

MEMORANDUM

TO: Council, SSC, and AP Members

FROM: Clarence G. Pautzke
Executive Director

DATE: June 1, 1998

SUBJECT: BSAI Crab Overfishing Definitions and FMP Update

ESTIMATED TIME
2 HOURS

ACTION REQUIRED

Final review of an amendment to (1) revise definitions of overfishing, MSY, and OY for the BSAI King and Tanner Crab FMP, and (2) update the FMP.

BACKGROUND

National Standard 1 states that conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry. The Sustainable Fisheries Act (SFA), which amended the Magnuson-Stevens Act in 1996, contained several provisions that affected National Standard 1, though the standard itself was not changed. The SFA added a definition of "overfishing" and "overfished," changed the definition of "optimum," required that each fishery management plan specify objective and measurable criteria for identifying when a fishery is overfished and added a section on identifying and rebuilding overfished fisheries. On May 1, NMFS published final National Standard guidelines in the Federal Register to assist the Councils with amending FMPs to conform with new provisions of the Act.

The Crab Plan Team has prepared an EA/RIR to bring our Crab FMP into compliance with the new provisions of the Act. The EA/RIR examines alternative definitions of the overfishing level, optimum yield (OY), and maximum sustainable yield (MSY) in accordance with the guidelines. Two alternatives were considered:

Alternative 1: Status Quo. No revisions to the current MSY, OY, and overfishing definitions would be made, and the FMP would not be updated.

Alternative 2: Redefine overfishing, OY, and MSY, and update the FMP. Updates to the FMP include general housekeeping as well as clarifying language on license limitation implementation schedule.

An executive summary of the analysis is attached as Item D-4(a). The Council is scheduled to take final action at this meeting. There are several outstanding issues that require clarification for the record.

Issue 1: Should MSY be established as a number or formula in the FMP? There are several options available for establishing MSY estimates. The amendment EA/RIR as written specifies MSY estimates as outlined in Option 2. However, the SSC suggested another approach be considered, as outlined in Option 1.

Option 1 (SSC recommendation): Specify only the procedure that will be used to estimate MSY, rather than a point estimate. The SSC felt that this was important for crab stocks which tend to be volatile and affected by climate shifts. MSY would be recalculated each year based on new information. The drawbacks to this option are 1) it would require additional NMFS staff time on an annual basis, 2) is less conservative in that it would allow for MSY and minimum stock size threshold (MSST) to decrease with stock declines, and may never trigger a rebuilding plan.

allow for MSY and minimum stock size threshold (MSST) to decrease with stock declines, and may never trigger a rebuilding plan.

Option 2 (plan team recommendation): Specify point estimates of MSY and fixed minimum stock size thresholds. When environmental conditions shift, MSY and MSST can be re-estimated and the plan can be amended at that time. The drawbacks to this option include 1) less flexibility to adjust to increasing stock sizes (such as Bristol Bay red king crab), and 2) would require a plan amendment to revise MSY estimates. The benefit to this option include: 1) MSST is clearly established so that rebuilding plans would be triggered if stocks declined, 2) annual analysis not required, 3) allows for quick determination of stock status.

Issue 2: How do GHGs relate to OY and MSY, and can GHGs exceed MSY on an annual basis? The current OY established in the FMP is 0.0 to 200 million pounds of king crab (all species combined), 0.0 to 108 million pounds of *C. bairdi*, 0.0 to 333 million pounds of *C. opilio* crab in the BSAI management area. These OY levels were established based on highest observed catch (king crab) and peak survey abundance levels (Tanner crab) during the 1960 to 1986 period. Note that the current OY ranges in the plan exceed the sum of MSYs estimated for individual stocks; this is no longer allowed under the Act. As shown in the attached table, the OY ranges proposed for these complexes are lower than in the current FMP.

MSY estimates contained in the current FMP are also shown in the attached table. These MSY levels were established based on average catches from the beginning of a directed fishery through 1987. As shown in the table, the MSY estimates proposed for the various crab stocks are lower for some king crab stocks, but significantly higher for most Tanner crab stocks. For example, MSY for EBS snow crab would increase from 35 million pounds to 276.5 million pounds.

The industry has expressed concerns about the Bristol Bay red king crab stock. The stock is rebuilding, with a large year class expected to recruit to the fishery over the next few years. Industry has expressed concerns that the proposed 17.9 million pound MSY would constrain the GHGs in the future (see PNCIAC letter, D-4 Supplemental). Note that last year's GHG was established at 7.0 million pounds, but the catch peaked in 1980 at 130 million pounds. The time period used to estimate MSY (1983 - 1997) does not include the period when this stock was at high abundance (1970's).

The guidelines have created some confusion about whether or not annual harvest limits (GHGs or TACs) can be set at levels higher than MSY. Under a simple interpretation of the Act and Final Rule, maximum GHGs would be established at levels less than or equal to point estimates of MSY. However, the guidelines are written so that annual harvests (GHG's) can be higher than MSY, under certain circumstances. Grant Thompson will be providing a detailed presentation of the guidelines to illustrate this. Hence, GHGs for BSAI crab stocks can exceed MSY in some years.

So for BSAI Crab FMP Amendment 7, it seems to me that the best way to proceed is as follows:

1. Take final action on the amendment this meeting, including the FMP update;
2. Adopt the plan team's point estimates of MSY for each stock;
3. Establish OY for each stock as a range of zero to MSY;
4. Note in the FMP that GHG's can exceed MSY on an annual basis as specified by the guidelines, and clarified by Grant Thompson.
5. Amend the plan in the future if we have signs of another regime shift, and prevailing ecological conditions are different than the time period used to estimate MSY.

Comparison of current and proposed MSY and OY estimates for BSAI king and Tanner crab stocks. Estimated values are in millions of pounds.

Stock	Current MSY	Current OY range	Proposed MSY	Proposed OY range	1997/98 Catch
Adak red king	7	-	1.8	0 - 1.8	0
Bristol Bay red king	35	-	17.9	0 - 17.9	8.8
Dutch Harbor red king	11.2	-	NA	NA	0
Pribilof Islands red king	NA	-	1.3	0 - 1.3	*
Norton Sound red king	1	-	0.5	0 - 0.5	0.09
Pribilof Islands blue king	4	-	2.6	0 - 2.6	0.7
St Matthew blue king	3	-	4.4	0 - 4.4	4.6
St Lawrence blue king	NA	-	0.1	0 - 0.1	0
Aleutian Is. golden king	8.8	-	17.9	0 - 17.9	4.1
Pribilof Is. golden king	NA	-	0.3	0 - 0.3	0.01
St. Matthew golden king	NA	-	0.4	0 - 0.4	0
Aleutian Is. scarlet king	NA	-	NA	NA	*
EBS scarlet king	NA	-	NA	NA	0.007
TOTAL king crab	70	0 to 200	47.2	0 - 47.2	18.3
E. Aleutian Is. Tanner	0.7	-	0.7	0 - 0.7	0
EBS Tanner	27	-	56.9	0 - 56.9	0
W. Aleutian Is. Tanner	0.2	-	0.4	0 - 0.4	0
TOTAL Tanner crab	27.9	0 to 108	58.0	0 - 58.0	0
EBS snow	35	-	276.5	0 - 276.5	240
TOTAL snow crab	35	0 to 333	276.5	0 - 276.5	240
E. Aleutian Is. angulatus	NA	NA	1.0	0 - 1.0	0
EBS angulatus	NA	NA	0.3	0 - 0.3	0
E. Aleutian Is. tanneri	NA	NA	1.8	0 - 1.8	0
EBS tanneri	NA	NA	1.5	0 - 1.5	0
W. Aleutian Is. Tanneri	NA	NA	0.2	0 - 0.2	0
TOTAL other Tanners	NA	NA	4.8	0 - 4.8	0

Executive Summary

This Environmental Assessment/Regulatory Impact Review (EA/RIR) addresses alternatives for meeting the NMFS proposed guidelines drafted in response to the Magnuson-Stevens Act provisions for National Standard 1. National Standard 1 states that conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry. The Act did not change the standard, but did change the definition of optimum yield and overfishing.

The Magnuson-Stevens act also requires the Secretary of Commerce to establish advisory guidelines (which shall not have the force and effect of law), based on the national standards, to assist in the development of fishery management plans. Proposed guidelines were published in the Federal Register on August 4. This document examines alternative definitions of overfishing, maximum sustainable yield (MSY), and optimum yield (OY), in accordance with the proposed rule.

This EA/RIR also examines potential impacts of updating the BSAI Crab FMP from its original 1989 version. Proposed updates to the FMP include general housekeeping and clarifying language on license limitation implementation schedule. A revised draft FMP is attached as Appendix 1.

Two alternatives were considered:

Alternative 1: Status Quo. No revisions to the current MSY, OY, and overfishing definitions would be made, and the FMP would not be updated.

Alternative 2: Redefine overfishing, OY, and MSY, and update the FMP. Updates to the FMP include general housekeeping as well as clarifying language on license limitation implementation schedule.

Alternative 2 would improve management of the BSAI crab fisheries by instituting the following conservation measures:

1. Requirement that OY take into account protection of marine ecosystems, that OY be no greater than MSY, and the OY for an overfished fishery allow rebuilding to the MSY level.
2. Revised definitions for MSY based on prevailing ecological and environmental conditions;
3. Revised definitions of overfishing that include both fishing mortality and biomass thresholds; and
4. An updated and user-friendly BSAI King and Tanner Crab FMP.

Language from the Magnuson-Stevens Act 1996.

Optimum Yield: The term 'optimum', with respect to the yield from a fishery, means the amount of fish which --

- (a) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;
- (b) is prescribed as such on the basis of maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and
- (c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Overfishing: The terms "overfishing" and "overfished" mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis.

The BSAI Crab Plan Team recommends the following criteria definitions be established for estimation of optimum yield and overfishing of BSAI crab stocks. These preliminary definitions were based on species life history characteristics and trends in stock biomass estimates.

MSY Control Rule = the natural mortality rate, M; M=0.2 for king crab and
M=0.3 for Chionoecetes sp.

MSY Stock Size = the average mature biomass observed over the past 15 years; 1983-1997.

Overfishing Rate = fishing rate > M.

Minimum Stock Size Threshold = ½ MSY stock size.

Application of these definitions to each stock is shown in the following table. MSY and threshold estimates were derived from average of 1983-1997 survey data when possible. Values of M were estimated from longevity data (Hoenig 1982). Thresholds were calculated as one-half of the biomass level that produces MSY, and was determined by the formula MSY/M/2. Survey data was adjusted for catchability for king crabs, but not for Chionoecetes species.

Estimated values of recommending criteria to define optimum yield and overfishing of selected BSAI king and Tanner crabs. Biomass, MSY, and threshold levels reported in millions of pounds.					
	1997 Spawning Biomass ¹	MSY Control Rule	MSY ¹	Overfishing Threshold ¹	Current Status
<u>Red King Crab</u>					
Bristol Bay	89.0	0.2	17.9	44.8	Above threshold
Pribilof Islands	7.1	0.2	1.3	3.3	Above threshold
<u>Blue King Crab</u>					
Pribilof Islands	8.0	0.2	2.6	6.6	Above threshold
St. Matthew I.	22.5	0.2	4.4	11.0	Above threshold
<u>Tanner Crab (C. bairdi)</u>					
Eastern Bering Sea	64.2	0.3	56.9	94.8	Below threshold
<u>Snow Crab (C. opilio)</u>					
Eastern Bering Sea	994.3	0.3	276.5	460.8	Above threshold

Note that C. bairdi spawning biomass is below the minimum stock size threshold, and hence would be deemed 'overfished', based on the proposed rule. If adopted by the Secretary of Commerce, the Council will be required to develop a rebuilding plan for this stock within one year.

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.

Table 1. MSY estimates for BSAI king and Tanner crab stocks. Estimated values are in millions of pounds. Long-term average catch represents MSY as it would have been calculated under the old FMP. Current average catch is that over the same years as the MSY estimate and may be taken as the average of OY determinations in the same period.

Stock	Long-term Average		Current Average		MSY Estimate	Comments
	Years	Ave. Landings	Years	Ave. Landings		
Adak red king	1960-95	5.8	1983-95	1.2	1.8	Closed 1996, 1997.
Bristol Bay red king	1953-97	30.8	1983-97	10.6	17.9	MSY from survey history; Closed 1983, 1994-95.
Dutch Harbor red king	1961-82	11.3	1983-97	0.0	NA	No current MSY; Fishery closed since 1982.
Pribilof Islands red king	1980-97	0.9	1983-97	1.0	1.3	MSY from survey history; No fishing or closed 1984-92
Norton Sound red king	1977-97	0.6	1983-97	0.3	0.5	Closed 1991.
Pribilof Islands blue king	1966-97	3.3	1983-97	0.8	2.6	MSY from survey history; Closed 1988-94.
St Matthew blue king	1977-97	3.0	1983-97	3.0	4.4	MSY from survey history.
St Lawrence blue king	1979-95	<0.1	1983-95	<0.1	0.1	MSY provisional; Fished in 1979, 1983, 1989, 1995.
Aleutian Is. golden king	1980-96	8.0	1983-96	8.8	17.9	1997-98 season in progress.
Pribilof Is. golden king	1981-96	0.1	1983-97	0.1	0.3	No fishing in 1984, 1990.
St. Matthew golden king	-	-	1983-96	0.1	0.4	MSY provisional; No fishing 1987-89, 1990-91, 1997.
Aleutian Is. scarlet king	-	-	1992-97	<0.1	<0.1	MSY = 0.06 provisional
EBS scarlet king	-	-	1995-96	<0.1	<0.1	MSY = 0.04 provisional
E. Aleutian Is. Tanner	1974-95	0.5	1983-95	0.2	0.7	No fishing 1996-97.
EBS Tanner	1965-96	30.0	1983-96	13.9	56.9	MSY from survey history; closed 1986-87, 1997.
W. Aleutian Is. Tanner	1973-95	0.2	1983-95	0.1	0.4	Closed 1976, 93-94, 96-97.
EBS snow	1965-97	70.7	1983-97	136.6	276.5	MSY from survey history.
E. Aleutian Is. angulatus	-	-	1995-96	0.3	1.0	MSY provisional; no fishing in 1997.
EBS angulatus	-	-	1995-96	0.1	0.3	MSY provisional; no fishing in 1997.
E. Aleutian Is. tanneri	-	-	1993-96	0.5	1.8	MSY provisional; no fishing in 1997.
EBS tanneri	-	-	1992-96	0.5	1.5	MSY provisional; no fishing in 1997.
W. Aleutian Is. Tanneri	-	-	1992-96	<0.1	0.2	MSY provisional; no fishing in 1997.

Pacific Northwest Crab Industry Advisory Committee

Garry M. Larson, Chairman

June 1, 1998

Mr. Rick Lauber, Chairman
North Pacific Fishery Management Council
605 West 4th Avenue, Ste. 306
Anchorage, Alaska 99501-2252

*Rick: disregard
the first letter,
I cleaned up
a few typos.
G*

RE: PNCIAC MEETING, FRIDAY, MAY 29, 1998

Dear Mr. Lauber:

On May 29th, 1998, an emergency meeting of the Pacific Northwest Crab Industry Advisory Committee was convened to discuss the Draft Environmental Assessment /Regulatory Impact Review for Amendment 7 to the Fishery Management Plan for the King and Tanner Crab Fisheries in the Bering Sea/Aleutian Islands (EA/RIR, May 7, 1998). Committee members and public testimony demonstrated considerable concern regarding the ramifications of the Overfishing, OY, and MSY and National Standard Guidelines as they would be applied to crab fisheries management.

In a unanimous vote, the Committee passed a motion calling for this letter and requesting the following:

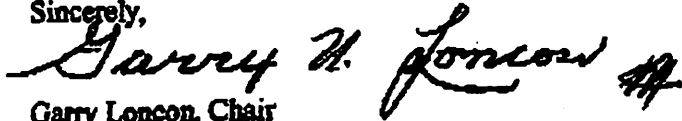
- A written legal opinion from NOAA General Counsel to clarify the confusion regarding whether MSY represents a "cap" on annual quotas, known as Guideline Harvest Levels (GHLs), in the crab fisheries. The NPFMC has relayed to the Alaska Dept. of Fish and Game and to the PNCIAC that the Central Office of NMFS recently stated to the Executive Directors of the Councils at a national meeting, that annual quotas (OYs), may under certain circumstances, be exceeded (or words to that effect), provided that these situations do not jeopardize the capacity of a stock to produce MSY on a long term basis. This is assured through the OY and MSY control rule formulas. In addition, the PNCIAC concurs with the findings and recommendations of the Crab Plan Team as expressed in the Team's letter dated February 2, 1998, to Gary Matlock, NMFS (enclosure). Absent the delivery of a written opinion that resolves the confusion with the definition of MSY, PNCIAC respectfully requests that the NPFMC delay final action on the Crab FMP revisions scheduled for the June meeting.

- The Committee registered further concerns regarding the EA/RIR, specifically the 15 year 1983-1997 time sequence selected by the Crab Plan Team in establishing the "current average landings" period. In the case of some king crab fisheries, particularly the Bristol Bay red king crab fishery, the time sequence represents a time period when the king crab habitat, protected by a prohibition on all trawling by foreign entities during the decade of the 1970s, was liberalized and opened to trawling by domestic trawl boats to encourage Americanization of the Bering Sea groundfish fisheries. The Bristol Bay king crab fishery has been depressed ever since and it is only recently showing significant signs of recovery since the expansion of the no trawl zone in January of 1996 and the implementation of the ADF&G/Board of Fisheries Revised Harvest Strategy for Bristol Bay King Crab in the same year. Thus, a time period reaching back to the mid-1960s would be more appropriate. The Committee noted its endorsement of the rebuilding harvest strategy, including the lowering of the harvest rate from 20% of the mature male biomass under low stock conditions, to 10% of the mature male biomass. This conservative harvest rate is 50% less than the OY Control Rule, a 20% harvest rate.
- In hindsight, the revised harvest strategy for Bristol Bay king crab, is a forerunner of the new MSFCMA guidelines for preventing overfishing and encouraging the rebuilding of depressed stocks, as expressed in National Standard One guidelines. In other words, FNCIAC, as well as other sectors of the industry have been willing to forego fishing opportunities in the near term in hopes of a "robust future" with GHIs in the range of 20, 30 and 40 million pounds. Under the pending implementation of the potential MSY "cap" of 17.9 million pounds, while not likely attainable in the next two years, it could be attainable within three years. Given the MSY estimate proposed for Bristol Bay king crab in the EA/RIR, a lengthy plan amendment process must be completed, in advance of a fishery opening, that would permit a harvest in excess of the MSY average estimate of 17.9 million pounds. Some flexibility must be built into the process to accommodate not only positive environmental conditions that encourage stock rebuilding, but, also to provide industry with an incentive to work with the public on sustainable fisheries management programs that encourage rebuilding of depressed stocks.
- The Committee also requested the endorsement of the Alaska Board of Fisheries on this matter, to maintain, intact, the Board approved Robust Harvest Strategy.
- The Committee also concurred with the Crab Plan Team's concerns for the ten year time period specified for rebuilding under National Standard One, as being inappropriate and too restrictive for Bering Sea crab stocks. Some fisheries have been closed to directed fishing for more than ten years, and subject to little or no bycatch from either groundfish or crab fisheries, yet they exhibit no signs of rebuilding i.e. Dutch Harbor red king crab. Some flexibility should be allowed for bycatch of rebuilding crab stocks, particularly if the directed fisheries are conducted during the late fall and winter seasons, when water temperatures are the coldest, the animals are the hardiest and mortality is minimized. This is the case with bycatch of tanner crabs in the directed crab and cod pot fisheries.

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In conclusion, Mr. Lauber, I can assure you that this issue has raised the concern of all the Committee members and the industry present. The issue is clouded by the conflicting language as published in the Federal Register and the EA/RIR. Please help the crab industry bring clarity to the issue by soliciting a written opinion of the NOAA General Counsel on the MSY issue.

Sincerely,



Garry Loncon, Chair
Pacific Northwest Crab Industry Advisory Committee
c/o 701 Dexter Ave. N., Ste. 403
Seattle, WA 98109
206 283 6605
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Enclosure, 1

cc: Steve Pennoyer, RD/NMFS/AKR
David Evans, Deputy Assistant Administrator, NMFS
Peggy Murphy, Chair, Crab Plan Team

Two terms in the definition of MSY (National Standard 1 - Optimum Yield (e) MSY (1) Definitions (i), p. 41913) "long-term" and "prevailing" need to be clarified to allow appropriate weighting of the terms in development of MSY control rules. The team debated three definitions of the term "long-term": more than a life span, a life span, or a recruitment cycle. The definition should depend on the species, the number of years of available catch data for a stock, and the length of environmental regimes. The term interpreted "prevailing"

The Overview of Issues, Overview of Policy and Rationale Optimum Yield, and National Standard 1 - Optimum Yield sections of the guidelines need to more clearly state the relationships among a target harvest level and the control rules for OY and MSY. In particular, the Overview of Issues section notes, "The main changes relative to the pre-SFA definition include the requirement that OY be no greater than MSY." (p. 41908). Additionally, the Overview of Policy and Rationale section states, "One of the most significant changes made by the SFA is a requirement that OY not exceed MSY" (p. 41910). However, National Standard 1 - Optimum Yield (3) OY (4) (ii) (pp. 41915-41916), states that "target harvest levels may be prescribed on the basis of an OY control rule similar to the MSY control rule . . . but designed to achieve OY on average, rather than MSY." The MSY control rule means "a harvest strategy . . . expected to result in the long-term average catch approximating MSY National Standard 1 - Optimum Yield (e) MSY (1) Definitions (ii); p. 41913). Further, the annual harvest level obtained under an OY control rule should always be less than or equal to the harvest level that would be obtained under the MSY control rule." Hence the OY and MSY control rules are based on catches that can vary above and below the long-term mean catch. We conclude an annual harvest level can exceed MSY because it is allowed to equal the catch under the MSY control rule. The overview in the guidelines leads readers to the erroneous conclusion that MSY provides a "not-to-exceed" cap on the annual harvest level. The Crab Plan Team recommends the guidelines clearly and unequivocally state that an annual harvest level can exceed MSY under the SFA.

The North Pacific Fishery Management Council (Council), Crab Plan Team (team) met on January 6-7, 1998 to review guidelines for the 18 stocks of Bering Sea and Aleutian Islands King and Tanner crab. The team includes experts in the fields of crab biology, population dynamics and modeling, and fishery management and economics. Members are from the National Marine Fisheries Service (Seattle, Juneau, and Kodiak), Alaska Department of Fish and Game (Juneau, Kodiak, and Dutch Harbor), University of Alaska Fairbanks (Juneau and Fairbanks), and the Council (Anchorage). The team carefully debated interpretation of the Magnuson-Stevens Act provisions. National Standard Guidelines during their meeting and we respectfully submit the following comments for your consideration.

Dear Dr. Madock:

Dr. Gary Madock
National Marine Fisheries Service
Office of Sustainable Fisheries
1315 East-West Highway
Silver Spring, MD 20910

February 2, 1998

Postage # of pages 2
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To: A. THOMPSON
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North Pacific Fishery Management Council

Dr. Gary Matlock
February 2, 1998
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conditions as those at the current time implying the average yield may be based on something less than the longest available series of data.

The maximum 10-year restriction specified for rebuilding in the guidelines is arbitrary and does not allow for "taking into account the status and biology of the stock." In particular, the 10-year maximum is inappropriate for BSAI Crab stocks managed under the FMP. North Pacific crab stocks are characterized by patterns of naturally fluctuating recruitment in which short episodes of high recruitment to spawning biomass are interspersed with long periods of low or very low recruitment. Such natural periods of poor recruitment can exceed 10 years for stocks with longer generation times. Red king crab, for example, are relatively long-lived with maximum age estimated at 20+ years and relatively slow growing reaching maturity at an estimated age of 7 years. They tend to be recruited to the fishery at age 8-9 years. Thus it is unlikely to rebuild stocks with just 1-2 years of remedial actions coupled to an 8-9 year time lag. In the western Gulf of Alaska a complete closure of the commercial red king crab fishery for the last 15 years, as well as closures of extensive areas of known crab habitat to bottom trawling and dredging, have failed to rebuild stocks of red king crab. For stocks that have been recruitment overfished, it may be impossible to rebuild them in 10 years without enhancement programs such as hatcheries that have proved cost prohibitive.

The team recognizes that the guidelines allow for the 10-year restriction on rebuilding schedules to be modified when "the biology of the stock" or "environmental conditions" dictates otherwise. However, underlying the specification of a 10-year (or any other) maximum guideline is the assumption that fishing is the only factor influencing fluctuations in stock levels and is unrealistic given random and otherwise unpredictable fluctuations in environmental conditions. The current guidelines will encumber development of rebuilding plans by requiring rebuilding within a fixed time period. We strongly suggest that the guidelines not specify a "not-to-exceed" period for rebuilding rather to define a time period for rebuilding with certainty, guidelines should specify a minimum probability of rebuilding as a target to evaluate management objectives against.

Last, the plan team requests guidance on how to factor bycatch, bycatch effects, personal use and subsistence harvest into rebuilding plans for overfished stocks. Thank you for the opportunity to comment.

Sincerely,



Peggy C. Murphy *for*
Chair, Crab Plan Team