most part, we have accomplished this task, however we wish to provide additional information on the potential impacts of Management Measure 2 (PSC Limits) using the Bering Sea Fishery Simulation Model. Results of the model should be available by the Council meeting.

March 28, 1996

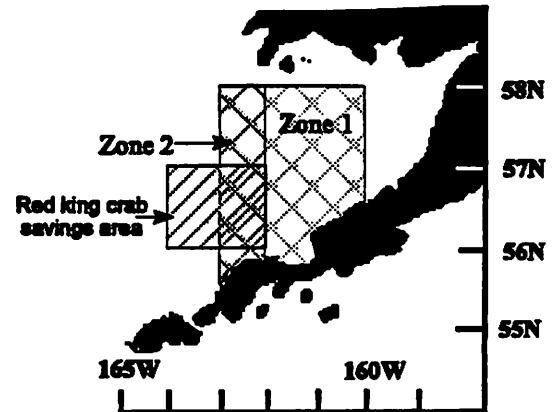
Executive Summary

Bering Sea crab stocks are currently at relatively low levels based on recent National Marine Fisheries Service (NMFS) bottom trawl surveys. Crab fisheries have been impacted by these low stock sizes, such that no Bristol Bay red king crab fishery occurred in 1994 or 1995, and harvests of Tanner and snow crabs have been much reduced. In January 1995, the Council initiated analysis of several proposals designed to reduce impacts of trawling on crab stocks and thus promote rebuilding of crab resources. The Council is considering three management measures for the current crab bycatch management regime for Bering Sea trawl fisheries. Specifically, these management measures are:

1. Revise the trawl closure time period for the Bristol Bay Red King Crab Savings Area;
2. Modify existing crab PSC bycatch limits, and initiate bycatch limits for snow crab; and
3. Close nearshore waters of Bristol Bay to trawling.

The Council requested that staff examine the suite of management measures in one package, so that the impacts of these measures can be analyzed in a comprehensive manner. These measures, and potential impacts and interactions, are described below.

Bristol Bay Red King Crab Savings Area: The non-pelagic trawl closure period adopted by the Council in September 1995 for Amendment 37 (Bristol Bay Red King Crab Savings Area) does not encompass the entire molting and mating period of red king crabs. The Bristol Bay red king crab stock remains at low abundance levels, and the Council recommended that NMFS implement an emergency rule to continue the closure through June 15, 1996. Because unobserved impacts of trawling on softshell crab may impact crab rebuilding and future crab harvests by pot fisheries, the Council requested additional information be examined before they reconsider the previous preferred alternative (January 1 - March 31) for Amendment 37.



Two main alternatives were examined. In addition to the status quo, Alternative 1, additional impacts of seasonal closures were examined. These alternatives and options are detailed below.

Alternative 1: Status quo, no action. Amendment 37 would be submitted to the Secretary based on the closure period adopted by the Council in September 1995. The Bristol Bay Red King Crab Savings Area (162° to 164° W longitude, 56° to 57° N latitude) would be closed to non-pelagic trawling from January 1 through March 31. The area bounded by 56° to 56°10' N latitude would remain open during the years in which a guideline harvest level for Bristol Bay red king crab is established.

Alternative 2: Extend closure period for the Bristol Bay Red King Crab Savings Area to provide increased protection for red king crab. Amendment 37 would be submitted to the Secretary based on one of the closure period options considered.

Option A: Six month closure. Close the Bristol Bay Red King Crab Savings Area to non-pelagic trawling from January 1 through June 15. The June 15 date corresponds to the opening date for Area 516, which is the area from 162° to 163° W longitude (closed March 15 to June 15 annually).

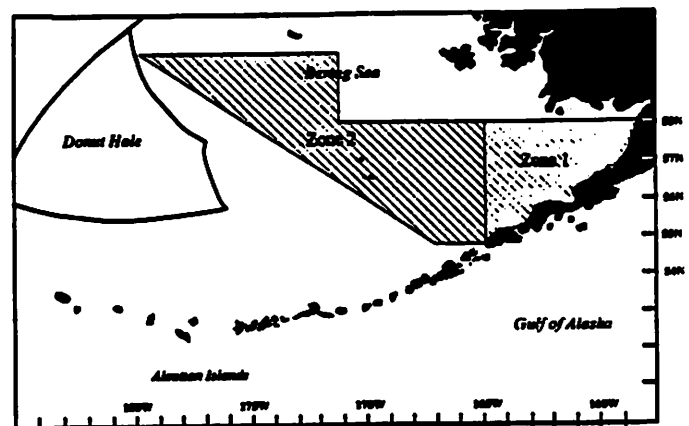
Option B: Year-round closure. Close the Bristol Bay Red King Crab Savings Area to non-pelagic trawling from January 1 through December 31.

As a supplement to Amendment 37 (Bristol Bay Red King Crab Savings Area) which examined a year round closure of the red king crab savings area, the Bering Sea Fishery Simulation model was run to estimate the net benefits to the nation from a three-month or a six-month closure to all trawling. As with the initial analysis, the model runs predicted no substantial change in net benefits to the nation under any closure option. Under the initial runs with an annual closure, the net benefits to the nation using 1993 data were estimated to increase by 1.4% for the Council's preferred alternative closure area (Alternative Area 3); known as the Red King Crab Savings Area. The net benefits to the nation were estimated to decrease by 2.3% under the same alternative using the 1994 data.

Examining the impacts of seasonal closures, the estimated net benefits to the nation under a three month closure increased by only approximately \$10,000 over an annual closure, and the six month closure caused a \$4,000 decrease in net benefits to the nation based on the 1993 data. Given the scale of revenues generated by BSAI fisheries, there is essentially no difference between these closure periods. Similarly, model runs with the 1994 data estimated the seasonal closures for the Red King Crab Savings Area changed the net benefits to the nation by a negligible amount of less than \$1,000 from an annual closure. There were no estimated differences in net benefits to the nation between a 3 month closure and a six month closure using the 1994 data which indicates no fishing activity in the area between March and July in 1994.

The additional analysis provided by the model was based on data from 1993 and 1994 when there was essentially no trawling in the closure area between April and June. Thus the model was unable to predict the magnitude of red king crab savings by extending the closure to June 15. However, in some years, Zone 1 has remained open to yellowfin sole trawling until May or June, and there remains a potential for vessels to trawl in the proposed area. Because this area contains a significant number of molting adult red king crab during this time period, Alternative 2 may reduce the potential for bycatch and unobserved mortality, which may be higher when crabs are in softshell condition.

Modify Existing Crab PSC Bycatch Limits, and Initiate bycatch limits for snow crab: Bycatch limits for red king crab and Tanner crab established for Bering Sea fisheries may be too high given current status of crab stocks, and bycatch may impact crab rebuilding and future crab harvests by pot fisheries. Bycatch limits for snow crab have not been established. Three main alternatives, developed by the Council's Advisory Panel and the State of Alaska, were examined. An additional option (Alternative 3, suboption A-1), proposed by the Alaska Crab Coalition in January 1996, was also examined at the request of the Council. The alternatives to the status quo included a reduced bycatch limit for crab and a crab PSC limit that fluctuates with crab abundance. Potential impacts of instituting a new bycatch limit for snow crab were also examined as an option. The alternatives and options were as follows:



Alternative 1: Status quo, no action. PSC limits would remain at 200,000 red king crab and 1,000,000 Tanner crab in Bycatch Limitation Zone 1, and 3,000,000 Tanner crab in Bycatch Limitation Zone 2.

Alternative 2: Reduce PSC limits of red king crab and Tanner crab. PSC limits would be reduced to a fixed level at 180,000 red king crab based on a three year average (1992-1994), and 900,000 Tanner crab in Zone 1, and 2,100,000 Tanner crab in Zone 2 based on a two year average (1993-1994).

Option A: Further reduce the red king crab PSC limit in Zone 1 to 35,000 crab, which was the number of red king crab bycaught in 1995 within Zone 1.

Option B: Establish a PSC limit for snow crab. Based on a three year average (1992-1994), a PSC limit would be established at a fixed level of 11,000,000 snow crab in Zone 2. No snow crab PSC limit would be established for Zone 1, as bycatch in this area has been miniscule by comparison.

Alternative 3: Establish PSC limits for crab that fluctuate with crab abundance. Annual PSC limits would be set as a percentage of the total population indexed by the NMFS bottom trawl survey. Limits would be established based on a rate specified, within the range 0.25-1.0% of red king crab in the Bristol Bay District, and 0.25-2.0% of Tanner crab in the Eastern District, as indexed by the survey. For Tanner crab, 25% of the total limit would be set as the limit for Zone 1, and 75% of the total for the Zone 2 limit.

Option A: Set a fixed upper limit for PSC at 200,000 red king crab and 1,000,000 Tanner crab in Zone 1, and 3,000,000 Tanner crab in Zone 2.

suboption A-1: Establish PSC limits for Tanner crab based on abundance thresholds. The following is an example of this type of bycatch measure. Limits would be set as a percentage of population when abundance is less than 100 million crab. In years when Tanner crab abundance is more than 100 million, but less than 250 million, PSC limits would be established at 850,000 Tanner crab in Zone 1, and 1,500,000 in Zone 2. In years when Tanner crab abundance is more than 250 million, but less than 500 million, PSC limits would be established at 900,000 Tanner crab in Zone 1, and 2,300,000 in Zone 2. In years when Tanner crab abundance exceeds 500 million, PSC limits would be established at 1,000,000 Tanner crab in Zone 1, and 3,000,000 in Zone 2.

Option B: Establish a PSC limit for snow crab as a percentage of the eastern Bering Sea total population indexed by the NMFS bottom trawl survey. Limits for Zone 2 would be set at a percentage within the range 0.005 to 0.25% of the snow crab population index (all districts combined). No snow crab PSC limit would be established for Zone 1.

Suboption B-1: Set fixed upper limit for PSC at 12 million snow crab in Zone 2.

The biological impacts of this management measure on crab populations were measured on the basis of adult equivalents. The adult equivalent formula incorporated data from groundfish and crab fisheries including bycatch numbers, size and sex of catch and bycatch, discard mortality, and natural mortality. Results indicated that, assuming only observed crab are impacted, bycatch in groundfish fisheries has relatively small impact on crab populations, and therefore reducing PSC limits as proposed under Alternatives 2 and 3 may not drastically improve or rebuild crab stocks. For example, under the most restrictive PSC limit considered for red king crab

(Alternative 2, Option A), the abundance of female spawning stock would be expected to be about 1.5% higher than under Alternative 1, based on average bycatch 1993-1995. It should be noted, however, that any reduction in mortality would slow the decline of the Bristol Bay stock. PSC limits for Tanner crab proposed under Alternative 2 would increase female spawning stock by about 0.38%.

The economic impacts of this management measure depend on the alternative chosen. If the Bristol Bay Red King Crab Savings Area is approved as an FMP amendment, reduced PSC limits for red king crabs in Zone 1 (as proposed under Alternative 2) may not further impact trawl fisheries, as bycatch was at or below this level in 1995 and 1996. For Tanner crab, recent data indicated that the current PSC limits (status quo) could be reduced from existing levels, yet not impact groundfish fisheries if the available PSC is optimally allocated. However, because PSC allocation becomes fixed for the year during the annual specification process, optimal allocation may be impossible to achieve. Bycatch of Tanner crab was much reduced in 1995, suggesting that the PSC limit proposed under Alternative 2 Option B may be achievable without substantially impacting trawl fisheries. The major assumption regarding assessment of impacts for Alternative 2 is that crab stock abundance will remain relatively stable in future years.

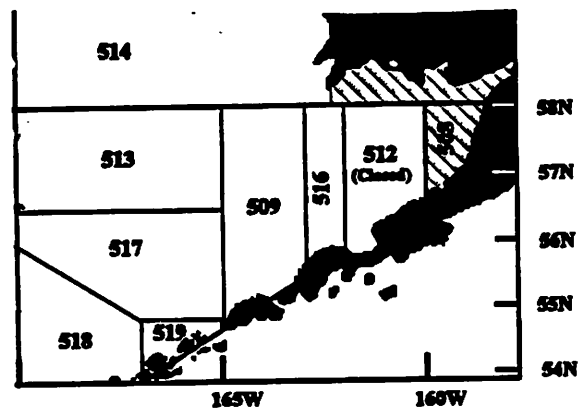
The impacts of Alternative 3 depend on the PSC rate chosen for each crab species. On average 1992-1995, groundfish fisheries bycaught crab at the following rates (bycatch as percentage of total crab survey abundance): red king crab (Zone 1, 0.40%), Tanner crab (Zone 1, 0.39%; Zone 2, 0.79%), snow crab (Zone 2, 0.10%). As with other alternatives, PSC limits set at these rates (current bycatch use) would not impact groundfish fisheries if the available PSC is optimally allocated. Fixed upper limits proposed by Alternative 3, Option A and suboption B-1 would further constrain trawl fisheries when crab abundance is high. The threshold limits proposed under Alternative 3, suboption A-1 may also do the same. The potential benefit of threshold limits is that while they allow bycatch levels to fluctuate with crab abundance, they also would temper year-to-year variability in PSC limits caused by trawl survey abundance estimates. Some stability may also be beneficial to long-term financial planning for trawl companies.

Nearshore Bristol Bay Trawl Closure Area: Existing trawl closure areas in Bristol Bay were designed to protect adult and sub-adult red king crab from trawling. However, protection of juvenile habitat, which may be negatively impacted by trawling, may provide for improved recruitment and subsequent stock rebuilding. A trawl closure area may also provide additional protection for Pacific herring and Pacific halibut. In addition to the status quo, Alternative 1, the impacts of prohibiting trawling in two areas were examined.

Alternative 1: Status quo, no action.

Alternative 2: Establish a Northern Bristol Bay Closure Area, which would prohibit all trawling, on a year-round basis, in the area east of 162° W longitude and north of 58° N latitude.

Alternative 3: Prohibit all trawling in Bristol Bay, on a year-round basis, in the area east of 162° W longitude. Because much of Bristol Bay (statistical area 512) is already closed to trawling year-round, the additional area encompassed by this alternative is statistical area 508 in eastern Bristol Bay and the area described under Alternative 2.



This analysis suggests that a nearshore trawl closure area designed to protect juvenile red king crab habitat may be a significant action managers can take to maintain and possibly increase recruitment of red king crab. Young-of-the-year red king crab require cobble or living substrate (such as stalked ascidians, sea onions, bryozoans) on which to settle and provide protection from predators. Much of this habitat is already protected by the area 512 trawl closure. Additional habitat for age-0 red king crab has been found to occur in the shallow waters (<50 m) of Area 508, and in the area north of 58° N latitude. By age 2, juvenile red king crab begin to form pods in deeper water (>50m) adjacent to settlement areas in Bristol Bay. Although Alternative 2 encompasses some habitat and podding areas, Alternative 3 would provide maximum habitat protection for young red king crab of the Bristol Bay stock. A trawl closure area in nearshore Bristol Bay may also provide some additional benefits for seabirds, herring, halibut, and marine mammals, but potential benefits remain unquantified.

Yellowfin sole are targeted by trawl fisheries in Bristol Bay (concentrated to the west of Cape Constantine), and consequently this fishery would be somewhat impacted by the proposed closure areas, particularly the northern Bristol Bay area (Alternative 2). A high of 50% of the yellowfin sole observed catch was taken in 1991 in Bristol Bay, however, this percentage has declined annually until only 2% of the directed catch was taken in Bristol Bay in 1994. The percentages of prohibited species bycatch taken in the Bristol Bay area are generally similar to the catch percentages with the exception of herring which generally constitutes a very high percentage of the total yellowfin sole bycatch of herring.

Estimates based on the Bering Sea fishery simulation model indicate that adoption of any of the Alternatives would lead to a slight decrease in the net benefits to the Nation over status quo based on both the 1993 and 1994 data. The approximately \$1.1 million decrease in net benefits (1993 data) and \$1.3 million decrease in net benefits (1994 data) result in approximately a 0.4% and a 0.5% decrease of the net benefits to the Nation under status quo from 1993 and 1994 data, respectively. Given the accuracy inherent in the data, and in the model procedures, these predicted changes in net benefits to the nation are probably not great enough to indicate an actual change from status quo. As with any closure, the tradeoffs between foregone groundfish catch, and savings in bycatch species are apparent in the model results. A closure of northern Bristol Bay would result in a slight decrease in retained catch and herring bycatch and an increase in Tanner crab bycatch. The minimal directed fishing activity in Area 508 during 1993 and 1994 resulted in minute changes in the model results due to the closure of this area.

**DRAFT Minutes of the
Bering Sea/Aleutian Islands Crab Plan Team
Meeting, April 3, 1996**

Members Present:

Ron Berg (NMFS)
Josh Greenberg (UAF)
Ken Griffin (ADF&G)
Rance Morrison (ADF&G)
Peggy Murphy (ADF&G, chair)

Bob Otto (NMFS)
Doug Pengilly (ADF&G)
Jerry Reeves (NMFS)
Tom Shirley (UAF)
Dave Witherell (NPFMC)

The Bering Sea/Aleutian Islands (BSAI) Crab Plan Team met in Anchorage on April 3, 1996. The Team meeting was conducted based on the following agenda:

Introductions
Review draft Crab FMP
Adopt/Endorse Plan Team Terms of Reference
Approval of 12/14/95 minutes
Review Council action on Bristol Bay red king crab protection area
Review recent BOF actions pertaining to Category 2 measures
Review ADF&G technical papers on LBA and harvest strategies
Additional topics for discussion
Upcoming meetings
Other Discussion

The meeting began with introductions of team members and public present. The draft agenda was approved and several topics were added for discussion. The Team also met for 3 hours on Thursday night, April 4, to review the draft EA/RIR on Crab Bycatch Management.

Crab FMP

The Team continued work on updating the Crab FMP. Revisions are of a housekeeping nature and will not affect the management of crab fisheries. The State/Federal Action Plan was substituted for the old Joint Statement of Principles. Ken Griffin suggested we include in the FMP information on the BOF petition policy for Category 2 measures. The Team concurred, and a paragraph will be inserted in the section "Petitions to the Board" (p. 49), and referenced in the section "At the Board Meeting" (p. 39). Jonathan Pollard (NOAA GC) provided numerous suggested revisions for the Team to consider, and the Team concurred with all of them. Jon thought that we should keep an eye on S 39, and make appropriate changes to the FMP when it is passed. [S 39 contains the language that would extend the State's jurisdiction into the EEZ for vessels not registered with the State]. Additionally, Jon informed the Team that he was looking into language currently in the FMP that mandates the state give priority to subsistence under State law. This may not be correct, and the team wants to fix any errors regarding this matter. Peggy noted that Amendment 1 (overfishing definition) used $M=0.25$ for snow crab, but the FMP reported $M=0.30$; she was planning to look into this and supplement the Amendment EA/RIR and provide explanatory text to include in the FMP, if necessary. Other recommended changes were more editorial in nature. All tables and figures showing "current" state management measures (Table 8.2; Figures 2.2, 2.3, 8.1) would be moved to appendix E with the year defined. Similarly, State management measures would be updated based on recent BOF actions. Several minor edits (such as spelling errors) were found and changed. All of these changes will be made for the next draft, and the Team will meet via teleconference when a draft is ready. The final draft will be presented as a plan amendment for review by the Council in September.

The team discussed updating Table 8.2. This is the table listing information on the size at maturity for BSAI king and Tanner crabs. After considerable discussion, it was decided that this would be a major undertaking, as maturity can be described by gonadal maturity or functional maturity. Bob noted that for opilio crab, for instance, maturity was highly variable and affected by cohort size and environmental conditions. There are difficulties in describing average size of maturity. A workgroup consisting of Bob, Tom, and Doug was formed to examine Table 8.2 and provide updated information for the Team meeting this fall. Any changes recommended by the work group would be included in a future housekeeping amendment. Updated information on size at maturity, given our current knowledge, will be provided in the first amendment, however.

Terms of Reference, Minutes

The Team adopted Terms of Reference to define the Team's membership, organization, and functions. No revisions were made to the December 29, 1995 draft. The team also discussed when to present the crab plan team report and SAFE results to the Council. It was decided that the most appropriate time would be at the Joint BOF/Council meeting in January. The team would continue to meet in September/October to review GHs, and coordinate preparation of the SAFE, however. Minutes of the previous meeting were approved with minor revision.

Board of Fisheries and Council Action

Ken Griffin provided a summary of actions the Board of Fisheries (BOF) took at their March meeting, and previous actions taken to protect Bristol Bay red king crab. In March, the BOF adopted the following measures: (1) new gear restrictions (escape rings or minimum mesh size) for brown king crab, Tanner crab, and snow crab fisheries; (2) regulations mandating that pots used in the Adak/Dutch Harbor area (combined to form Aleutian Islands king crab registration area) be longlined as a way to reduce lost pots; (3) changes to season opening dates (September 1 for Aleutians brown king crab) and closing dates (EO for St. Matthew king crab rather than fixed date); (4) changes regarding landing provisions and delivery times, pot storage areas, and tank inspection times. Future issues for the BOF include: reducing the minimum size of Bristol Bay red king crab to 6" CW, establishing pot limits in the Aleutian Islands area, adjusting observer coverage, and possible changes in gear regulations designed to reduce bycatch and handling mortality. It was noted that the BOF passed a resolution urging the NPFMC to close the Red King Crab Savings Area year-round to non-pelagic trawling, and to close all nearshore areas east of 162° W in the eastern Bristol Bay area to all trawling.

Peggy Murphy opened the floor for questions and discussion of the LBA model and the new harvest strategy for Bristol Bay red king crab. Industry questioned what additional factors and criteria are considered when deciding to open or close the Bristol Bay fishery. ADF&G staff noted that additional factors such as fishing effort, CPUE, relative abundance, trends, GHs, crab shell condition, MSY, timeliness and accuracy of survey data, and general stock condition were all taken into account when determining if a fishery should be opened, even if the threshold criteria are met. It was felt that this procedure was consistent with the goals and objectives of the FMP. The team concurred with the management principle that the resource comes first. The team recommended that ADF&G and NMFS provide a better explanation of how GHs are established and what factors are taken into account if a fishery is closed. The team also noted that under the FMP, harvests over the overfishing definition must be prevented, and some level of risk analysis should be taken into account. The team recommended that ADF&G and NMFS (Research Planning Group) examine how new and additional information can be used in the GHs setting process.

Industry also questioned how handling mortality was taken into account in the harvest strategy. The model used to develop the harvest strategy incorporated a handling mortality factor of 20%. Industry felt this might be high relative to handling mortality studies. Tom Shirley and Bob Otto briefed the team on their laboratory experiments of handling mortality of red king crab and bairdi crab. Both indicated very low mortality even when subjected

to repeated dropping or shell damage. Peggy clarified that the handling mortality factor used in the model incorporates unobserved mortality from gear, predation, and other losses that cannot be modeled in a laboratory.

The team briefly discussed observer data on crab bycatch in groundfish fisheries. Ron noted that NMFS now publishes on the Bulletin Board individual vessel bycatch data at the request of industry. Some vessels consistently have high bycatch rates; these vessels have been referred to by the industry as "the dirty dozen". Team members had expressed concern about accuracy and precision of bycatch estimates from basket sampling. Ron noted that an RFP was awarded last year, and the observer sampling methodology is currently under evaluation. Results are expected early next year.

Evaluation of EA/RIR on Crab Bycatch Management

The Team met the evening of April 4 to review the draft EA/RIR of proposed crab bycatch management measures, dated March 28, 1996. Dave Witherell had summarized the background of the three crab bycatch management measures discussed in the document to the Crab Rebuilding Committee earlier in the day. Team discussion focussed on additional questions and recommendations regarding Alternatives. Due to time constraints, the Team reviewed only management measures 1 and 2. Management measure 1 considers alternative time periods for the Bristol Bay Red King Crab Savings Area trawl closure that was adopted under Amendment 37. Management measure 2 considers potential changes to crab PSC management, including proposed bycatch limits for snow crab.

The team reviewed the alternative options for time period closures of the Red King Crab Savings Area. Much of this information was also discussed by the Crab Rebuilding Committee and was captured in the Committee report, and in the interest of space won't be repeated. The Team recommended that the Council Adopt Alternative 2, Option B for a year-round closure in the Bristol Bay Red King Crab Savings Area. Team members were convinced that the impacts of trawling in this area are greater than just the number of crab counted as bycatch. Rance noted that the stock is at the precipice of a major collapse, and stressed that uncertainty relative to unobserved mortality should be of grave concern. The team concurred, and continues to have serious conservation concerns about this red king crab stock. Because crab distribution may change over time, the team also recommends that the plan team monitor distribution as part of their regular SAFE review, such that the closure area could be altered or even eliminated if and when the situation changes.

The team briefly reviewed alternative options for crab bycatch limits in groundfish fisheries. Bob Otto reviewed potential problems with Alternative 3, in that it is dependent upon the trawl survey index of all size groups. He didn't think this was the approach to take because minor changes in survey station or crab distribution can create major changes in the survey population estimate. This is because the population index is dominated by small animals (true for all 3 species) and survey estimates of small crab and their distribution are highly variable from year to year. This creates problems because annual PSC limits could be set disproportional to the abundance of the size of crab taken in trawl fisheries (which take larger crab as bycatch). Of concern is the potential for a high PSC limit generated by large numbers of juveniles. A similar concern occurs at the opposite extreme where an artificially low PSC limit could needlessly constrain trawl fisheries. The Team concluded that Alternative 3 for PSC limits would have less problems if PSC limits were based on the survey abundance of large crab. The Team also agreed that bycatch numbers should be negotiated by industry representatives, as scientists can only provide some of the information required for allocative evaluations.

The meeting concluded at 10 p.m. on April 4.

Others in attendance on April 3 were Tom Casey, Henry Mitchell, Brent Paine, Lauri Jansen, and Jeff Stephan

Alaska Board of Fisheries
Action to Protect
Bristol Bay Red King Crab

1. Concurrent *C. bairdi* and red king crab fishery openings (allows retention of these concurring species and reduces handling of non-target crab).
2. Reduction of Tanner crab pot tunnel eye opening from 5 to 3 inches.
3. Closure of the area east of 163° West Longitude after the conclusion of the red king and *C. bairdi* fisheries. (To minimize bycatch of red king crab).
4. March 31 closure on *C. bairdi* Tanner crab to protect molting red king crab.
5. Mandatory closure of *C. bairdi* Tanner crab East of 163° West Longitude when the Bristol Bay red king crab fishery is closed.
6. Bristol Bay red king crab harvest strategy: (Codifies a threshold and reduces exploitation rates to rebuild and maintain stock productivity).
7. Total closure of the fishery for the 1994 and 1995 seasons.

**Board of Fisheries
Action for
Bering Sea/Aleutians Crab Fisheries**

1. **Board of Fisheries Policy on King and Tanner Crab:**
 - a. **maintain stocks of multiple sizes and ages of mature crabs to sustain reproductive viability and to reduce industrial dependency on annual recruitment.**
 - b. **routinely monitor crab resources so that harvests can be adjusted according to stock productivity.**
 - c. **protect the stock during mating, molting and egg hatch periods.**
 - d. **Minimize handling mortality of non-legal crabs.**
 - e. **maintain adequate brood stock to rebuild the population when it is depressed.**
 - f. **establish management measures based on the best available information for each area.**
 - g. **establish regulations for an orderly fishery.**
2. **Endorsement of the Westward Region Fishery Management Plan.**
3. **Adopted a resolution to encourage the Council to take appropriate action to close the Bristol Bay red king crab savings area year-round to non-pelagic trawling and to close all near shore waters of Bristol Bay east of 162° West Longitude to all trawling.**
4. **Male retention only.**
5. **Minimum size limits.**
6. **Established pot limits in both the king and Tanner crab fisheries.**
7. **Identified critical life cycles for king and Tanner crab and established biological seasons from which to conduct commercial fisheries.**
9. **Established escape mechanisms for pots:**
 - a. **Increased the pot mesh size requirement beginning in the 1995 fishery.**
 - b. **biodegradable twine requirements (from 120 to 30)**

c. escape rings

10. Require observers on all processing vessels to obtain on grounds biological information and monitor inseason fishery performance.

11. Observers on catcher boats in the Aleutians, deep water king and Tanner crab permit, and haircrab fisheries.

12. Require longlinning of pots in the deep water brown king crab fisheries in the Aleutians.

13. Norton Sound: (harvest rate set at 1/2 the rate of other BSAI king and Tanner crab fisheries.

a. closed area to 15 miles off shore.

c. designated as super-exclusive area



UNITED STATES DEPARTMENT
National Oceanic and Atmospheric
National Marine Fisheries Service
 P.O. Box 21668

AGENDA C-2(a) :
 APRIL 1996
 Supplemental

Juneau, Alaska 99802-1668

April 9, 1996

Clarence Pautzke, Executive Director
 North Pacific Fishery Management Council
 605 West Fourth Avenue, Suite 306
 Anchorage, Alaska 99501-2252

Dear Clarence:

The Council has scheduled for its April 1996, meeting a review of crab bycatch amounts in the Gulf of Alaska under agenda item C-2(a). Attached for the Council's information is a table that summarizes bycatch amounts of Tanner crab and red king crab in the groundfish trawl fisheries during 1994 and 1995.

About 34,000 and 48,000 Tanner crab (all species) were taken in the 1994 and 1995 trawl fisheries, respectively. Most of these (75% and 59%) were caught in the flatfish fisheries. The shallow water flatfish fishery represented the largest proportions (32% and 65%) of the Tanner crab bycatch in the flatfish fisheries. In 1995, a substantial proportion (32%) of Tanner crab was also taken in the Pacific cod trawl fisheries.

During 1994 and 1995, 45 and 219 red king crab, respectively, were caught in the Gulf of Alaska trawl fisheries. As with Tanner crab bycatch, most of the red king crab (93% and 94%) were caught in the flatfish fisheries. The shallow water flatfish fishery again represented the largest proportions (93% and 72%) of the red king crab bycatch in flatfish fisheries.

No crab bycatch limits are established for the Gulf of Alaska trawl fisheries. Certain time/area closures however, are in effect to protect sensitive crab habitat near Kodiak Island. The attached figure shows their locations. Regulations close Type I areas year round and Type II areas from February 15 to June 15 of any year.

NMFS staff will be available during the Council meeting to discuss crab bycatch issues as necessary.

Sincerely,

Steven Pennoyer
 Director, Alaska Region



GOACRAB

Crab bycatch in Gulf of Alaska trawl groundfish fisheries, during 1994 and 1995.

Source: NMFS Alaska Region data as of April 9, 1996

A	Atka mackerel	10	0	0	0
B	Bottom pollock	977	3,926	0	0
C	Pacific cod	4,529	15,173	3	14
D	Deep-water flatfish	2,404	1,040	0	0
H	Shallow-water flatfish	8,201	18,483	42	148
K	Rockfish	2,916	196	0	0
L	Flathead sole	6,734	3,295	0	57
O	Other	0	0	0	0
P	Midwater pollock	7	9	0	0
S	Sablefish	70	216	0	0
W	Arrowtooth flounder	3,795	3,252	0	0
X	Rex sole	4,497	2,113	0	0
	Totals	34,141	47,703	45	219

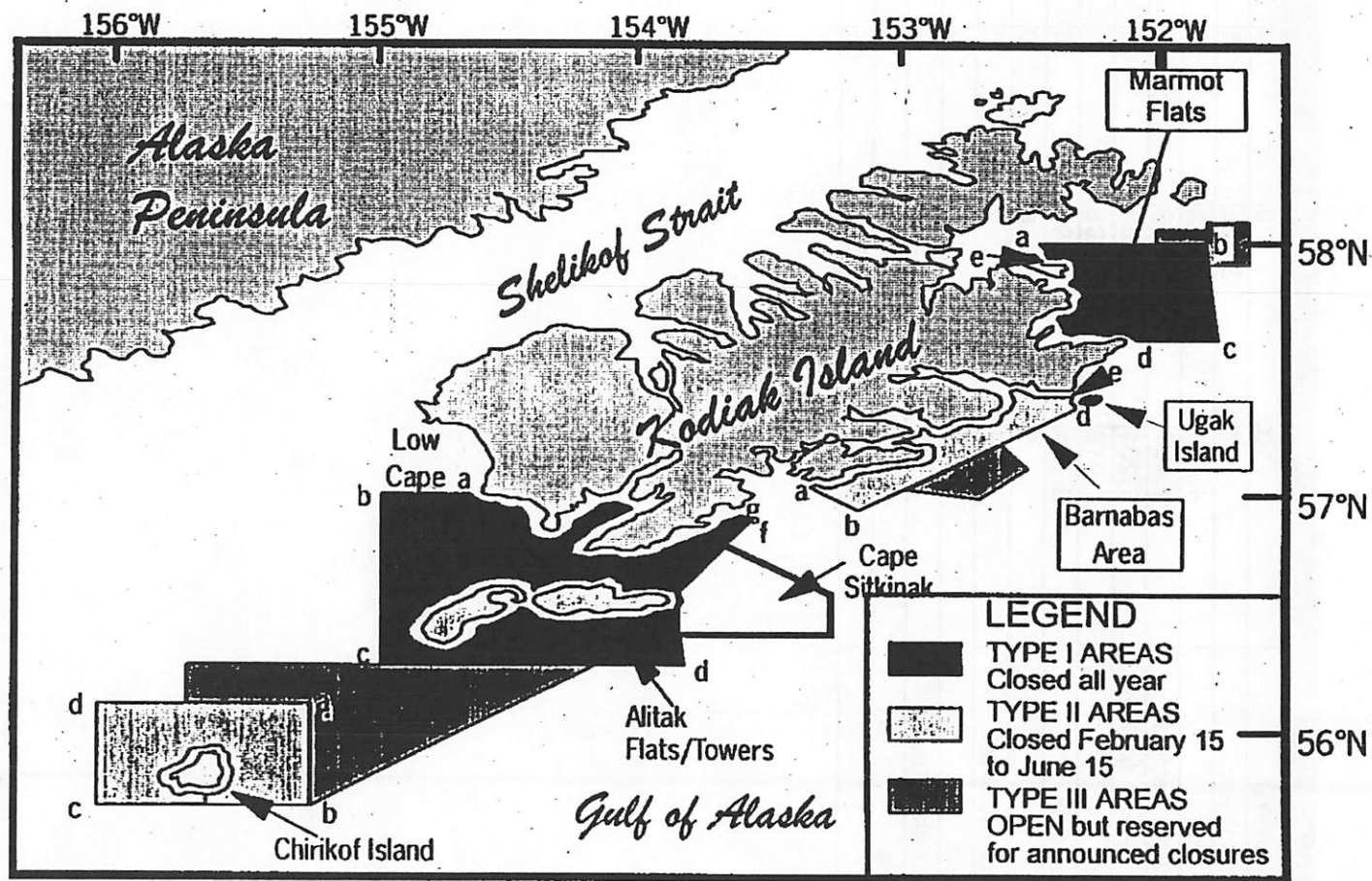


Figure 5. Kodiak Island Areas Closed to Non-pelagic Trawl Gear
a. Map

9/94

Proposed Crab Bycatch Management Measures Under Consideration By the NPFMC

Revise time period for Bristol Bay Red King Crab Savings Area

- January 1- March 31
 - ✓ adopted by Council in Sept 95 to reduce bycatch in rock sole fishery
- January 1 - June 15
 - ✓ adopted by the Council in Jan 96 to protect molting crabs in YFS fishery
- January 1 - December 31
 - ✓ considered for maximum protection

Modify existing crab PSC bycatch limits for trawl fisheries, and initiate bycatch limits for snow crab (opilio). Current crab bycatch limits are 200,000 red king crab and 1 million Tanner crab in Zone 1, and 3 million Tanner crab in Zone 2.

- Reduce bycatch limits for red king and Tanner crab, and establish opilio limit
 - ✓ 35,000 or 180,000 red kings in Zone 1
 - ✓ 900,000 Tanner in Zone 1 and 2,100,000 Tanner in Zone 2
 - ✓ 11,000,000 opilio in Zone 2
- Base bycatch limits for red king, Tanner, and opilio on annual abundance estimates
 - ✓ 0.25% to 1% of abundance for red king crab
 - ✓ 0.25% to 2% of abundance for Tanner crab
 - ✓ 0.005% to 0.25% of abundance for opilio crab
- Combination of fixed and floating bycatch limits
 - ✓ Base limits on abundance at low stock sizes, cap the limits at high stock size
 - ✓ Base limits on abundance thresholds, "stairstep limits"

Establish a trawl closure area in nearshore waters of Bristol Bay to protect juvenile red king crab habitat.

- Close the northern section, east of 162° and north of 58°
 - ✓ alternative proposed by Council in Jan 95
- Close all nearshore areas east of 162°
 - ✓ encompasses all known juvenile red king crab habitat in Bristol Bay

Measure 1: Revise time period for Bristol Bay Red King Crab Savings Area**Summary of Impacts:**

- Biological
 - ✓ Savings Area contains a high percentage of adult king crab stock (40% of the mature male stock, 17% of the mature females)
 - ✓ Some crabs in softshell condition January through June
- Economic
 - ✓ no change in net benefits between 3, 6, or 12 month closure (1993, 1994 data)

Measure 2: Modify existing crab PSC bycatch limits for trawl fisheries, and initiate bycatch limits for snow crab (opilio).**Summary of Impacts:**

- Biological
 - ✓ Bycatch accounts for relatively small proportion of total mortality
 - ✓ Bycatch has largest impact on male Tanner crab (4.73%) and least impact on female opilio crab (0.12%) stocks.
- Economic
 - ✓ Crab bycatch (males) worth \$10.5 million per year to directed crab fisheries
 - ✓ Impacts to trawl fisheries depend on PSC allocation among fisheries, crab stock trends, other regulations, and Alternative bycatch limit (Alt 2) or rate (Alt 3) chosen relative to status quo. Average bycatch in groundfish fisheries, 1992-1995, shown below.

Crab PSC limits based on average bycatch, 1992-1995.

	(Zone 1)	(Zone 2)
Red king crab	149,000	-
Tanner crab	968,000	2,027,000
Snow crab	-	9,170,000

Crab PSC rates based on average bycatch, 1992-1995, and survey abundance index.

	(Zone 1)	(Zone 2)
Red king crab	0.40%	-
Tanner crab	0.39%	0.79%
Snow crab	-	0.10%

Measure 3: Establish a trawl closure area in nearshore waters of Bristol Bay to protect juvenile red king crab habitat.**Summary of Impacts:**

- Biological
 - ✓ Red king crab nursery habitat found in nearshore areas (< 50 m) of Bristol Bay.
 - ✓ Most habitat protected by Area 512 closure, additional habitat found in Area 508 and to a lesser extent in northern Bristol Bay near Hagemeister Island.
 - ✓ Slight reduction in herring bycatch, and slight increase in Tanner crab bycatch predicted by model.
- Economic
 - ✓ Area has provided high catch of yellowfin sole in some years.
 - ✓ Slight reduction in retained catch predicted by model.
 - ✓ Overall, no change in net benefits to the Nation predicted by model.

Crab Rebuilding Committee Recommendations on Crab Bycatch EA/RIR

Measure 1: Revise Time Period for Bristol Bay Red King Crab Savings Area

- If the Council's objective was to reduce mortality on softshell crab, a closure through July 1 would provide more protection. However, a year-round closure to bottom trawling could be justified as a way to protect habitat and reduce unobserved mortality. Regardless of what option is chosen, closure areas should be re-evaluated on a regular basis because crab abundance and distribution change over time.
- A full economic analysis of tradeoffs among crab and groundfish fisheries should be performed if possible when data become available.

Measure 2: Modify Existing Crab PSC Bycatch Limits

- The problem statement and list of alternatives should be presented separately for each crab species.
- Alternative 3 would have less problems if PSC limits were based on survey abundance of large crab rather than the total index of all size groups.
- The analysis provides sufficient information for industry representatives to negotiate bycatch limits.

Measure 3: A Trawl Closure Area in Nearshore Bristol Bay

- It would be prudent to prohibit trawling from areas containing juvenile red king crab habitat.
- The area between 159° and 160°W, and north of 58°N should be included as a suboption to continue trawling in this area.
- The regulation allowing trawling for Pacific cod off Port Moller should be repealed given new information on juvenile habitat and red king crab stock status. The required regulatory amendment language could be rolled into the EA/RIR for Amendment 41.

Crab Rebuilding Committee Terms of Reference

Membership: Representative members from BSAI crab and groundfish plan teams meet together under direction of Committee chair Dave Fluharty.

Problem Statement: Status of red king crab is depressed, and BSAI Tanner and snow crab are in low abundance.

Objective: Develop comprehensive plan to rebuild Bering Sea crab stocks and reverse stock declines.

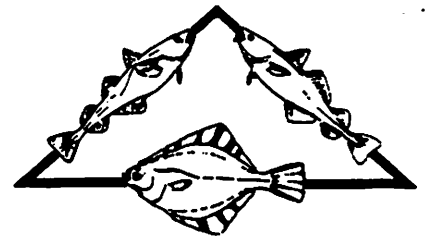
Focus: Evaluate sources of mortality due to interaction of crab and groundfish fisheries, and evaluate potential management measures to reduce mortality. Measures may include closed areas, bycatch management regime, and ecosystem impacts.

Approach to Rebuilding Plan

		<u>Rebuilding Plan</u>				
<u>Mortality Sources</u>		<u>Concern</u>	<u>Knowledge</u>	<u>Study</u>	<u>Council Action</u>	<u>Priority</u>
Crab Fishery						
Bycatch						
Other						
	unobserved					
	lost gear					
Predation						
Competition						
Parasites/Disease						
Habitat						
	critical					
	fishing impact					
	physical env.					

Guidance from Council

- Is the Terms of Reference agreeable to the Council?
- Should the Committee examine GOA crab stocks?
- How should industry be involved in the Committee process?
- How should the rebuilding plan be approached, through staff preparation or contract?



**TANNER CRAB AND KING CRAB BYCATCH IN THE GULF OF ALASKA BY
TRAWL, POT AND LONGLINE GEAR**

OVERVIEW AND DISCUSSION

PREPARED MARCH 8, 1996

ALASKA GROUND FISH DATA BANK

**CHRIS BLACKBURN, DIRECTOR,
AND JULIE BONNEY, ASSISTANT ANALYST**

INTRODUCTION

TO THE OVERVIEW AND DISCUSSION OF TANNER CRAB AND KING CRAB BYCATCH IN THE GULF OF ALASKA BY POT, LONGLINE AND TRAWL GEAR

At the January 1996 meeting of the North Pacific Fishery Management Council a Council member requested that the Council review crab bycatch in the Gulf of Alaska at the April meeting to determine if consideration of additional or revised crab bycatch control measures are warranted.

Crab protection areas were implemented in the Central and Western Gulf of Alaska state waters by the Alaska Board of Fish and in Federal Waters by the North Pacific Fishery Management Council in 1986. The management plan included a three year sunset clause to assure periodic review. During the review period in 1989 a new class of closures was incorporated into the crab protection plan to protect juvenile crab should a recruitment event occur. In 1992 Council staff suggested that the three year sunset provision be dropped to save staff time in the future. Kodiak fishermen agreed, in the interest of saving staff time, to support dropping the sunset clause.

It is certainly appropriate for the Council to review management measures on regular basis to assess how the measures are working and if changes in the fisheries, distribution of species or relative abundance suggest that the current management strategy should be altered, abandoned or replaced with an alternative strategy.

Because the ten minutes allowed for public testimony is inadequate to review, explain and comment on Gulf of Alaska crab issues, Alaska Groundfish Data Bank hopes that the members of the North Pacific Fishery Management Council, Advisory Panel and Scientific and Statistical Committee will have ample time to review this paper prior to the April North Pacific Fishery Management Council meeting.

It is not the intent of this paper to present an in-depth study of Gulf of Alaska crab management, crab bycatch or crab bycatch management. The intent is to provide an overview to assist the Council family in deciding whether crab bycatch in the Gulf of Alaska is a serious enough problem to merit further Council attention and analysis or if the current management system is providing adequate conservation.

ORGANIZATION OF THIS PAPER

Following the Table of Contents is a "Points Paper" summarizing Alaska Groundfish Data Bank's major points.

The Council motion was to review crab bycatch Gulfwide, all gears. The body of this paper starts by reviewing the current status of crab bycatch in each Gulf area for trawl, pot and longline gear and then focuses on the areas and gears where crab bycatch actually occurs. The discussion moves from an overview of current observer data to current management measures to protect Gulf crab stocks and then to associated issues such as data quality and mortality of crab taken as bycatch. An overview of the status of crab stocks in each Gulf management area and subarea is also included.

The appendices contain the tables and figures developed for this document.

GULF OF ALASKA CRAB BYCATCH - OVERVIEW

DATA SOURCES

Most of the data used was from existing Alaska Department of Fish and Game and National Marine Fisheries documents. A data request for 1995 crab survey data was submitted to Pete Probasco, Westward Region Director. A data request for observed crab bycatch rates and percentage of total observed catch plotted by 1 x 1/2 degree square for the 1993 and 1994 pot cod fishery, trawl cod fishery and trawl shallow flatfish fishery in reporting areas 620 and 630 was submitted to Bill Karp, head of the Alaska observer program, Alaska Fisheries Science Center. We thank both agencies for their timely and helpful responses.

GULF OF ALASKA CRAB BYCATCH - OVERVIEW

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APPENDIX I: 1994 AND 1995 TANNER AND KING CRAB BYCATCH DISTRIBUTION BY GROUND FISH REPORTING AREAS

APPENDIX II: GULFWIDE TOTALS - 1990-1994 - TANNER CRAB BYCATCH BY TARGET SPECIES AND GEAR TYPE, SUMMARY OF 1995 VESSEL BYCATCH RATES BY NAME AND VESSEL BYCATCH RATES BY NAME - 1995.

APPENDIX III: PREDATION ON TANNER CRAB - GULF OF ALASKA

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APPENDIX V: TANNER CRAB CATCH BY GULF OF ALASKA DISTRICT

APPENDIX VI: GRAPHS OF TANNER CRAB POPULATION ESTIMATES AND NUMBER OF LEGAL MALE CRAB

APPENDIX VII: CARAPACE WIDTH FREQUENCY GRAPHS - KODIAK DISTRICT BY SECTION - 1987-1994

APPENDIX VIII: 1 X 1/2 DEGREE SQUARE PLOTS OF OBSERVED CATCH, OBSERVED TANNER CRAB BYCATCH RATES AND OBSERVED HALIBUT BYCATCH RATES

GULF OF ALASKA CRAB BYCATCH - OVERVIEW

EXECUTIVE SUMMARY

1. **EXTENT OF CRAB BYCATCH:** Gulf wide bycatch of king crab 1991-1995 ranged from 1,065 crab to 72 crab. This number appears too small to merit any additional bycatch control measures. Tanner crab bycatch Gulfwide 1991-1995 ranged from 140,483 to 53,296 crab. While this too seems a small number, it is large enough to merit a review.
2. **STATUS OF GULF TANNER CRAB STOCKS:** Biomass estimates for all Gulf crab management areas were reviewed for the years 1990-1994. (Southeast Alaska is the only management district where crab are not surveyed). Results are shown in the table below:

MANAGEMENT DISTRICT	NET CHANGE - #CRAB 1990-1995	%CHANGE	1994 POPULATION NUMBER OF CRAB
KODIAK	-57,928,454	-75.00	19,304,868
PRINCE WILLIAM SND	-2,603,876	-77.02	776,986
COOK INLET	+259,544	+3.55	7,570,356
CHIGNIK	-7,128,889	-78.25	1,981,889
SOUTH PENINSULA	-20,945,082	-89.26	2,521,391

Most of declines shown above started with a very sharp decline during a one or two year period. Total estimated Gulfwide Tanner crab bycatch, all gears and targets, during the 1990-1994 period was 595,729 crab. Between 80 and 90% of that bycatch occurred in the Central Gulf, which means the groundfish fisheries bycatch was about 1% of the total Tanner crab decline 1990-1994. The Kodiak District landed commercial Tanner catch 1990-1993 was 2,076,280 legal male crab - 3.6% of the 1990-1994 total Tanner crab decline.. The Tanner crab fishery was closed 1994 and 1995.

It seems unlikely that either the Tanner crab fishery or the groundfish bycatch of Tanner crab could be implicated in the dramatic decline of the Tanner crab population.

It should also be noted that the rate of decline was the same in Prince William Sound which has minimal groundfish fishing of any kind, Kodiak which has an intensive groundfish fishery and Chirikof where groundfish fishing is light.

3. **PROTECTION OF THE REMAINING TANNER CRAB POPULATIONS:** Most of the fishing in the Kodiak area appears to occur, according to observer data, on the Eastside of Kodiak. The total Eastside Tanner crab stock in 1994 was 10,296,249 crab. Crab bycatch in the groundfish fisheries was an estimated 27,448 crab (all gears and targets), which represents 0.27% of the total estimated Eastside Tanner crab population. There may be reason to look at Tanner crab bycatch in each of the three Eastside management sections to determine if any section is being adversely affected.
4. **CURRENT CRAB PROTECTION MEASURES:** Extensive closures to bottom trawling to protect king crab were implemented in State and Federal Waters in 1986. Further closures which will be triggered when a crab "recruitment event" occurs were approved in 1989. In 1993 an area in the Sitkalidak area was closed by the Board of Fish for all but six weeks of the year. The 1989 EA/RIR for Amendment 13 to the Gulf of Alaska FMP (which extended the existing crab closures and added the protection for juvenile crab) stated that the existing crab closures "provide protection to 85% of the Kodiak red king crab stocks, protects about 75% of the Tanner crab stocks, protects the most highly concentrated crab areas all year round, yet may provide for the groundfish fishing opportunities necessary to support the economic base of Kodiak communities."

GULF OF ALASKA CRAB BYCATCH - OVERVIEW

If any changes in the distribution of king and tanner crab stocks have occurred since 1989, changes in the current closures to continue the protection offered by the 1989 closures may be warranted.

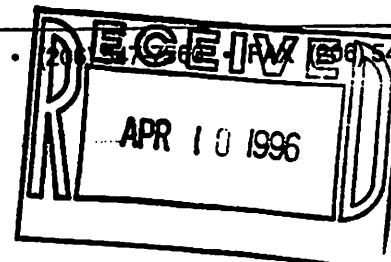
5. **PROBLEM WITH CAPS:** Since the current bycatch of Tanner crab is small, any area/gear specific cap would probably be a less than 25,000 crab -- a number which is so small as to be difficult to manage. Because Tanner crab stocks are managed by small area sections, groundfish reporting areas and observer requirements would probably have to be revised to match the crab section boundaries. There are other problems with caps detailed in Section 7: Other Issues.

6. Speculating about the cause of the Gulf crab declines provides much room for the imagination, but, similar to the sea lion declines, there is no clear explanation for the decline and the best that can be done is to protect the existing breeding stock, offer protection to juveniles when a recruitment event occurs to speed rebuilding and develop a rebuilding plan to implement when the stocks show signs of improvement. AGDB feels all these measures are currently in place and further management measures cannot be justified or expected to have an effect on crab stocks at this time.



ALASKA CRAB COALITION

3901 Leary Way (Bldg.) N.W., Suite #6 • Seattle, WA 98107 • 206-467-5470-130



DATE: April 9, 1996

TO: Mr. Clarence Pautzke,
Executive Director
North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, Alaska 99501-2252

FROM: Arni Thomson
Executive Director

RE: AGENDA ITEM C-2(d), COMMENT ON CRAB CLOSURES IN
BRISTOL BAY, AMENDMENT 41, GROUND FISH FMP, BSAI;
HISTORICAL REFERENCE POINTS, THE SOUTHEAST BERING
KING CRAB POT SANCTUARY

INTRODUCTION:

The recently concluded meeting of the North Pacific Fishery Management Council Crab Rebuilding Committee (for the Southeastern Bering Sea) is essentially revisiting historic conservation and allocation issues, that revolve around the development of trawling for groundfish, versus sustainability of pot, hook and line and limited driftnet and purse seine gear fisheries for crab, halibut and salmon. Of significance, the committee has incorporated a considerable body of new scientific information and fisheries management experience into its discussions that is not a part of the administrative record for Amendment 37 to the Groundfish Fishery Management Plan for the Bering Sea/Aleutian Islands.

The development of Alaskan and Pacific Northwest concern over unregulated offshore targeted exploitation of first the high value traditional species, then groundfish exploitation with retention of high value species as bycatch, dates back to the 1930s. Regulatory measures to prevent depletion of the fishery resources that inhabit the continental shelf off the coast of Alaska began with international fisheries agreements. Ronald C. Naab, Fisheries Management Supervisor, Bureau of Commercial Fisheries, Juneau, Alaska has recorded the precedental agreements in "The Role of International Agreements in Alaskan Fisheries," (Commercial Fisheries Review, Vol. 30, No. 10, Attachment 1.)

Mr. Naab notes the beginning of the treaties with an agreement to protect Northern fur seals in 1911, followed by the International Pacific Halibut Convention in 1924, the Inter-

national Whaling Convention in 1937, and the International North Pacific Fisheries Convention in 1953 to provide safeguards to three species of salmon.

HISTORIC ORIGINS OF THE "POT SANCTUARY":

It is within the context of Bilateral Agreements between the U.S. and the USSR and the U.S. and Japan from 1964 through 1977, that measures to protect king and tanner crab, halibut and salmon from exploitation and potential depletion by foreign fleets developed.

An area of particular concern, the near and offshore waters on the north side of the Alaska Peninsula became the focus of controversy between American and foreign fishing fleets in the early 1960s. This was due to overlapping abundance of commercially exploitable fishery resources of king and tanner crab, large concentrations of flounder species and juvenile halibut.

* May 1964, the U.S. enacted Public Law 83-308, the Bartlett Bill. This law prohibited foreign vessels from engaging in fisheries in U.S. territorial waters, or to take any Continental Shelf fishery resource that belongs to the U.S., except as provided by the Act or by an international agreement to which the U.S. is party. The precedent law defined Continental Shelf fishery resource to include "living organisms belonging to sedentary species; that is to say, organisms which, at the harvestable stage either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil." (Naab, Vol. 31, No. 6.) The U.S. prepared a list of organisms that qualified as Shelf resources and the list was published in the Federal Register. The listing included king and tanner crab and thus began initial measures to protect shellfish resources off the coast of Alaska.

* November 1964, Conclusion of the first Bilateral Agreement with Japan, followed by a similar agreement with the USSR. The agreement provided protection for the developing U.S. king crab fishery and initiated the first regulatory measures to safeguard the resource, which included: (1) quotas for the Japanese catches; (2) defined an area on the north side of Unimak Island where king crab fishing was restricted to the use of only pot gear; and (3) minimum mesh size was established for tangle nets and pots or tangle nets were the only gear allowed by the Japanese; minimum size of crabs taken was established and males only for retention. (See Naab, Figure 5.)

In December of 1964, a bilateral agreement between the U.S. and the USSR provided for the closure to trawling of six areas off Kodiak Island to protect the king crab fishery. These areas extended well beyond the 12 mile territorial fishery limit of the U.S., as did the the "pot sanctuary"

off the north side of Unimak Island.

Following the agreement with Japan in regards to king crab in the Southeastern Bering Sea, a similar agreement was reached with the USSR with almost identical provisions.

* October 1966, the U.S. Congress enacted Public Law 89-658. This legislation established a 9-mile contiguous fishery zone adjacent to the U.S. 3-mile territorial sea. "The law provides that the U.S. will have the same jurisdiction over fisheries within this newly created zone as it has within its territorial sea, subject to the continuation of "traditional" fisheries by foreign nations." (Naab, Vol. 30, No. 10, p. 53.) This law initiated the regulation of foreign fishing within 12 miles of the coast of the U.S. and it had major implications for foreign fishing off the coast of Alaska and helped protect not only king and tanner crab, but halibut and salmon.

* The pot sanctuary zone was expanded in 1968 when agreements with Japan and the Soviet Union were renegotiated. That change became effective in 1969 and the northern boundary changed from 55-28N to 55-54N. The Japanese government also prohibited trawling in an extensive area in the Eastern Bering Sea, including the pot sanctuary. Negotiations with the USSR that concluded in January 1969 resulted in the agreement on identical provisions with the Japanese agreement, including use of pot gear only in the pot sanctuary. The Soviets also agreed to refrain from trawling for other species within the sanctuary area.

Of particular interest to the Crab Rebuilding Committee in regards to the controversy over allowance of flounder fishing in the "pot sanctuary" area, Ron Naab notes in 1969 that the Soviet agreement on trawling "should be beneficial to U.S. fishermen in the area faced with interference by the large Soviet winter flounder fishing expeditions north of the Alaska Peninsula. (Ronald C. Naab, "Revisions of International Agreements Affecting Alaskan Fisheries," Commercial Fisheries Review, Vol. 31, No. 6. p. 34, Attachment 2.)

* The final expansion of the "pot sanctuary" occurred in 1975, when the U.S./Soviet fisheries agreement expanded the pot zone to its present configuration. The Japanese agreed to the same configuration. The final bilateral arrangements were carried forward in the foreign fishing regulations that implemented the Magnuson Act in 1977 and they remain in effect today. (Craig Hammond, NMFS Enforcement, Juneau, AK, correspondence to Arni Thomson, February 20, 1987, with attached chartlet on Foreign Fishing Regulations for the Bering Sea and Aleutian Islands, Attachment 3.)

* It is also worth noting that the International Pacific Halibut Commission recognizes the "pot sanctuary" zone as a significant halibut nursery area. In 1967, the IPHC

declared this area "a halibut nursery area" and closed it to directed fishing for halibut with longline gear. The rationale for the closure was to rebuild the Bering Sea halibut resource, as this area was known to contain large concentrations of juveniles. The boundaries of the closure area have changed only slightly since 1967, most recently in 1990 to allow for the establishment of a small commercial fishery within the nearshore Bristol Bay area. (NPFMC, Draft EA/RIR for BSAI Amendment 41, March 28, 1996, p. 95, Attachment 4.)

PASSAGE OF THE MAGNUSON FISHERY CONSERVATION AND MANAGEMENT ACT IN 1976, AND THE DEVELOPMENT OF DOMESTIC GROUND FISH TRAWL FISHERIES:

The passage of the MFCMA in 1976 resulted in the creation of eight regional fishery management councils in the U.S. and development of a whole new series of fishery management plans (FMPs) to not just regulate, but to encourage the development of domestic groundfish fisheries. This ushered in the period of "Americanization of groundfish fisheries" off the coast of Alaska.

To encourage the development of flatfish fisheries in the Southeastern Bering Sea by a fleet of small coastal trawlers, the North Pacific Fishery Management Council first allowed an experimental joint venture fishery in 1981 within the boundaries of the long established pot sanctuary.

The experimental flatfish fishery expanded following the collapse of the Bristol Bay king crab fishery in 1982 and in 1984, the NPFMC approved Amendment 1 to the Bering Sea/Aleutian Islands Groundfish FMP. Amendment 1 allowed year-round domestic trawling within the area. (NPFMC, 1995, Bering Sea Species Protection Areas, p. 14, Attachment 5.)

With the adoption of a single amendment to the Bering Sea FMP, 15 years of tediously negotiated international fisheries agreements structured for the protection of king and tanner crab, halibut, salmon and herring were dismantled to encourage the development of domestic flatfish and other groundfish commercial fisheries.

The passage of Amendment 1 created great consternation amongst crab and halibut fishermen concerned about exorbitant bycatches that were common knowledge through NMFS reports based on the foreign observer program. Fishermen were also concerned about the unobserved impacts of trawl gear to the benthic substrate.

Within one year of Amendment 1 being implemented, NMFS reported bycatches of king and tanner crab in the joint venture fisheries skyrocketed. King crab bycatch approached almost 1 million animals in 1995, at a time when overall abundance of king crab plummeted to historic low levels from which it has not recovered. (NPFMC Draft EA/RIR for

BSAI Amendment 41, p. 85, March 28, 1996.)

**RECONSTRUCTION OF KING AND TANNER CRAB AND HALIBUT
PROTECTION ZONES IN THE SOUTHEASTERN BERING SEA:**

As a result of Bering Sea crab fleet's fears of the rapidly growing domestic trawl fleet virtually depleting the Bering Sea king and tanner crab stocks, a voluntary coalition formed, the Coalition of Concerned Crab Fishermen. (The Coalition evolved into the formation of the Alaska Crab Coalition in the spring of 1986.) The Coalition submitted a petition to the NPFMC in the fall of 1985 requesting emergency action to reinstate the provisions and boundaries of the "pot sanctuary."

* This resulted in the NPFMC adoption of Amendment 10 to the BSAI FMP reestablishing only the eastern portion of the pot sanctuary as a no trawl zone in 1987. Amendment 10 also created bycatch "caps" and bycatch cap zones for king and bairdi crab as part of the compromise package of regulations that provided flexibility for the groundfish fleet. The actual closure and bycatch cap zones were implemented by emergency rule in 1986, then extended by Amendment 10. (Attachments 6 and 7).

* Amendments 12A and 16 implemented in 1989 and 1991 increased the king and bairdi caps to their present levels and established Zone 1, Zone 2H and BSAI-wide halibut caps at their present levels. (Attachment 8.)

* Amendment 18 to the BSAI FMP adopted on June 1, 1992, like Amendment 1, may also prove to have far reaching impacts on the potential rebuilding of king and bairdi crab stocks of the Southeastern Bering Sea. Amendment 18 which initiated the inshore/offshore pollock allocation program, included the creation of the Catcher Vessel Operational Area (CVOA) for trawl catcher vessels delivering to the inshore component. The eastern portion of the CVOA that extends east of Cape Saricheff, closely parallels the boundaries of the original pot sanctuary on the north side of Unimak Island. (NPFMC, Bering Sea Species Protection Areas, 1995, p. 11, Attachment 9.) The area has now become a preferential access area for shorebased trawlers, who operate extensively in this area, fishing not only for pollock, but for cod and some flounder. This area, once an area of high king crab abundance and harvests, is now an area of intensive bottom trawling. As Bob Otto pointed out to the Crab Rebuilding Committee, the 1995 NMFS Bering Sea king crab survey illustrates, this is now coincidentally an area devoid of king crab.

* The most recent NPFMC action to affect the rebuilding of king crab, is Amendment 37, implemented as an emergency rule in 1995 and continued in 1996. Amendment 37 establishes the King Crab Savings Area, 56N - 57N and 162W - 164W, closed to non-pelagic trawling from January 1 through March 31. This

expansion of the (eastern pot sancturary) no trawl zone is in response to the continued recruitment failure of king crab stocks despite conservative directed pot fisheries in the late 1980s and early 1990s. This is yet another attempt to provide a compromise measure for king crab protection while allowing development of shorebased flounder fisheries. (NPFMC Bering Sea Species Protection Areas, Attachment 10.)

CONCLUSION:

Based on the circumstances of abundant king crab harvests that developed out of extensive protection of king crab from 1967 through 1981, compared to the persistent recruitment failure and historic low abundance levels under the compromise protection program initiated in 1986, it is recommended that the NPFMC close the King Crab Savings Area year-round.

APR-04-1996 10:38

B.B. NATIVE ASSOC.

1

907 842 5932 P.01

April 3, 1996

North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, Alaska 99501-2252

Attention: Richard B. Lauber, Chairman

Dear Mr. Lauber:

In the early 1980's, the Alaska Herring Co-Op (Bristol Bay Herring Co-Op & North Pacific Longline Association) funded a project to test the waters from Cape Constantine to Hagemeister Island for a potential Hair Crab fishery. Four 32' Bristol Bay boats participated in the project. The undersigned participated with their boats

We developed a grid map and assigned each boat to cover certain areas ranging from near shore to about 10 miles outside of the Walrus Islands. We used crab pots (30-40 per boat) that were specially designed by the Japanese Longliners. We fished the last two weeks of August and first two weeks of September. There were no catches of Hair Crab, however, we did catch fairly good numbers of smaller crab called "Curry Crab".

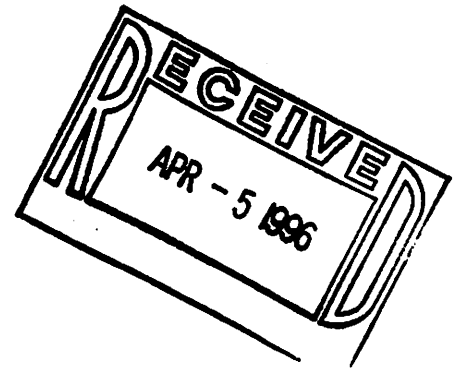
Of special interest is that we caught immature King Crab in several areas between Cape Constantine and Round Island. Our concern is that if we continue to allow Trawlers in these areas, there is potential to devastate King Crab stocks.

In more recent years, on our return trips home from participating in the Togiak herring fishery, we observed Trawlers fishing less than three miles from shore and other Trawlers fishing several miles offshore. Several times we stopped to watch when they were hauling in their nets and observed substantial numbers of herring in the trawls. Many other Bristol Bay fishermen witnessed the same and still complain about it today.

We know for a fact that adult King Salmon are also present in these waters during the spring months. Since Trawl fishermen deny by-catch of herring, we believe they deny substantial by-catches of King Salmon.

The North Pacific Management Council also needs to take a close look at the impacts of Trawling in and around the waters of the Walrus Islands. It is well known that the Walrus feed primarily on clams. What long term impacts will there be if Trawling is allowed to continue right on top of their feeding grounds?

In addition, it is documented that Walrus will abandon an area if they are continuously disturbed.



APR-04-1996 10:39

B.B. NATIVE ASSOC.

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907 842 5932 P.02

In recent years there has been increased trawler activity for yellowfin sole around these Islands. Are we going to wait until the Walrus leave before Trawling in the area is halted or is harvesting the yellowfin sole more important?

We're also concerned about the impact that trawlers have on the juvenile halibut stocks in the area. Currently, the Bristol Bay area has a very small commercial halibut fishery, amounting to only 36,000 pounds. It behooves us that trawlers are also to discard substantially much higher halibut by-catch levels.

Another ecological impact that concerns us is that a local effort is currently underway to examine a potential commercial sea urchin fishery in the area. What impacts will trawling activity have on urchins? Please keep in mind that our salmon fishery is undergoing very poor salmon prices and we area residents need to diversify and develop other fisheries to survive as fishermen.

Finally, we understand that the yellowfin sole stocks are abundant. We do not believe that it is necessary to wait until they are near shore to catch the yearly quotas. Please take action now before it is too late!

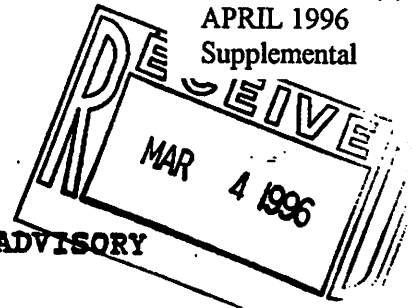
Sincerely,

Thomas L. Hoseth
Thomas L. Hoseth
P.O. Box 95
Dillingham, AK 99576

Edward Nicholson
Edward Nicholson
P.O. Box 476
Dillingham, AK 99576

Andy Golia
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February 27, 1996

MINUTES OF THE PACIFIC NORTHWEST CRAB INDUSTRY ADVISORY COMMITTEE

Leif Erickson Lodge Hall, Seattle, Washington

AREA/SPECIES: Bering Sea/Aleutian Islands king and tanner crab fisheries.

Committee present: Garry Loncon, Chairman, Royal Aleutian Sfds.; Clyde Sterling, Peter Pan Sfds.; Rob Rogers, Icicie Sfds.; Kevin Kaldestad, F/V Aleutian Mariner; Phil Hansen, Unisea Inc.; Gary Stewart, F/V Polar Lady; Gary Painter, F/V Trailblazer; Dave Benson, Tyson Sfds. joined at 1:00; Arni Thomson, Secretary.

Committee not present: Joe Wabey, F/V Arctic Eagle; and Robert W. Miller, F/V Northern Cascade, fishing opilio in Bering Sea.

ADF&G staff: Paul Larsen, Peggy Murphy, Ken Griffin, Al Spallinger, Rance Morrison, Doug Pengilly.

NMFS staff: Bob Otto, Jerry Reeves

NPFMC staff: David Witherell

CALL TO ORDER, Garry Loncon, Chairman, 9:15 AM

ANNOUNCEMENTS:

The Board of Fisheries will meet from March 10 - 18 for its Statewide Shellfish Meeting to review proposals for changes in various regulations. The meeting will be held at the Anchorage West Coast International Inn (near the airport).

The next NPFMC meeting will take place at the Anchorage Hilton, the week of April 15 - 20.

THE NEXT MEETING OF THE PNCIAC WILL BE HELD IN CONJUNCTION WITH THE NPFMC MEETING IN PORTLAND, OREGON, JUNE 11TH, AT THE SAME FACILITY WHERE THE NPFMC MEETS.

REPORT ON NPMFC BRISTOL BAY TRAWL CLOSURE: David Witherell

David gave an overall report of Council actions on crab bycatch measures. See enclosed summary report. At the January Council meeting, the Council voted to make the expanded Bristol Bay king crab savings area a seasonal closure from January to June 15th, thus extending the temporary closure from April 15th to June 15th.

At the April Council meeting, the Council is to consider a large package of crab bycatch proposals. Then at the

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June Council meeting, the Council intends to make decisions on the crab bycatch proposals: the Bristol Bay closure area (seasonal or year round); reduced bairdi caps; and a cap for opilio crab.

David also clarified that the Council disapproved a proposal to transfer 20% or more of the Zone 2 bairdi cap into Zone 1 in recognition of the depressed condition of the bairdi stocks. The action would be inappropriate at this time.

There was also considerable discussion amongst crabbers present about the need for the Council to develop an incentive based bycatch program for the trawlers to assist in reducing bycatch, the Vessel Bycatch Accounts program, (VEA).

PNCIAC MOTIONS ADOPTED UNANIMOUSLY ON THE ISSUE OF CRAB BYCATCH IN THE BERING SEA GROUND FISH FISHERIES:

1. Reiteration of PNCIAC support for year round closure of Bristol Bay king crab savings area, 56 - 57 N. latitude, 162 - 164 W. longitude. See attached NPFMC chartlet.
2. PNCIAC recommends NPFMC adoption of a bycatch cap for c. opilio crab.
3. PNCIAC recommends the NPFMC take action to reduce the bairdi cap to a realistic level consistent with the present abundance of tanner crab.

REVIEW AND RECOMMENDATIONS REGARDING BERING SEA/ALEUTIAN ISLANDS SHELLFISH PROPOSALS FOR THE ALASKA BOARD OF FISHERIES:

#455: Change the boundary separating Dutch Harbor, Areas O and Adak Area R. (Watson and Walters)

PNCIAC ADOPTS MOTION (Loncon and Hansen) (1) SIMULTANEOUS OPENINGS FOR BOTH AREAS: (2) ELIMINATE CHECK-IN, CHECK-OUT SYSTEM WHEN TRANSITING TO AND FROM THE GROUNDS (ADF&G now has mandatory 100% observer coverage for all crab vessels in the brown crab fisheries).

ADOPTED UNANIMOUS.

DISCUSSION:

Steve Hall: The brown crab fishery in the Aleutian Islands is being managed by red king crab boundaries and regulations that are inadequate for the brown crab resource and fishery. There needs to be a set of area and district boundaries and regulations for the brown crab fishery, if it is going to be managed properly.

Asbjorn Nordheim and Kris Poulsen both spoke to the need for

brown crab to managed more conservatively. They expressed concern for the long term health of the stocks.

A. Nordheim also expressed a need for a pot limit of possibly 600 pots for the brown crab fishery.

Al Spallinger responded that ADF&G shared their concern about protection of the stocks and that is a primary reason they established 100% observer coverage on catcher boats in 1995, to get more information on the status of the stocks and the need to be more conservative in management.

A lengthy discussion followed about the brown crab fishery and changing the boundary and how the fishery would be managed if the areas were combined.

Rance Morrison stated that he could support combining the areas, but he would manage Dutch Harbor and Adak as subdistricts with separate GHLS. He also stated that there is no longer a need for the check-in check-out system with 100% observers on all boats.

A. Nordheim requested that PNCIAC recommend that simultaneous openings be established and that the areas be combined.

Further discussion ensued about the feasibility of combining the areas and no consensus developed on this issue due to controversy over the present boundary, as it straddles a major concentration of the stock.

#477/478: Change the Bering Sea c. opilio subdistricts

MOTION THAT PNCIAC SUPPORTS STATUS QUO ON C. OPILIO DISTRICTS (Sterling and Loncon).

Motion adopted. G. Painter opposes.

DISCUSSION:

Painter/Casey express support for creation of new subdistrict north of 60 N. latitude to optimize long term GHLS of opilio. This would enable the fleet to get to the high end of the GHLS, not just the mid point. Reference to the Polmar boats that recently brought Russian caught opilio into Dutch Harbor, crabs caught just over the Russian line just north of 60 N. latitude. Reported big catches occurring there.

B. Otto comments that creating an additional district north of 60 degrees will result in no more animals being available for harvest. The present survey covers the whole range of opilio crab concentrations.

G. Loncon comments that the northern district "mother lode"

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is a myth. He has personal experience with the recent Polmar boats that brought crab loads into Dutch Harbor. The catches were small, the crabs small and dirty shelled, thus a meaningful percentage was graded #2 crab.

R. Morrison commented that he has inseason authority to close and reopen the fishery, based on criteria, (thus he can effectively create a northern subdistrict with a separate opening). He references a situation a few years ago when industry and ADF&G developed criteria for reopening the fishery when ice cover was threatening to close most of the area where the harvest was occurring.

#461, HARVEST STRATEGY FOR RED KING CRAB IN BRISTOL BAY:
Peggy Murphy

MOTION THAT PNCIAC SUPPORT ADOPTION OF #461 (Painter and Stewart).

MOTION FAILS 4-3, Painter, Stewart, Rogers and Benson opposed; Hansen, Kaldestad, Loncon supporting.

MOTION THAT PNCIAC SUPPORT REDUCTION OF EXPLOITATION RATE TO 15% FOR THREE YEARS, 1997, 1998 and 1999 IN RECOGNITION THAT THE 20% EXPLOITATION RATE IS TOO HIGH (Benson and Kaldestad)

MOTION ADOPTED 5-2, Painter and Stewart dissenting.

DISCUSSION:

Murphy summarizes the Harvest Strategy for King Crab, (revised paper, 2/96) noting that this includes a reduction of the exploitation rate from 20% to 15% due to the depressed condition of the resource.

Tom Casey raises questions and challenges why ADF&G did not sanction a king crab fishery in Bristol Bay, as it appears that the population has met minimum standards of mature female threshold and effective spawning biomass.

He also challenges the 20% handling mortality rate in the harvest strategy referring to the recent S. Zhou and T. Shirley handling mortality experiments and analysis.

Doug Pengilly comments that recent handling mortality studies do not represent the final conclusions on the issue and that there is likely a higher long term mortality impact to the stocks and this has to be addressed.

Paul Larsen responds that the 1995 ADF&G decision for no fishery for Bristol Bay in 1995 when the survey estimate of the minimum threshold level for mature females was extremely close. ADF&G had to make a judgment call, which is what we do with a lot of fisheries management decisions. Fisheries science is imprecise. ADF&G also feels that the current harvest strategy has been a little too aggressive.

Gary Painter expresses his concern that according to the new harvest strategy, his business may fail, as it appears to him that he may not be fishing king crab for a long time.

Peggy Murphy clarifies that it is the intent of ADF&G in developing the new harvest strategy not to keep the fishery closed for a protracted period of time, but to get the fleet fishing with a framework that will lead to optimal harvest levels.

P. Hansen asks how a commercial fishery impacts the rebuilding curve? In other words, can ADF&G illustrate through the graphs on the model, where a commercial fishery will begin again and what GHs can be predicted in the short term?

Peggy Murphy responds that ADF&G has no prediction model yet for GHs related to Effective Spawning Biomass (ESB) levels.

Bob Otto and Jerry Reeves both commented in general support of the present closure for Bristol Bay king crab. Very concerned about all age classes of the population. The exploitation rate has been too high and we support lowering the exploitation rate to 15%.

B. Otto recommends that industry take the long term predictions in the model with a grain of salt and don't be too concerned about them. Given the present stock conditions, I think the new harvest strategy is a good idea. I too have some concerns with some of the inputs into the model, but they can be dealt with.

Benson, Kaldestad and Loncon concur with the judgment of Reeves and Otto, but express concerns about the long term impacts of using the model, protracted closures and their overall lack of understanding of how the use of the model will affect the reopening of the Bristol Bay king crab fishery.

A. Thomson comments that the recent experience of the ACC sponsored four year closure in the Pribilofs coincident with rebuilding and ADF&G reopening the fishery in 1993 has been a positive development for the crab fleet. The State of Alaska, ADF&G and coastal communities are in need of revenues from the king crab fisheries as much as the fleet is.

G. Loncon concluded that the current strategy has been inadequate and the exploitation rate has been too high.

#461 KING CRAB HARVEST STRATEGY AND #473 AND #474, BAIRDI SEASON: ACC discussion papers proposing to reduce the size limit on king crab to 6 inches; and change of king and bairdi crab season to January 15th. (See attachments, ACC).

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MOTION THAT PNCIAC SUPPORT REDUCTION OF KING CRAB SIZE LIMIT TO 6 INCHES (Kaldestad and Loncon).

MOTION ADOPTED, Painter and Rogers dissenting.

DISCUSSION:

Chairman introduces ACC discussion papers on reduction of size limit on Bristol Bay king crab and change of king and bairdi season to January 15th for discussion and action by the PNCIAC.

Tom Casey raises objections that this is arbitrary and capricious and violates the federal Administrative Procedures Act. He states that he has not seen the papers.

A. Thomson responds that he has spoken with the Division of Boards about the ACC proposals to lower the size limit and change the season. The Executive Director advised that the proposals meet the State's legal notice requirements as the public has been noticed that change of seasons and size limits are agenda items scheduled for the March Shellfish meeting. However, there is a matter of practical notice that must be determined by the Attorney General and the Board of Fisheries.

D. Witherell responds that PNCIAC discussion of the ACC discussion papers does not violate the Administrative Procedures Act and that it is appropriate for the PNCIAC to take up discussion and make recommendations on the proposals. The meeting is duly noticed in the Federal Register and it is identified that the PNCIAC will be discussing and making recommendations on proposals for the Board of Fisheries March 10th meeting.

The PNCIAC then took up discussion of the two proposals.

In regards to the size limit, Reeves comments that lowering the size limit is a good idea. This will reduce handling mortality and it will improve the way the fishery is conducted.

In response to another question from the chairman, Doug Pengilly responds that 119 mm is the size at functional maturity (5.7 inches). He also notes that there will be no increase in the GH, but there may be a decrease.

In response to Benson's question about negative impacts, Pengilly responds that ADF&G has not analyzed the proposal and that he has some questions about impacts. Would fishermen target on different size limits? Concur that reduction in size limit would likely reduce handling mortality.

G. Stewart expresses concern that the new 10 inch mesh restriction for one third of the vertical surface of a

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side panel would have to be changed back to nine inch or the fishery could become uneconomic. The ten inch mesh proposal adopted by the Board in 1993, to allow escapage of undersize animals, was based on the 6.5 inch minimum size.

R. Morrison notes that the change in size limit could result in a higher CPUE, but because some of the animals will be smaller, there could be less value to the harvest.

J. Reeves notes that a reduction in handling mortality will result in keeping more of what you catch. He sees no problem with lowering the size limit to 6 inches as long as the exploitation rate is also lowered and ADF&G is proposing to lower it to 15% with the new harvest strategy.

B. Otto notes that if the size limit is lowered to 6 inches, he recommends that the 9 inch stretched mesh requirement for one third of one vertical side panel be maintained. This will assure a positive effect on handling mortality.

MOTION TO TABLE DISCUSSION OF PROPOSED CHANGE OF KING AND BAIRDI SEASON TO JANUARY 15TH (Kaldestad and Loncon).

MOTION ADOPTED UNANIMOUS.

DISCUSSION:

A. Spallinger comments that the proposed change of season is within the biological seasons ADF&G recognizes. This issue is allocative and ADF&G has no further comment at this time.

R. Rogers commented that the economics would improve for his company with the combining of seasons.

G. Painter commented that having three fisheries so close together would make price negotiations more difficult.

G. Loncon responded that reduced mobilization costs for processors could translate into better prices for the fishermen.

G. Stewart raised a question about the feasibility of opening opilio in the fall, but expressed concern about the quality of crab at that time.

G. Loncon responded that it was his experience that opilio would not be in good condition in the fall.

T. Casey raised concern about the need to change the opilio season to November to avoid freezing spray conditions and that a fishery at this time would reduce mortalities from vessels sinking.

Kaldestad commented that he saw no improvements to safety by changing the opening date to November, the weather can be very severe then and the race for fish is the biggest problem with safety in the crab fisheries and ITQs are needed to alleviate that problem.

T. Casey noted that his group is opposed to ITQs. He further asserted that the deceased, Matt Pope, (Pacesetter) was opposed to ITQs. Relief from freezing spray conditions by changing the season to November was important to improved safety.

A. Thomson noted that icing conditions did not exist at the time the Pacesetter was lost this winter. In addition, he noted that storms are severe in November and that on October 30, 1990 the Pacific Apollo sunk with 3 men lost; on November 25, 1991, the Harvey G sunk with 4 men lost; and on September 14, 1993, the Nettie H sunk with 5 persons lost. These vessels were either fishing crab, or enroute to Bering Sea crab fisheries when lost. Changing the season to the fall won't reduce the fatalities.

G. Loncon noted that he saw no improvement in safety from a fall opening of opilio.

P. Hansen and K. Kaldestad noted that they were not ready to vote on the change of season proposal, that they needed more time to consider it.

G. Loncon recommended that the change of seasons issue be temporarily tabled in order to allow committee members more time to study the issue.

#473, ALLOW C. BAIRDI FISHING EAST OF 163 W. LONGITUDE, REGARDLESS OF WHETHER THE KING CRAB SEASON IS OPEN.

MOTION TO ADOPT (Painter and Benson).

MOTION FAILS 4-2-1. Painter and Benson dissenting, Stewart abstains.

DISCUSSION:

G. Loncon comments that he supports maintenance of the 163 closure line for bairdi. Given the depressed condition of the resource, it is not a good idea at this time.

G. Stewart asks the question are we saving bairdi for trawlers or crabbers (in reference to the high bycatch of bairdi in trawl fisheries)?

R. Morrison notes in reference to the recent joint meeting of the Board of Fisheries with the NPFMC and Larry Engel's comments to the NPFMC, that the crabbers are heavily restricted in the bairdi fishery and that the Council needs

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to take stronger measures with the trawlers. Morrison further states that he feels the 163 closure to bairdi fishing is gaining the crabbers political capital with the NPFMC. Asks A. Thomson for comment on that.

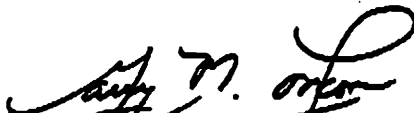
A. Thomson responds and concurs that the 163 line restriction for bairdi fishing is gaining crabbers political capital and this will be critical to crab bycatch decisions made at the upcoming April and June Council meetings. T. Casey notes that more work needs to be done by crabbers on Washington State Council members to secure their votes on these issues.

#468, Reduce pot limits in all Bering Sea king crab fisheries to 40 and 50 pots and link to GHL.

MOTION ADOPTED BY PNCIAC IN SUPPORT OF STATUS QUO ON POT LIMITS IN THE BERING SEA CRAB FISHERIES. (Committee noted that this position did not apply to the brown crab fisheries.)

MOTION ADOPTED UNANIMOUS, Benson abstains.

Meeting adjourned at 5:15 PM.



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Attachments: Agenda; industry attendance list; NPFMC crab bycatch paper; Bering Sea crab boat fatalities, 1989-1996; ACC discussion papers on reducing king crab size limit to 6 inches and change of king and bairdi season to Jan. 15th.

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See attached for agency distribution.

February 21, 1996

**BERING SEA CRAB BOAT FATALITIES
JANUARY 1, 1989 - JANUARY 31, 1996
(Preliminary, U.S.C.G. records)**

YEAR	BOATS	FATALITIES
1/29/89	F/V Vestford	5 persons
10/30/90	F/V Pacific Apollo	3 persons
2/10/91	F/V Barbarossa	6 persons
11/25/91	F/V Harvey G	4 persons
1/5/92	F/V St. George	5 persons
9/14/93	F/V Nettie H	5 persons
2/1 - 2/28/94	F/V St. Matthew F/V Chevok F/V King & Wings F/V Belair F/V Jody Ann F/V Lady Selket	2 persons
1/15/95	F/V Northwest Mariner	6 persons
1/27/96	F/V Pacesetter	7 persons
8 YEARS	14 BOATS	43 MEN

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ICES COOPERATIVE RESEARCH REPORT

RAPPORT DES RECHERCHES COLLECTIVES

ARNI THOMSON
C-2d 4/96

NO. 200

**REPORT OF THE STUDY GROUP ON ECOSYSTEM EFFECTS
OF FISHING ACTIVITIES**

Copenhagen, Denmark
7-14 April 1992

International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

Palægade 2-4 DK-1261 Copenhagen K Denmark

September 1995

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2.1 Introduction

Ecosystem effects of fishing activities may occur at all scales of space and time. Although a clear distinction between local, regional, and North Sea-wide effects cannot always be made, the global approach taken in this report is inappropriate for consideration of some more local ecosystem effects, both of fishing and other human activities, which will be considered in regional reports.

Fisheries exploit species against the background of a variable environment which is a major source of perturbation to the system. The effects fisheries cause should thus be viewed as one of several anthropogenic interactions in a non-equilibrium system.

Fishing has a number of direct effects:

- a) it causes mortality on the target fish and incidentally on other biota;

- b) it makes food available to other species in the ecosystem by:

- i) discarding unwanted catch of fish and benthos,
- ii) discarding wastes, and/or
- iii) by killing or damaging animals in the path of the gear during its deployment.

- c) it disturbs the seabed by the action of some fishing gears; and
- d) it generates litter composed of lost or dumped gear as well as other non-specific debris.

These direct effects in turn can lead to indirect effects such as the modification of predator-prey relationships, thereby changing the flow of energy through parts of the system. They can also lead to the modification of habitats.

2.2 Temporal Trends in Fishing and Marine Biota in the North Sea

Fishing in the North Sea has a long history (see Table 3.3.2) with some significant technical developments taking place by the end of the nineteenth century and the pace of innovation has accelerated since then.

Time-series data on total catches by species are available from the beginning of the century onwards. Total catch increased gradually from 1 million tonnes around 1900 to 2 million tonnes around 1960 (Figure 3.1.2.a). During the 1960s, the catch increased steeply to more than 3 million

tonnes, followed by a gradual decline to around 2.5 million tonnes in recent years. The catches of major fish categories (e.g., pelagic, roundfish, flatfish, industrial) have been rather more variable (Figure 3.1.2.b). Roundfish catches increased significantly in the 1960s, an increase that is generally referred to as the "gadoid outburst", followed by a gradual decline since 1970. Pelagic fish catches decreased sharply after about 1970, while industrial fish catches increased at about the same time. More recently, some pelagic fish catches have increased, some roundfish catches have decreased to their lowest levels in the past 30 years, while industrial catches have been maintained, albeit with major changes in species composition.

Fish catches depend on both fish abundance and on the intensity of fishing. Estimates of fish abundance for a number of fish species have become available during the past 40 years, and time series of these are shown in the reports of the ICES Advisory Committee on Fishery Management

The development of the intensity of fishing, expressed as fishing mortality rate, for a number of important North Sea stocks is shown in Figures 3.3.3.1 to 3.3.3.4. Fishing pressure has generally increased over the last century. For some stocks, notably haddock, exploitation has been high since the early part of this century.

Time-series data for numbers of seabirds have been recorded since the beginning of the century and show large increases for many species (Figure 3.1.5). Some species, however, have shown declines over the last 15 years (Table 3.1.1). Time-series data exist for common and grey seals since 1965 and show that seal numbers increased until 1988, but then common seal numbers declined sharply owing to the phocine distemper epidemic (Figure 3.1.6). For cetaceans, the trends in abundance are far less certain. However, the available evidence suggests that declines have occurred in porpoises in the southern North Sea since World War II and in bottle-nosed dolphins over the last century. No appropriate large-scale time-series data exist for benthos.

2.3 Direct Effects of Fishing

Some of the direct effects of fishing can be quantified.

a) Mortalities

The current levels of fishing mortality (expressed as percent of the population present at the start of the year which is caught during the year) for the most important commercial fish species in the North Sea are summarized in Table 4.4.2. For some species, these levels imply that

more than half of the fish of exploited ages will be captured during a year.

Fish also escape through the meshes and some of these are damaged or killed. The quantities which escape cannot readily be assessed, however, the proportion of these which is likely to survive is given in Table 4.5.1.

The fishing effort (intensity of fishing) deployed in 1989 in almost all of the NSTF areas has been calculated (Tables 4.1.a-i) for various gear types. For towed gears the effort data have been converted into estimates of the total swept areas (Tables 4.2.3 and 4.2.4). It should be noted, however, that the application of fishing effort is very uneven and, thus, certain areas will be fished many times while others are missed.

In the case of benthos, towed fishing gears cause mortalities on infauna and epifauna.

Infauna is most affected by gears that penetrate the seabed, such as beam trawls. Mortalities on animals in the path of beam trawls have been estimated for a limited number of species and range from 15-55%. The conversion of percent mortality in the trawl path into mortality for individual NSTF-areas or the entire North Sea is problematic. This would require estimates both of the spatial distribution of the gear deployment and of the benthic species. Among the benthic animals caught in the beam trawl, the mortalities range from virtually zero to close to 100% depending on the species.

Epifauna is affected by all towed fishing gear, but insufficient information is available on the relative catchabilities of different species in different types of gear.

In the case of seabirds, there are many observations that attest to mortality from entanglement in fishing gear. Evidence points to the largest impact being from gill nets and other fixed nets on diving seabirds. This impact cannot be quantified at present. It is thought to be sporadic and localized. The local mortality rates can clearly be high, but at the North Sea population level and even at the colony level, they do not preclude population increase.

Seals can become entangled and killed in fishing gear. Evidence suggests that the largest impact comes from fixed salmon nets. In some countries, it is legal to shoot seals if they interfere with fishing gears. The resulting mortalities have not been quantified, but the North Sea seal population levels have not declined in this context.

Small cetaceans are caught in gill nets, but the data are not adequate to quantify the resulting mortality.

There is a shortage of relevant demographic information on biota affected by fishing gear.

b) Food inputs

After capture, fish and benthos may be discarded for either regulatory reasons (undersized or over-quota fish) or because no market for them exists. For haddock and whiting caught in demersal fisheries in the northern North Sea, extensive discard data are collected routinely (Table 4.5.2). For other fisheries and areas, some data have become available and approximate discard rates can be derived (Table 4.5.3). However, no global estimate can be provided at present. Some of the discarded animals survive, but many are dead or moribund. In addition, some fishing operations dump fish offal (fish processing waste). Both discards and offal provide an important food resource for scavenging organisms, notably seabirds. Fish and other organisms that have passed through the meshes, either already dead or dying as a result thereof, add to these inputs, but will be more available to benthic scavengers.

c) Physical disturbance of the seabed

The action of some fishing gears physically changes the seabed, but the effect will depend on the gear and the nature of the substrate. There are rough estimates of how far individual gears penetrate into the seabed (Table 4.2.1). There are also estimates of the total area swept (Tables 4.2.4 and 4.2.5). Heavy towed gears can change the sediment characteristics of the seabed, displace boulders which form a primary substratum for benthic organisms, mobilize sediment particles leading to transport of fine particulate matter and modification of sediment geochemistry including sediment-water exchange (e.g., of nutrients).

d) Litter

Fishing operations generate litter through the accidental loss of gear and by the dumping of damaged gear. In addition, fisheries produce debris comparable to that produced by shipping in general, such as the plastic litter which ends on the sea floor and on beaches.

2.4 Comparison with Other Anthropogenic Activities

Anthropogenic activities other than fishing also affect the North Sea. The anthropogenic activities covered in the context of this report preclude fishing and/or mimic fishing effects on biota. Thus, it may be very difficult to separate these effects from the consequences of fishing.

¹ The swept area is the seabed area that would be covered by the development of the gear if there were not replication. N.B. This should not be used to infer the area of the North Sea impacted by trawling because replication may frequently occur.

Offshore structures (e.g., wrecks and platforms) locally preclude fishing operations. They provide refuges and sites of increased biomass and diversity for fish and benthos. Point sources of wastes from oil production and organic/sewage enrichment alter benthic communities in the vicinity, frequently resulting in a dominance of short-lived, opportunistic species; this is essentially comparable with the effects of intense bottom trawling. Hypoxia can be caused by the combined action of several factors, e.g., poor water exchange, elevated water temperature and eutrophication. Areas of hypoxia have resulted in emigration of fish and other motile biota and in mortality of more sessile biota (e.g., benthos and shellfish); these effects may initially result in elevated catches of benthos and shellfish in trawls before mortality occurs, while hypoxia-caused emigration and mortality may mimic some of the results of overfishing.

2.5 Long-term Effects

Generally, the long-term effects of fishing on marine biota are impossible to predict at the species level. While short-term effects may be predicted, the long-term consequences to species may be quite different. Predictions may, however, be possible of broader community attributes, such as species diversity or size distribution. A further important exception to the rule of limited predictability is the possible elimination of a vulnerable species by sustained over-exploitation. Slow-growing species with low fecundity are the most likely candidates for such local extinctions.

Fisheries have altered the size distribution of exploited fish species by reducing the abundance of larger fish.

Populations of fish species taken for human consumption have been heavily exploited for most of this century, but have been able to withstand this. Experience suggests, however, that intensive exploitation requires careful control during periods of naturally-induced decreases in recruitment. Some gadoids are at their lowest level of spawning stock biomass in the past 30 years, and this gives reason for concern.

Little data are available for the short-lived fish species exploited by industrial fisheries. These species constitute an important source of food for a number of other species

and changes in their abundance may thus have important direct and indirect consequences.

Consideration of the biology of many benthic species suggests that they are unlikely to suffer from recruitment failure at the current levels of fishing. However, undisturbed reference sites are not presently available although areas closed to fishing for scientific investigations would facilitate understanding of these processes.

Despite low fecundities, birds and seals have sustained their populations while subjected to fisheries-induced mortality. The situation for cetaceans is uncertain due to the lack of knowledge of their distributions, abundances and mortality rates. Clearly, a better understanding of their population dynamics is needed, but the generally low rate of reproduction in cetaceans suggests that they might be particularly vulnerable to additional mortality caused by fishing.

Apart from the long-term population effects of fishing, it is possible that the selective pressure of fishing might lead to evolutionary changes in the biology of affected species. It might also reduce genetic diversity in exploited stocks.

The fishing industry currently introduces considerable amounts of food into the marine environment in the form of discarded fish, offal, and animals killed by non-catch fishing mortality. Changes in discarding practices due to changing fisheries regulations (e.g., mesh changes to eliminate the capture of discards, or the prohibition of discarding) could, therefore, produce large effects on scavenger species and the species with which they interact.

The physical effects of fishing can lead to structural changes in habitat and thus to changes in species assemblages. Some bottom communities may be more vulnerable than others, but the extent to which changes have occurred cannot be assessed at present.

Given the complexity of the interactions among the various components of the system and the variability of the environment, it is difficult to separate the long-term effects of fishing from changes due to other factors. Very few of the observed long-term changes in North Sea biota have thus been conclusively linked to fishing.

Draft discussion of Bering Sea fishery simulation model results for various crab caps

The model was modified to include the bycatch of *Chionoecetes opilio* crab and assign caps for this species. The value data for *C. bairdi*, *C. opilio* and red king crab were updated for this analysis as well. The model was run with the most constraining options in place to examine the greatest expected changes from Status Quo. Model runs using both the 1993 and 1994 data sets included the following options: (1) Status Quo which included a three month closure of the Red King Crab Savings Area; (2) a Zone 1 cap for bairdi crab of 850,000 and a Zone 2 bairdi crab cap of 1.5 million crab; (3) a Zone 1 cap of 35,000 red king crab; (4) a Zone 2 cap of 11 million opilio crab; and (5) a run with all of the above caps in place.

The bycatch of opilio crab in each of the directed fishing groups was averaged over three years, and that average was used to assign a portion of the 11 million crab cap to each group. The Zone 2 caps used for the opilio crab option were as follows: 2,313,651 opilio crab to the flatfish/rock sole group (21%); 1,413,464 to the "other" group which includes bottom trawl for pollock (13%); 136,904 to the Pacific cod target (1%); and 7,135,981 to the yellowfin sole fishery (65%).

The valuation of bycaught crab was modified somewhat, to take into account the average size of bycaught crab in each species, and the size the crab are available to the directed crab fishery for harvest. Red king crab are, on average, above legal size (135 mm cl) when bycaught in trawls, and were therefore not discounted by natural mortality. Bairdi crab were estimated to be one year away from legal size (140 mm cw), and opilio crab were estimated to be 3 years away from marketable size (102 mm cw). The average harvest weight of the crab species at legal size were estimated to be 2.5 lbs, 1 lb, and 5 lbs for bairdi, opilio and red king crab, respectively. Product recovery rates were estimated to be 65% for bairdi, 61% for opilio crab, and 100% for red king crab, and the prices per pound were estimated to be \$7.00, \$3.50, and \$6.00 for each of the species, respectively. The estimated per crab gross values to the directed crab fisheries were \$6.83 for bairdi crab, \$.72 for opilio, and \$24.00 for red king crab. Net values were estimated by the same ratio of net value to gross value used in previous model runs.

The bycatch of the crab species in 1993 and 1994, largely because of existing caps, were not generally greatly in excess of the most restrictive options used in the model runs, and often were below the more restrictive caps. For instance, under Status Quo in the 1993 data, 7.5 million opilio crab were estimated to be bycaught in Zone 1 in the absence of a cap, and in 1994 approximately 10 million opilio crab were estimated to be bycaught in Zone 1. The cap applied for opilio crab was 11 million, and only specific fisheries might be affected by caps since the overall cap exceeded the overall bycatch in each year. Thus the model does not capture the impacts of years in which the bycatch rates for any of the species might be higher. Similarly, the impacts of a cap might be less than the model predicts if crab were caught at a higher rate in 1993 or 1994 than would happen in the future, as was the case in 1994. The bycatch of red king crab predicted by the model in 1994 was approximately 90,000 red king crab with the 3 month Red King Crab Savings Area in place while in 1995 the actual number bycaught was approximately at the cap of 35,000 crab.

The constraints on the fishing fleet by the more restrictive crab caps resulted in changes in net benefits to the Nation from Status Quo of less than approximately \$500,000 under the 1993 data set. This is because the bycatch of each crab species available to the model was similar to the caps in that year. The model runs based on the 1994 data estimated decrements to the net benefits to the Nation of from \$1 million to \$5 million. The reduction of the red king crab cap to 35,000 resulted in the greatest change from Status Quo.

Trawl bycatch of Opilio in the Bering Sea											
From: Amendment 41						Percentage of Total					
Fishery	1992	1993	1994	1995	Average	1992	1993	1994	1995	Average	
Bottom pollock	1,010,740	522,517	506,916	146,715	546,722	5.79%	3.57%	4.10%	2.84%	4.41%	
Pacific cod	89,814	165,461	311,717	45,922	153,229	0.51%	1.13%	2.52%	0.89%	1.24%	
flathead sole	1,301,980	1,860,349	1,414,376	456,552	1,258,314	7.46%	12.71%	11.45%	8.84%	10.15%	
midwater pollock	3,560,001	215,743	305,443	59,939	1,035,282	20.41%	1.47%	2.47%	1.16%	8.35%	
rock sole/o.flats	868,358	2,397,273	855,098	1,204,128	1,331,214	4.98%	16.38%	6.92%	23.31%	10.74%	
yellowfin sole	10,608,803	9,468,877	8,673,331	3,196,459	7,986,868	60.82%	64.72%	70.22%	61.88%	64.42%	
other	2,467	1,397	285,017	55,840	86,180	0.01%	0.01%	2.31%	1.08%	0.70%	
TOTAL	17,442,163	14,631,617	12,351,898	5,165,555	12,397,808						
											Number of
Bycatch Group											Opilio
FLATRSOL	2,170,338	4,257,622	2,269,474	1,660,680	2,589,529	12.44%	29.10%	18.81%	32.50%	21.03%	2,313,651
OTHER	4,570,741	738,260	812,359	206,654	1,582,004	26.21%	5.05%	6.73%	4.04%	12.85%	1,413,464
PCOD	89,814	165,461	311,717	45,922	153,229	0.51%	1.13%	2.58%	0.90%	1.24%	136,904
ROCK											0
ARROW											0
YFSL	10,608,803	9,468,877	8,673,331	3,196,459	7,986,868	60.83%	64.72%	71.88%	62.56%	64.87%	7,135,981
TOTAL	17,439,696	14,630,220	12,066,881	5,109,715	12,311,628						11,000,000

Estimate of gross and net values for 1000 bycaught crab in trawl fisheries.

	Starting Number	Average Age at Bycatch	Average Age in Catch	Trawl Discard Mortality	Trawl Mortality	Years to Directed Fishery	Given 25% Natural mort. S = 1-m	Number in Directed Catch	Average Weight	Price per Pound	Product Recovery Rate	Gross Value	Previous nv/gv Ratio	Net Value
Bairdi	1000	7	9	0.8	800	1	0.75	600	2.5	\$7.00	0.65	\$6,825	0.3864	\$2,637
Opilio	1000	8	12	0.8	800	3	0.75	337.5	1	\$3.50	0.61	\$721	0.3864	\$278
Red	1000	10	12	0.8	800	0	0.75	800	5	\$6.00	1	\$24,000	0.4598	\$11,035

	3 year average trawl size bycatch		Minimum Legal Harvest size		Years to Attain Legal size		Average wt at min.harvest
	Male	Female	Male	Female	Male	Female	Male
Bairdi	123	85	140	90	1	1	2.5
Opilio	75	63	102	50	3	0	1
Red	139	112	135	90	0	0	5

Red king crab are in carapace length, others are carapace width

Table . Summary of total catch, bycatch, total gross and net values of catch and bycatch, and estimated total net benefits to the Nation under status quo and combinations of bairdi, opilio and red king crab caps - 1993 and 1994 data.

Model runs based on 1993 data

Alternative	Total Catch	Total Retained Catch	Total Gross Value	Total Net Value	Tanner Crab	Opilio Crab	Red King Crab	Halibut	Chinook Salmon	Other Salmon	Herring	Gross Value Bycatch	Net Value Bycatch	Total Gross minus Bycatch Gross	Total Net minus Bycatch Net
Status Quo	1,809,778	1,552,688	\$847,189,115	\$315,373,429	2,278,571	14,941,488	63,692	3,708	50,506	98,496	746	\$46,719,083	\$20,923,772	\$800,470,032	\$294,449,657
Bairdi	1,807,370	1,551,953	\$846,410,232	\$315,091,474	2,093,271	14,238,044	61,082	3,663	50,506	98,496	746	\$44,682,729	\$20,103,812	\$801,727,503	\$294,987,662
Red	1,812,070	1,552,768	\$846,815,608	\$315,238,220	2,330,484	15,029,742	63,987	3,691	50,549	98,496	746	\$47,071,607	\$21,050,105	\$799,744,001	\$294,188,114
Opilio	1,809,264	1,552,380	\$846,974,451	\$315,295,721	2,268,976	14,873,835	63,692	3,708	50,506	98,496	746	\$46,804,656	\$20,879,579	\$800,369,795	\$294,416,142
All 3	1,800,044	1,548,209	\$843,358,594	\$313,986,781	2,084,468	13,248,501	56,844	3,638	50,549	98,496	746	\$43,699,035	\$19,701,343	\$799,659,559	\$294,285,438

Model runs based on 1994 data

Alternative	Total Catch	Total Retained Catch	Total Gross Value	Total Net Value	Tanner Crab	Opilio Crab	Red King Crab	Halibut	Chinook Salmon	Other Salmon	Herring	Gross Value Bycatch	Net Value Bycatch	Total Gross minus Bycatch Gross	Total Net minus Bycatch Net
Status Quo	1,803,803	1,536,805	\$827,694,490	\$305,508,379	2,597,799	10,914,052	90,030	4,576	42,216	49,528	1,600	\$51,225,167	\$23,341,231	\$776,469,322	\$282,167,148
Bairdi	1,786,906	1,528,925	\$821,268,068	\$303,180,458	2,344,968	11,808,740	90,900	4,743	41,992	49,531	1,612	\$50,915,043	\$23,329,385	\$770,353,025	\$279,851,073
Red	1,784,587	1,530,065	\$809,049,182	\$298,758,777	2,401,238	10,234,614	45,766	4,266	41,987	49,528	1,611	\$46,965,008	\$21,420,894	\$762,084,174	\$277,337,884
Opilio	1,803,653	1,535,666	\$827,078,518	\$305,285,397	2,500,570	11,349,426	89,894	4,870	42,216	49,528	1,600	\$52,179,102	\$23,896,895	\$774,899,416	\$281,388,502
All 3	1,785,714	1,546,466	\$818,242,868	\$302,471,879	1,970,888	11,871,255	45,950	4,487	42,273	49,531	1,612	\$46,202,502	\$21,268,206	\$772,040,366	\$281,203,674

Bairdi = 850,000 Zone 1 cap, 1.5 million Zone 2 cap; Opilio = 11 million Zone 2 cap; Red = 35,000 Zone 1 cap.

Tom CASEY c-2d
4/96

Alaska Fisheries Conservation Group

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Testimony on BSAI Crab Caps & On-bottom Trawl Closures

1. Include 1995 bycatch data in all EA/RIR bycatch charts
2. Correct 38% red king crab mortality in groundfish pots to 8% or less. Bob Otto has said he has no idea where the 38% comes from.
3. Mandate use of mature male king crab abundance estimates as the only basis for any stair-step options.
4. Encourage yellowfin sole trawling outside of State waters in Eastern Togiak Bay between 160W and 159W North of 58N with 100% observer coverage by adding such an option to the EA/RIR.
5. Add an EA/RIR option for an annual six million opilio PSC cap.
6. Endorse use of SEA STATE plotter by all trawlers in a formal letter to each vessel owner.


Tom Casey, Executive Director
April 18, 1996

AFTA
JOHN GAVIN
C-2(d)

Proposal for analysis: Northern Bristol Bay area

The area north of 58 ° 43 ' North and east of 162 ° West would be closed to trawling on a year round basis. The area north of 58 ° North and east of 162 ° West exclusive of the area closed year round (as described above) will be open to trawling during the period of April 1st to June 15th each year.

This proposal is for analysis purposes alone and does not represent an agreement between members of the yellowfin sole fishery and representatives of Northern Bristol Bay.

One hundred percent observer coverage is to be mandated for trawling north of 58 ° North and east of 162 ° West.

The makers of this proposal recommend that State of Alaska and NMFS enforcement concentrate more enforcement resources on the state boundary line within the area north of 58 ° North and east of 162 ° West.