

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

**DAY 2**

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

<b>Mortality Sources</b>	<b>Concern</b>	<b>Knowledge</b>	<b>Study</b>	<b>Council Action</b>	<b>Priority</b>
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?

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*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*