MEMORANDUM

ESTIMATED TIME
3 HOURS

TO: Council, SSC and AP Members

FROM: Clarence G. Pautzke
Executive Director

DATE: June 1, 1999

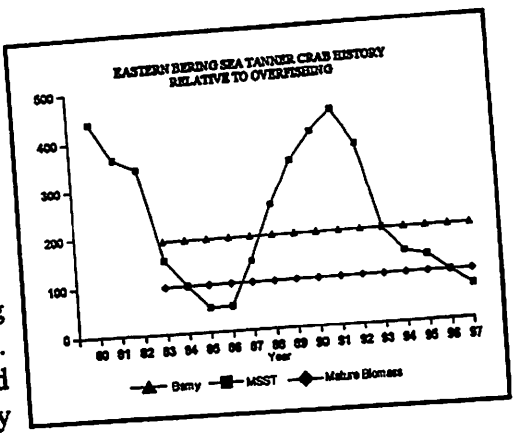
SUBJECT: Crab Management

ACTION REQUIRED

Initial review of Bering Sea Tanner crab rebuilding plan.

BACKGROUND

Tanner Crab Rebuilding Plan



The Bering Sea Tanner crab (*C. bairdi*) stock was declared "overfished" on March 3, 1999, because the 1997 *C. bairdi* spawning biomass (64.2 million pounds) was below MSST (94.8 million pounds of biomass; see adjacent figure). The stock has continued to decline in 1998, with spawning biomass estimated to be 36.9 million pounds.

Section 304 of the Magnuson-Stevens Act requires that a rebuilding plan be developed within one year of an overfishing determination. The national standard guidelines further require a rebuilding period less than 10 years unless dictated otherwise by life history characteristics.

A draft rebuilding plan was distributed in March. In April, the SSC reviewed the draft and recommended that the time required to rebuild the stock to the Bmsy level be modeled. A revised analysis was distributed on May 19, 1999. An executive summary of this analysis is attached as Item D-2(a).

At this meeting, the Council is scheduled to initially review the analysis. Final action is scheduled for Octob

Executive Summary

The Bering Sea Tanner crab (C. bairdi) stock is at a very low level. Spawning biomass has been estimated to be below the minimum stock size threshold established for this stock. On March 3, 1999, the stock was deemed "overfished", which requires a rebuilding plan to be developed within one year. This Environmental Assessment/Regulatory Impact Review (EA/RIR) addresses alternatives for rebuilding the overfished stock of Tanner crab (C. bairdi) in the Eastern Bering Sea. Two primary alternatives were examined.

Alternative 1: Status Quo. No rebuilding plan would be adopted for Bering Sea Tanner crab.

Alternative 2: Establish a rebuilding plan for Bering Sea Tanner crab. The rebuilding plan may have three components: a harvest strategy, bycatch control measures, and habitat protection. Note that more than one option can be adopted for each component.

A. Harvest Strategy: In previous years when there was a directed fishery, harvest rates for Bering Sea Tanner crab were established at 40% of the mature male abundance. This harvest strategy could be modified to reduce mortality on legal males, females, and juvenile crabs.

Option 1: Status quo. Continue to establish harvest rates for Bering Sea Tanner crab at 40% of the mature male abundance.

Option 2: Endorse the new harvest strategy for Bering Sea Tanner crabs as adopted by the Board of Fisheries. ADF&G has recently developed a stairstep harvest strategy for Tanner crabs, which was adopted by the Board of Fisheries in March 1999. The strategy, as detailed in Section 1.6.1 and Appendix 1, includes lower harvest rates at low biomass levels, and incorporates a threshold female biomass.

B. Bycatch Controls: Bycatch control measures have previously been implemented in the crab, scallop, and groundfish fisheries. These measures could be adjusted to reduce mortality on unharvested crabs.

Option 1: Status quo. Maintain existing Tanner crab bycatch control measures in all fisheries.

Option 2: Reduce the Zone 2 PSC limit. The Zone 2 PSC limit would be set equal to 0.75% of the total C. bairdi population as estimated by the NMFS annual bottom trawl surveys, with a maximum PSC limit of 3,000,000 Tanner crabs.

(a) .5% + 2m TC

Option 3: Request the Board of Fisheries and the Alaska Department of Fish and Game to consider additional measures (such as gear modifications and area closures) to reduce bycatch of C. bairdi in crab fisheries.

C. Habitat protection: Adequate habitat is essential for maintaining the productivity of fishery resources. Measures previously implemented that protect Tanner crab habitat from fishing impacts include several areas where trawling and dredging is prohibited. Essential fish habitat (EFH) has been defined and potential threats have been identified. Additional measures could be implemented to further protect habitat.

Option 1: Status quo. Maintain existing habitat protection measures.

Option 2.: For agency consultation purposes, highlight the importance of Tanner crab EFH in maintaining stock productivity. To the extent feasible and practicable, this area should be protected from adverse impacts due to non-fishing activities.

The alternatives were developed by the Council at their October, 1998 meeting. The options have been proposed by the analysts and Crab Plan Team for discussion purposes. They may be revised or dropped when considered by the Council, and new alternatives and options may be added.

The proposed actions contained in this amendment are timely to rebuild the Bering Sea Tanner crab stock. Although the near-term outlook for this stock is bleak, the 1998 survey encountered a fair number of small crab (30-50 mm CW). These small crabs may represent the cornerstone of stock rebuilding, as protection of these crabs through maturity may pay off in terms of increased spawning and recruitment in future years. Clearly the stock is capable of rebounding in a relatively short time period when conditions are favorable, as was the case in the late 1980's.

Adoption of Alternative 2 (particularly Part A, Option 2) is expected to allow the Bering Sea Tanner crab stock to rebuild to the Bmsy level in 11 years. Adoption of the revised harvest strategy should result in more spawning biomass as more larger male crab would be conserved and fewer juveniles and females would die due to discarding. This higher spawning biomass would be expected to produce good year-classes when environmental conditions are favorable. Protection of habitat and/or reduction of bycatch may reduce mortality on juvenile crabs, thus allowing a higher percentage of each year-class to contribute to spawning (and future landings). Any or all of these actions proposed under Alternative 2 would be expected to improve the status of this stock. No rebuilding benefits are provided by Alternative 1.

None of the alternatives is expected to result in a "significant regulatory action" as defined in E.O. 12866. None of the alternatives are likely to significantly affect the quality of the human environment, and the preparation of an environmental impact statement for the proposed action is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations, fisheries, regulations, gear used, revenues generated, etc.

Alaska Marine Conservation Council

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AGENDA D-2
JUNE 1999
Supplemental

May 21, 1999

RECEIVED
JUN - 1 1999
N.P.F.M.C

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

Re: Agenda Item D-2 b – Bairdi Rebuilding Program, Environmental Assessment (EA)

Dear Chairman Lauber,

The overfished condition of the bairdi tanner crab (*Chionoecetes bairdi*) in the Bering Sea requires a population rebuilding plan under the mandates of the Magnuson-Stevens Act. A management plan for population recovery must include the following elements: 1) a very conservative harvest strategy, 2) minimizing bycatch and bycatch mortality of tanner crab in groundfish and other crab fisheries, and 3) tanner crab habitat protection.

The Alaska Department of Fish and Game (ADFG) has developed an appropriate harvest strategy, stair-stepped to accommodate low, rebuilding stock levels. **We support this harvest strategy, however it must be coupled with effective bycatch reduction and habitat protection in order to have a viable tanner crab population rebuilding plan.**

Bycatch and Habitat

The EA addresses a number of facets of the tanner crab bycatch problem, both in other crab fisheries and in trawl groundfish fisheries. Ample evidence exists, and common sense tells us, that crab bycatch mortality increases with poor handling methods in crab fisheries. **The Bering Sea king crab and opilio fisheries *must* incorporate measures by which tanner bycatch and bycatch mortality are avoided.**

The Board of Fisheries (the Board) has approved the rebuilding harvest strategy developed by ADFG, which regards the tanner crab as occurring in two discrete locations, and seeks to protect their geographic range. In order to protect these stocks, the Board may need to change present time, area, and gear restrictions, and to consider tanner population thresholds when setting quotas in the other crab fisheries. And, although the Board has established a 28-thread cotton rot-twine requirement to eliminate ghost pot fishing, they may need to revisit adequacy of the measure. Obviously, measures designed to reduce gear loss, such as the program of communication between trawlers and pot fishermen last winter, are also to be encouraged. The Council can lead

by sharing and adapting the experience gained in hotspot avoidance, working with both the fixed-gear and trawl fleets.

Trawl fishery bycatch of tanner crab subjects them to mortality directly and indirectly. Direct mortality occurs when the crab are caught in the nets or when they are crushed beneath the trawl gear but not brought up in the nets. Indirect mortality occurs through habitat disruption or destruction, and may be particularly lethal during sensitive life stages. Important prey for tanner crab may be killed or otherwise made unavailable in this same manner. Prey eaten by tanner crab includes a variety of benthic dwellers such as clams, barnacles, polychaetes, ophiuroids, fish, and other crab.

Life stages of the bairdi tanner crab which are particularly sensitive include molting, mating, and the water surface to ocean floor migration of megalopa larvae whereby there they settle and molt into a benthic stage resembling an adult tanner crab. Of course, mature tanner crab in a pre-molt/mating phase represent an important and vulnerable life stage as well. Indirect mortality can occur when defensive or breeding aggregations of tanner crab are scattered.

Bycatch removals enumerated on boat decks describe little of the effects of bycatch on behavioral ecology in the tanner crab life cycle. For example, a fascinating element of tanner reproductive behavior is that primiparous, or female crab with their first egg clutches, have been observed mating in shallow waters in isolated pairs. However, multiparous females, or those females who have had prior egg clutches, mate in deeper water offshore. In 1991, researchers observed large mounds of multiparous females, 50 – 300 in each, surrounded by a ring of mating pairs and unmated males (Stevens et al, 1994). Such behavior, more complex than previously considered, is a clear illustration that human disturbances in the form of bycatch and habitat disruption may have a larger influence on recovering populations than many have thought in the past. Scattering the mounds of females or mating pairs may disrupt mating behavior and ultimately reduce reproductive success. With this in mind, now that the Bering Sea tanner crab have reached the "overfished" status, it is imperative that a comprehensive rebuilding plan be instituted. It must include meaningful measures to reduce bycatch and bycatch mortality of bairdi tanner crab, and adequate habitat measures to protect particularly sensitive lifestages.

Trawl bycatch caps have been in place since the early 1990s. However, as stated in the EA, the industry negotiated tanner bycatch caps established in 1994 are likely too liberal, and could be lowered without impacting the trawl fleet, *since these high levels of bycatch have not been reached in the last four years.* The EA also notes that, "reductions in bycatch limits may not result in measurable improvements to crab stock abundance" *if only this option is chosen.* **Bycatch reduction measures must be coupled with other measures to protect habitat.** The EA goes on to recognize that since tanner crab population levels are so low, then *"any reduction in mortality would slow the decline of the Bering Sea tanner crab stock and improve survival of juvenile crab."*

Trawl bycatch of tanner crab and habitat disruption by trawl gear are inextricably linked. Mortality may be seriously underestimated if one relies solely on what is brought up dead in the net as a measure. Certain tanner crab behavior, such as that of female tanner crab forming high-density aggregations when mating can make them particularly vulnerable to trawl bycatch. Tanner bycatch in groundfish fisheries is not fully understood by merely counting the number of crab taken directly as a portion of the population. Also, feeding ecology and food availability as influenced by oceanographic conditions and habitat disturbances are not easily described. However, the effects of bycatch and habitat disruption on a depressed population can hinder the recovery of a rebuilding population if not addressed in a comprehensive manner. The crab technical team working on EFH requirements for crab in the Bering Sea agreed (NMFS, 1998):

> "All crab species' life stages in the BSAI rely on habitat associated prey. From settling larvae to senescence, crabs dwell on the bottom and are dependent on benthic feeding. The importance of habitat quality to crab diet seems intuitive but is not quantified for benthic life stages. **The team recognized change in diet due to habitat disturbance and alteration will impact crab survival and potentially long term production."**

The concept of habitat protection to assist in crab stock recovery is best illustrated in the recent improvements of the Bristol Bay red king crab stock. The Red King Crab Savings area was closed to trawling first in 1995 by emergency order then adopted as part of Amendment 37 in 1996. In 1999, ADFG noted in its summary report that the majority of commercial harvest (of red king crab) came from the area within the Red King Crab Savings Area in 1996, 1997, and 1998 (ADFG, 1999).

Recommendations:

Alternatives for **bycatch controls should include:**

1. **Additional options for an increased reduction in the PSC should be presented to include .50% of the total *C. bairdi* population or lower, and the overall maximum cap established at *two million tanner crab, or lower.***

2. **Options for stricter crab bycatch control in those trawl fisheries with the highest documented bycatch of tanner crab should be included such as time and area closures in these fisheries.**

Habitat Protection must include options to expand Crab Savings Area and other Habitat Conservation Areas in the Bering Sea to give consideration to sensitive life stages of tanner crab. To accept that "Tanner crab do not appear to have any discrete habitat areas that are required for maintenance of this stock" and therefore conclude that no further

habitat protection is warranted, is completely unjustified in this situation of an overfished stock. The 1998 survey observed a "fair number" of juvenile tanner crab. This is an opportunity to identify discrete areas important to young tanner crab and to continue to use the survey and observer database to map area distribution of tanner crab in the Bering Sea.

Also, the requirements for Essential Fish Habitat (EFH), or "those waters *and substrate* necessary to fish for spawning, breeding, feeding, or growth to maturity", emphasize the importance of habitat conservation especially significant for the recovery of an overfished stock. In its work to describe and identify EFH for tanner crab in the Bering Sea, the crab technical team noted that "protection of crab in molting/mating habitat during this sensitive life history stage is important" (NPFMC, 1998). The options under habitat protection should be expanded to include:

1. **Refine existing EFH information to identify discrete areas important to mating, molting, pre-mating/molting adults, and juvenile tanner crab. Conduct a thorough analysis of important tanner crab habitat by using existing observer database, and survey information in a comprehensive spatial analysis. This analysis should be completed within one year and be incorporated into the tanner crab rebuilding plan for habitat protection from the effects of fishing gear.**

2. **Design and implement seasonal - or year-round where necessary - trawl closures for areas described as important to sensitive life stages of tanner crab.**

3. **Based on the survey and other available information, close known areas of distribution within the CVOA to bottom trawling.**

The status of the tanner crab population and the requirement to establish a viable rebuilding plan for them demands a comprehensive approach for bycatch reduction and habitat protection. Having no directed tanner fishery allowed under current stock abundance addresses only part of a rebuilding plan. Directed catch *and* bycatch remove juvenile, adult, male, and female tanner crab. With the directed tanner crab fishery closed for the foreseeable future, we must ensure that bycatch of these crab in other fisheries is minimal. And we must ensure that tanner crab habitat is protected, especially during sensitive life stages.

Sincerely,

Francine Bennis
Project Coordinator

Reference:

ADFG, 1999. Regional Information Report No. 4K99-10: Bristol Bay Red King Crab Fishery, 1998 Report to the Alaska Board of Fisheries. Division o f Commercial Fisheries, Dutch Harbor, Alaska.

NPFMC, 1998. Draft for Secretarial Review, EA for FMP Amendments 55, 8, and 5 for Essential Fish Habitat.

Stevens, B.G., J.A. Haaga, W.E. Donaldson. 1994. Aggregative mating of Tanner crabs (*Chionoecetes bairdi)* Canadian Journal Fish.and Aquat. Science. 51 (6): 1273-1280.