DRAFT BSAI King and Tanner Crab Plan Team minutes
September 22-24, 2003

Members present:
Doug Pengilly (ADFG, chair)
Gretchen Harrington(NMFS)
Bob Otto(NMFS)
Forrest Bowers(ADFG)
Wayne Donaldson (ADFG)
Diana Stram (NPFMC)
Lou Rugolo (NMFS)
Tom Shirley (UAF)
Jack Turnock (NMFS)
Shareef Sideek (ADFG)

Members absent: Herman Savikko (ADFG), Joshua Greenberg (UAF)

Additional personnel attending: Jeff Stephens, Linda Kozac, John Boggs, Heather Brandon (UW student), Denby Lloyd, Doug Woodby, Jie Zheng, Steve Davis, Tom Casey (phone)

The Crab Plan Team meeting was convened at 1pm Monday September 22 at the Alaska Fisheries Research Center, Kodiak. The Bering Sea/Aleutian Islands(BSAI) Crab Plan Team meeting was convened at 1pm Monday, September 22 at the Alaska Fisheries Research Center, Kodiak.

The following agenda was approved for the meeting:

Review Plan Team Terms of Reference
Assemble SAFE and review GHLs
Review Pribilof Island blue king crab rebuilding plan
Review current overfishing definitions
Any additional business

Plan Team Terms of Reference:

The Plan Team reviewed their existing Terms of Reference and discussed the role of the Plan Team in the status of stocks process as well as the necessity for additional plan team meetings. Discussion focused upon the timing of plan team meetings with respect to the stock assessment process. Team members expressed the need for the team to play a more timely role in the stock assessment/status of stocks process. In recent years the plan team's primary role has been to address issues and analyses as tasked by the Council. Given the nature of the deferred state management under the Crab FMP, as well as the timing of GHL determinations, the plan team has not previously taken as large a role in the stock assessment and status of stocks determination as do the groundfish plan teams. The team discussed the fact that the terms of reference do not seem to limit the plan team from having a larger role in this process provided that this is in addition to the currently tasked work of the plan team. The plan team came to the

consensus that at least two regularly scheduled meetings per year would be necessary to adequately address both the status of stocks on an annual basis as well as the normal duties of the plan team work as assigned by the Council (e.g amendments to the FMP and any additional analyses and proposals as they come up). The team agreed that an additional meeting held in the spring of each year would provide for an opportunity to discuss the results of the year's fishery, preliminary stock assessment, assessment methodologies and any additional issues prior to the summer research surveys. In this way, the spring meeting would serve much the same role as with the BSAI and GOA groundfish plan teams' September meetings. The second plan team meeting would then be timed to occur prior to the State's GHL determinations, i.e., generally mid-August. This meeting would focus upon the status of stocks as well as any additional work undergone by the plan team.

It was the consensus of the plan team that adding an additional meeting as well as changing the timing of the fall meeting would allow for more timely status of stocks discussion by the plan team. Currently these issues are discussed at the plan team meeting in September, which generally occurs after the state has made it's GHL determination for all of the crab stocks. It is understood by the plan team that this would not preempt the normal inter-agency consultation process in determining the status of stocks prior to GHL determinations, rather it would allow for an additional advisory body forum, open to the public, to review the status of stocks in a more timely fashion. The plan team is aware that this would increase some of the workload on the team as this status of stocks review work would be in addition to the role already assumed by the plan team under their existing terms of reference. The SAFE report would still be compiled by the Plan Team, but would not be released immediately following the August meeting. Instead, by continuing to produce the report in time for the October Council meeting, there would be additional review time by the Plan Team and authors prior to its' release. The current time frame for compiling the SAFE report does not allow for any additional discussion or review of the report following the Plan Team meeting. The team discussed the practicality of an August meeting prior to determinations of fishery GHLs, some of which must necessarily be announced in mid-August. With regard to an August meeting to review stock status, the team discussed the issues of: 1) timing of availability of summer survey data; 2) time available for data analyses after the data becomes available, distribution of analyses to team members, and pre-meeting review of analyses; and 3) the need to provide 21 days of public notice for the meeting relative to the uncertainties of timing of data availability and the time requirements for analyses and review of analyses. Those issues may not make it practical to expect that the August meeting can be held prior to the determination of GHLs for all stocks in all years. Hence the team included the qualifier "in so far as is practicable" in describing the intended meeting schedule in the revised terms of reference. The team also discussed the additional need meet possibly via teleconference after the August meeting to review GHLs after they had been announced and to finalize the SAFE.

The plan team revised their terms of reference in accordance with these decisions. The revised terms of reference are attached. The changes are contained in Section 3: Organization, part b) Meetings. The revised text now reads (changes shown in bold):

(b) Meetings. A **minimum of two** Plan Team meeting**s** will be held **annually in so far as practicable** to discuss guideline harvest levels, status and management of the BSAI crab stocks. **The timing and scope of meetings, in so far as practicable, will be as follows; a spring meeting will be held with the intention of reviewing the previous year's fishery catch data, the methodology for stock assessment modeling, preliminary stock assessment and any additional issues pertinent to the summer research schedule. A following summer/fall meeting will be held with the intention**

to discuss the status of stocks. This meeting would be intended to occur prior to the GHL determinations by the state. It is understood that this status of stocks meeting does not preclude additional Inter-agency meetings prior to GHL setting. The Plan Team chairperson may call other meetings as necessary. The Crab Plan Team may meet separately or jointly with the BSAI Groundfish Plan Team to discuss areas of joint concern. A draft agenda will be prepared in advance of each meeting by the Council staff in consultation with the chairperson, and may be revised by the Plan Team during the meeting. Minutes of each meeting will be prepared by the Council staff, distributed to Plan Team members, and revised as necessary at or before the subsequent Plan Team meeting. The Chairperson (or designee) will report the Team's finding to the Council.

The Plan Team further agreed to reassess this new system and timing of the two Plan Team meetings after one year to determine if the meetings meet the intentions expressed during the Plan Team meetings.

Stock Assessment Fishery Evaluation Report

The Crab SAFE report was compiled at the meeting. There was discussion of ways to improve the report in the future, including analyses for stocks under rebuilding plans that would show the percent recovery over time with respect to the projected recovery in the rebuilding plan. Additional information and analyses to each stock assessment could also improve the report. In as much as possible the team will strive to add such additional analyses and information presentation as staff time allows.

Review of GHLs

Wayne Donaldson reviewed the state GHL determinations for the following stocks: Pribilof red king crab, Pribilof blue king crab, St. Matthew blue king crab, snow crabs. Forrest Bowers updated the team on the GHL determinations for Bering Sea Tanner crabs and Bristol Bay red king crab. Of those stocks, fisheries will be prosecuted only for snow crab and Bristol Bay red king crab in the upcoming season; fisheries on the other stocks are closed. The information ADF&G used to base GHL determinations on is in the 2003 SAFE.

Pribilof Island blue king crab rebuilding plan

Doug Pengilly presented an overview of the Pribilof Island blue king crab rebuilding plan, amendment 17 to the BSAI crab FMP. The Council mailed the public review draft of the EA accompanying this amendment in late August. Given the compressed timeline for this amendment, this was the first opportunity for a full Plan Team review of the document, though individual plan team members were involved in writing and reviewing the draft. There was some discussion of the model methodology utilized in the analysis of alternative rebuilding plans, specifically the choice of M = 0.3 in the model. It was suggested that in the future there should be a related discussion of the sensitivity of M to model results, the necessity of utilizing biologically relevant life history parameters, and the selectivity and probability of rebuilding. There was discussion regarding the B_{MSY} and MSST used in the model, which are different from the FMP, and how these modeled values compare to those defined in the FMP. Jie Zheng explained that given the truncated age class modeled in the analysis, a lower MSST and B_{MSY} value were used to approximate the rebuilding population level had the entire population been simulated. There was discussion regarding the modeling of recruitment for this stock(cyclic versus random) and how sensitive the stock recovery is to the recruitment pattern.

Given concerns regarding the vulnerability of this stock to overfishing, the poor precision of survey estimates, poor estimates of recruitment and the exceedingly limited bycatch information available for this stock, the only option the Crab Plan Team had consensus on choosing was alternative 3B. This is the most conservative alternative examined, whereby there is no fishing until the stock has completely recovered, and the threshold for opening is such that the fishery is not opened until the second year that the stock is above B_{MSY}. The Crab Plan Team discussed the other alternatives, particularly alternative 2D which was identified by the Council in June as being their preliminary preferred alternative. However, in discussing threshold and harvest rates the team's consensus was that the fishery should not be opened until the second year over the chosen threshold, that the threshold should not be less than 10 million lbs, and that the harvest rate selected should be less than 15%. Alternative 2D approaches a 15% harvest rate, and there were concerns that this would be too aggressive a harvest strategy for this vulnerable stock.

Dr. Robert Otto also presented Pribilof Islands blue king crab distribution information from the NMFS trawl survey, which indicates that the distribution of blue crab has changed in recent years following changes in water temperature. The water temperature in traditional areas of blue king crab habitat has increased, causing blue crab to move into pockets of colder water. This may inhibit rebuilding because these new cold water areas do not have the habitat characteristics blue crab are known to depend on, such as shell hash and rocky substrate. This information indicates a conservative rebuilding harvest strategy is warranted.

Review of overfishing definitions

The plan team reviewed the current overfishing definitions in the FMP for BSAI king and Tanner crab stocks. The current overfishing definitions were adopted under Amendment 7 as proposed by the Crab Plan Team and adopted by the council in 1998. During the development of Amendment 7 the plan team recommended that the overfishing definitions be reviewed five years after the adoption of Amendment 7.

Robert Otto presented a review of the current overfished/overfishing definitions. The 22 king and Tanner crab stocks managed under the FMP were classified into 3 tiers according to level of data availability: Tier 1 – unsurveyed stocks with minimal history of effort and harvest; Tier 2 – stocks with sporadic or limited years of survey data, but well documented history of catch and effort; Tier 3 – stocks with annual survey data, well documented history of catch and effort, and information pertaining to productivity parameters. Otto's presentation focused on definitions for the stocks classified as Tier 3. Those are the six stocks that are annually surveyed by the NMFS EBS trawl survey: Bristol Bay red king crab, Pribilof red king crab, St. Matthew blue king crab, Pribilof blue king crab, eastern Bering Sea Tanner crab, and eastern Bering Sea snow crab.

For the Tier 3 stocks, the MSY control rule, the maximum fishing mortality threshold, $B_{MSY,}$ the minimum stock size threshold (MSST), and MSY were defined as functions of survey estimates of total (male and female) mature biomass (TMB), and a fishing mortality rate (F) set equal to an estimate of the natural mortality rate (set at M=0.2 for all species of king crab and M=0.3 for all *Chionoecetes* species).

The MSY control rule is

$$SY = TMB*F.$$

This MSY control rule was defined as Baranov's catch equation applied to TMB under the assumption that TMB estimated at the time of survey is the average TMB available for the year and because size, sex, and fishing season dates are optimum yield choices that can vary from stock to stock.

The maximum fishing mortality threshold is defined by the MSY control rule.
B_{MSY} for a stock is defined as the average annual estimated TMB for the 15-year period, 1983-1997.

MSST for a stock is defined as one-half of B_{MSY}.
MSY for a stock is defined as the average of the annually computed SY over the 15-year period, 1983-1997.

Alternative procedures for determining overfished/overfishing definitions were presented by Shareef Siddeek and Jack Turnock. Siddeek presented methods for estimating overfishing harvest rate thresholds, target harvest rates, and minimum spawning stock thresholds using a size-based, per- recruit simulation method. Turnock presented a method for annually determining MSST and overfishing rates in the context of a stock assessment model.

After discussion, the plan team concluded with consensus that an analysis of a new FMP amendment revising the current overfished/overfishing definitions was warranted. The team agreed that the present definitions in the FMP did not provide clear guidance for determining if overfishing is occurring or for developing harvest strategies that avoid overfishing. The MSY control rule was defined to allow for a range of possible OY choices that have not been made and are not likely to be made in the future. Sex and size limit restrictions for harvesting are applied to the fisheries for all FMP stocks and there are seasonal harvest restrictions for most stocks, including each of the six Tier 3 stocks. The MSY control rule and the maximum fishing mortality threshold as defined do not reflect those realities of crab fishery management. State harvest strategies are developed to control the harvest of the exploited portion of the stock; however, under the maximum fishing mortality threshold as defined, harvest strategies could be developed without such controls that would clearly result in overfishing while not exceeding the maximum fishing mortality threshold. Moreover, the work by plan team members in the years since adoption of Amendment 7 indicate the need to evaluate alternatives to the current practice of estimating F_{MSY} by setting equal to an estimate of M.

Given those considerations, the method for estimating B_{MSY} and MSST under Amendment 7 deserves review. Additionally, under Amendment 7 the overfished/overfishing definitions are fixed numbers that do not allow for inclusion of any new information. Work by plan team members since adoption of Amendment 7 indicate that overfished/overfishing definitions defined as a frameworked method, rather than a fixed number, need to be analyzed.

A work group was formed by the plan team to lead the analysis of a new FMP amendment to revise the overfished/overfishing definitions. The work group consists of three plan team members, Lou Rugolo, Jack Turnock, and Shareef Siddeek, and Jie Zheng of ADF&G. This workgroup plans to convene its' first meeting within the next two months and at that time they will draft preliminary alternatives for analysis as well as a detailed schedule and workplan for the FMP amendment. Preliminary guidance for the workgroup was provided by the Crab Plan Team and is attached to the minutes (see Attachment, "Draft Guidance to Workgroup"). This draft guidance also includes a preliminary schedule for analysis and presentation to the Crab Plan Team and Council. The team noted that the workgroup may also examine and offer advice on other issues related to overfishing and stock status in addition to the overfished/overfishing definitions; for example, determination of rebuilding timeframes. The Plan Team targets having an EA and

overfishing/overfished amendment for Council initial review in June 2005.

Additional Items

The plan team discussed the lack of current genetic research being conducted and the need for emphasis in genetic research priorities. Tom Shirley noted that the CPT would benefit from CPT membership for a geneticist.

The meeting adjourned at 3pm on Wednesday September 24, 2003.

Addendum to BSAI King and Tanner Crab Plan Team Meeting Minutes
22-24 September 2003

Louis Rugolo
4 October 2003

Forward:
The limited time schedule following the Crab Plan Team meeting did not allow opportunity for review and comment by team members. The material in this addendum would be inserted on p.5 before the 4th full paragraph beginning with "After discussion, ...". While it has been distributed to them, this addendum similarly has not benefitted from review and comments by team members. The responsibility for its contents rests with is that of the author.

Upon opening the discussion topic of *Overfishing Definitions and Fisheries Management Plan*, Lou Rugolo was asked by the CPT Chairperson to summarize the technical limitations with the overfishing definitions in the BSAI King and Tanner Crab FMP [FMP]. The following is an annotated outline of the points addressed:

1. The definition of 'overfishing' and 'overfished' in the plan:
   There is inconsistency in the FMP and Amendment #7 concerning these definitions.
   a. SFA requires that overfishing status criteria must specify both a maximum fishing mortality threshold and a minimum stock size threshold. Stocks are assessed as to whether the maximum fishing mortality threshold is exceeded and whether the stock is below the minimum stock size threshold.
   b. SFA states that 'overfishing' is occurring if the fishing mortality rate [F] exceeds that required to produce maximum sustainable yield [MSY] on a continuing basis..
   c. SFA states that a stock is 'overfished' if its biomass is below the minimum stock size required to produce MSY on a continuing basis.
   d. The BSAI King and Tanner Crab FMP defines an 'overfishing' threshold based on a catch standard measured as sustainable yield [SY].
   e. That SY catch standard is derived in a manner that is not technically or theoretically consistent with SFA 'overfishing' and 'overfished' standards. [Items 10, 12 and 13].

2. The MSY control rule of the FMP:
   The FMP states:
   "MSY control rule ... is the mature stock biomass ... exploited at a fishing mortality rate equal to ... natural mortality. Overfishing is defined ... as any rate of fishing mortality in excess of the maximum fishing morality threshold, F_{MSY}. The maximum fishing mortality threshold [MFMT] is defined by the MSY control rule, and is expressed as the fishing mortality rate. The MSY fishing mortality rate $F_{MSY}=M$."
   a. The MFMT is defined by the control rule as a fishing mortality rate F, and is set equal to $M=F_{MSY}$.
   b. Amendment #7 supercedes this definition, and defines 'overfishing' based on a fishery catch standard SY computed as TMB * F_{MSY}.
   c. This latter definition is theoretically inconsistent.
      i. SY is not computed on the exploited portion of the stock.
      ii. TMB includes mature female biomass which are not a component of direct exploitation.

iii. TMB includes mature males of smaller size than the effective minimum size limit, and of shell condition which are not a target of the directed fishery or main component of yield.

d. The SY catch standard is inconsistent with the MSY control rule which defines overfishing in terms of a rate of fishing mortality F_{MSY} in excess of M.

e. Application of the Amendment #7 catch standard-based overfishing definition results in exploitation rates in excess of F_{MSY} on the exploited stock [see Item 13].

3. Co-application of instantaneous fishing mortality rate [F] and annual exploitation rate [u]:

Lack of specificity in FMP allows F and u to be used interchangeably.

a. The annual rate of exploitation [u] corresponding to a target F rate [e.g, F_{MSY}] is:

$u = F * [1 - e^{-(F+M)}] / (F+M)$ where M and F co-occur.

$u = 1 - e^{-(F)}$ where M and F do not compete for deaths.

Using the instantaneous rate of fishing mortality [F] in computational formulae requiring the exploitation rate [u] results in substantial overestimation of the target u rate and allowed catch removals.

b. The fully recruited rate of fishing mortality F and the fishery selectivities should be employed in and amended overfishing definition to:

i. avoid confusion over the proper exploitation rate to use.

ii. what is the exploited stock in question.

4. Application of F_{MSY} is inconsistent with its definition:

a. F_{MSY} is a yield-based type of biological reference point [brp] and does not pertain by rule to, or is based on exploiting the mature component of a stock.

b. Other brps exist which are designed to conserve [or exploit] a certain fraction of mature stock biomass. For example,

i. $F_{\%MSP}$ - the equilibrium fishing mortality rate which would conserve a fixed percentage of the maximum spawning potential of a stock on a SSB/R basis.

c. The plan overfishing definition is the catch standard [SY] computed as $TMB*F_{MSY}$. This is inconsistent with the concept of fishing a stock at F_{MSY}.

d. The catch standard should be derived using the exploitation rate corresponding to F_{MSY} as: [u_{MSY} * ESB], where ESB is the exploitable component of stock biomass, and considering discard losses.

5. Baranov (1918) Catch Equation mis-specified:

The catch equation $C=F*A/Z$ is incorrectly applied in setting the catch standards - hence, in setting the operational overfishing definitions of the plan. This results in underestimation of actual exploitation rates and overestimation of harvest goals.

a. Exploitation rates are calculated on survey biomass which is the maximum biomass defined at the start of the 'biological' year consistent with the time of the survey. This is not average stock biomass over the year required by the catch equation if F is used as the multiplier instead of u.

b. In this application, losses from the stock due to natural mortality are not accounted for in estimating the exploitation rate corresponding to target F_{MSY}.

6. Discard mortalities not properly incorporated into harvest rates:
   a. In some cases, discard mortality is estimated in models as part of M. Accordingly, losses from the stock due to discards from the directed fishery or from non-directed bycatch are improperly assigned to the intrinsic instantaneous rate of natural mortality [M] of the species.
   b. Such modeling exercises are required to translate the overfishing definitions in the plan to total direct and indirect removals from the stock by the fishery that correspond to the target F_{MSY} rate.
   c. Lack of incorporation of these losses results in overestimation of the target u rates and allowed catch removals.

7. The values of instantaneous rate of natural mortality M specified in the plan are inconsistent with the basic life-history of these species.
   a. They are overestimated resulting in biologically risk-prone outcomes in terms of target or threshold F rates or exploitation rates.
   b. Current estimates are based on a method [Hoenig 1983] for estimating Z for lightly exploited stocks using observed mean oldest age [t_{MAX}] in the stock. The method was not applied to crustaceans or to virgin populations.
   c. Current practice in ICES, and as adopted in other Federal fishery management plans, is based on the longevity method of Anthony [1982].
   d. The method of Hoenig estimates M to be 40% higher than the ICES approach across the range of maximum ages corresponding to longevity. When used to derive overfishing definitions based on target fishing morality rates, this difference provides more risk-prone management outcomes.

8. Annual estimates of M are not integrated from the overfishing definitions in the plan.
   a. The concept of the intrinsic rate of natural mortality is decoupled from the MSY control rule specified in the plan.
   b. In some cases, M is estimated each year by simulation models effectively as a 'catch basin' category for all stock losses not attributed to direct fishery removals.
   c. Estimates of M can exceed that specified in the overfishing definition of F_{MSY} without modification of the target F_{MSY} or MFMT goals.

9. Concept of Z_{MSY} not addressed by plan overfishing definition.
   a. The instantaneous rate of total annual mortality [Z] is defined as M+F, where F includes all direct and indirect losses.
   b. Estimates of F_{MSY} are customarily an emergent property of theoretical population dynamic modeling whose value depends on the specified M. That is, if the value of M changes, so would the value of F_{MSY}.
   c. While we accept that M may change inter-annually, or may be age or size-variant, empirical studies are commonly lacking to provide such understanding.
   d. The principle embodied in the Magnuson-Stevens Act of fishing at F_{MSY} is that, given a value of M specified for the species, the plan will define conservation and management measures to maintain total annual losses at or below the sum of $F_{MSY}+M$. Hence, at or below $Z_{MSY} = F_{MSY}+M$.

e. The overfishing definitions in the plan allow M to be estimated annually in excess of that specified, while the harvest quotas remain estimated using the full F_{MSY}. By such application, the realized Z is allowed to exceed Z_{MSY}, often dramatically, without meeting the overfishing test standard.

10. Sustainable yield [SY] as computed using the plan overfishing definition is theoretically inconsistent.
    a. The SY in any year, or MSY for a stock, results from the population's inherent production characteristics.
    b. SY is meant to represent a measure of stock production which can be removed from the stock in excess of that necessary to provide stock replacement. It is often based on long-term dynamic equilibrium theory.
    c. The Bering Sea crab stocks under plan management have not demonstrated the ability to replace total annual losses or to maintain themselves in equilibrium. Instead, stock have fallen to levels below their compensatory reserve.

11. B_{MSY} for each stock is defined as the average annual survey-based estimated TMB for the 15-year period, 1983-97.
    a. The principal BS crab stocks were not in equilibrium, dynamic or otherwise, with their environment during this period. Instead, they illustrated significantly, systematic declining trends in overall abundance.
    b. They were at levels of stock biomass which would not provide maximum sustainable yield [MSY] by definition.
    c. Computing benchmarks of B_{MSY} or MSST using this 15-year time period in effect underestimates threshold levels of stock biomass used to define the 'overfished' test standard of SFA, or the 'overfishing' standards using measures of stock biomass as applied in this plan.
    d. This lowered bar of stock thresholds results in more risk-prone outcomes in terms of judging stock health, stock recovery or overfishing.

12. A conceptual mismatch exists between the stock component used to estimate annual harvest goals and the component of the population exploited by the fishery.
    a. As noted, harvest goals are estimated using TMB which includes all mature animals of all sizes and both sexes.
    b. The fishery exploits only a segment of the male stock, and not females directly. This results in removals from the vulnerable stock at rates of F in excess of targets specified in the overfishing definitions of the plan.
    c. The TMB estimate is computed using animals throughout the Bering Sea geographic range of the species.
    d. The fishery operates in a portion of this range thereby exploiting local stocks disproportionately at F > target F.
    e. With opilio, for example, the fishery mainly exploits local stocks in the southern / eastern [of 173° W. Longitude] for practical considerations. That is, the fishery does not fish randomly across the range distribution from which TMB is estimated.
    f. This leads to high rates of exploitation born by specific segments of the stock and to localized depletions. Changes in spatial distributions of BS opilio over time demonstrates the clearly.

13. The application of the MSY control rule for determining overfishing based on whether harvest exceeds SY is inconsistent with the definition of overfishing.
Using the 2003 numbers, an example was presented of this inconsistency.

2003 overfishing standard for opilio as applied in the SAFE:

a. TMB in 2003 = 306.2 million pounds.
b. SY would be 306.2 million pounds * F_{MSY} [0.30] = **92 million pounds**.
c. As defined, if the retained catch is < 92 million pounds, overfishing is not occurring.
d. The 2003 survey estimated 65 million males in the stock ≥4".
e. At 1.27 lbs/individual [used in GHL calculation] = **82.6 million pounds**.
f. Thus, the applied MSY control rule would allow every male ≥4" to be taken by the fishery [since 82.6 < 92 million pounds] without meeting the overfishing threshold standard of the plan.

14. Two additional plan elements were proposed to be included in the plan amendment:
    a. A Limit Reference Point [LRP] System [Caddy 1998] for gauging the annual status of the stocks [sos].
        i. Caddy's 'Traffic Light System' is an approach for identifying and enumerating meaningful indices of stock status. These are evaluated annually so as to derive an aggregate index of stock health.
        ii. This method was proposed to replace the current simple determination as to where current stock biomass is relative to a single level.
        iii. Several classes of LRPs were discussed for illustration.
        iv. Annual sos determination would be based on the aggregate index of stock health which would provide guidance to the harvest setting process.
        v. Target vs. limit reference points were discusses, and their use in an overfishing control rule to define a 'F Buffer Zone' between the 'F Target Zone' and the 'F Overfishing Zone'.
    b. A Tier System for prescribing maximum fishing mortality threshold [MFMT] rates as adopted in the BSAI Groundfish FMP, with modification.
        i. The Tier System in the Groundfish plan corresponds to orders of information availability. With the exception of lesser BS crab stocks, the order of information on the principal stocks is comparable and should enable estimates of thresholds corresponding to the top tiers in the groundfish plan.
        ii. It was proposed to merge the Limit Reference Point System and the Tier System so as to derive MFMT values considering current health and status of the stocks.
        iii. The combined systems would be useful in terms of revised overfishing definitions, and for advising appropriate F_{OFL} values.

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9/26/03 Draft guidance to working group on examining/revising BSAI crab FMP amendment 7 (overfishing definitions):

1- Workproduct:

- Overall product is an amendment to the FMP (amendment 18) which proposes to revise the overfishing definitions specified in amendment 7 to the BSAI crab FMP. Along with the amendment is an EA which analyzes the impact of the proposed preferred alternative in the amendment as well as a range of reasonable alternatives.
- The EA will include an analysis of the current overfishing definitions (specified in amendment 7) and their application under the FMP. This is the status quo management process and is one alternative under consideration in the EA (to retain the existing definitions).
- The EA will also consider a range of alternatives to status quo. There is no set number of alternatives that must be considered, but a "reasonable" range must be considered
- Alternatives should not be limited to only biomass-based MSY definitions. The range of alternatives should be broad enough to evaluate other methodologies for measuring overfishing and establishing biological reference points for indicators of stock status.

2- Additional ideas for consideration

- Frameworked methodologies rather than absolute numbers should be examined whenever possible to allow for greater flexibility for incorporation of the most recent scientific information on an annual basis(without constantly amending the FMP)
- Sensitivity analysis should be included when analyzing reference points. E.g., the 'robustness' of 'optimum' in relation to the assumptions etc.
- An examination of the distinction between 'target' and 'threshold or limit' reference points
- Be mindful of information availability versus seasons and dates that are included within the frameworks

3- Planning guidance for workgroup

- Stay current with National Standards review re: timing, findings, etc.
- Review SSC comments from March 2000 Council meeting(opilio rebuilding plan guidance)
- Keep Crab Plan Team members informed regularly of workgroup meetings and progress (progress reports and minutes as much as possible of workgroup meetings)
- Council, state and agency staff will assist the workgroup as necessary. Council staff will be available for workgroup meetings as much as possible.
- Written reports should be submitted to the CPT members at least 2 weeks prior to a meeting to insure that everyone has adequate review time
- The draft work schedule/timeline is as follows:
    - 1st meeting of workgroup Oct/Nov 2003 (schedule for workgroup, internal timelines)
    - Progress report to CPT Sept 2004(verbal update at the proposed May 2004 meeting as well as regular updates as necessary in writing to CPT)
    - Crab PT review of workgroup draft (includes amendment and EA for the amendment) January 2005
    - Initial review by Council June 2005

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- Final action by Council October 2005

PLAN TEAM FOR THE KING AND TANNER CRAB FISHERIES
OF THE BERING SEA/ALEUTIAN ISLANDS

TERMS OF REFERENCE

(as revised by the Plan Team 9/24/03, changes from 12/95 draft are in **bold**)

1. Establishment. The North Pacific Fishery Management Council (Council) shall establish a Plan Team for the king and Tanner crab fisheries of the Bering Sea/Aleutian Islands (BS/AI) area. The Plan Team will provide the Council with advice in the areas of regulatory management, natural and social science, mathematics, and statistics as they relate to the king and Tanner crab fisheries of the BS/AI area.

2. Membership. Plan Team members will be appointed from government agencies, academic institutions, and organizations having expertise relating to the crab fisheries of the BS/AI. Normally, the Plan Team will consist of at least one member from the Council staff, the National Marine Fisheries Service (NMFS), the Alaska Department of Fish & Game, the University of Alaska, and other universities and institutions. Alternate members may be assigned to participate in case a member cannot attend a meeting. With the consent of the sponsoring agency or institution, nominations may be made by the Council, the Scientific and Statistical Committee (SSC), the Advisory Panel (AP), or the Plan Team. All nominations will be subject to approval by the SSC, with the Council retaining final appointment authority. Appointments should reflect the Plan Teams' responsibility to evaluate and make recommendations on management, biological, economic and social conditions of the fisheries.

3. Organization. The Plan Team will be directed by a chairperson, and may divide some of its responsibilities among work groups organized according to subject matter. A work group may also include members from the BS/AI groundfish Plan Team. Each work group will be directed by a work group leader.

   (a) Rules of order. In general, rules of order will be informal. Plan Team decisions will be reached by consensus, whenever possible. If a decision is required and consensus cannot be reached, the opinion of the majority will prevail. In representing the Plan Team publicly, the spokesperson will take care to relate Plan Team opinions accurately, noting points of concern where consensus cannot be reached.

   (b) **Meetings**. A **minimum of two** Plan Team meeting**s** will be held **annually in so far as practicable** to discuss guideline harvest levels, status and management of the BSAI crab stocks. **The timing and scope of meetings, in so far as practicable, will be as follows; a spring meeting will be held with the intention of reviewing the previous year's fishery catch data, the methodology for stock assessment modeling, preliminary stock assessment and any additional issues pertinent to the summer research schedule. A following summer/fall meeting will be held with the intention to discuss the status of stocks. This meeting would be intended to occur prior to the GHL determinations by the state. It is understood that this status of stocks meeting does not preclude additional Inter-agency meetings prior to GHL setting.** The Plan Team chairperson may call other meetings as necessary. The Crab Plan Team may meet separately or jointly with the BSAI Groundfish Plan Team to discuss areas of joint concern. A draft agenda will be prepared in advance of each meeting by the Council staff in consultation with the chairperson, and may be revised by the Plan Team during the meeting. Minutes of each meeting will be prepared by the Council staff, distributed to Plan Team members, and revised as necessary at or before the subsequent Plan Team meeting. The Chairperson (or designee) will report the Team's finding to the Council.

(c) Selection of officers. Officers (Plan Team chairperson and work group leaders) will be selected at the meeting preceding the annual Plan Team meeting or as vacancies arise. The Plan Team chairperson will be selected at the annual meeting for two-year terms. Work group leaders will be selected for one-year terms. There will be no limit on the number of consecutive terms that officers may serve.

4. Functions. The Plan Teams' primary function is to provide the Council with the best available scientific information, including scientifically based recommendations regarding appropriate measures for the conservation and management of the BS/AI king and Tanner crab fisheries. All recommendations must be designed to prevent overfishing while achieving optimum yield (National Standard 1). All recommendations must also be scientifically based (National Standard 2), drawing upon the Plan Teams' expertise in the areas of regulatory management, natural and social science, mathematics, and statistics. Finally, uncertainty must be taken into account wherever possible (National Standard 6).

(a) SAFE report. The Plan Team compiles a SAFE report for the BS/AI king and Tanner crab fisheries on an annual basis. The SAFE report provides the Council with a summary of the most recent biological condition of the crab stocks and the social and economic condition of the fishing and processing industries. The SAFE report summarizes the best available scientific information concerning the past, present, and possible future condition of the crab stocks and fisheries, along with ecosystem concerns.

(b) Plan amendments. The Plan Team may also play a role in the development and evaluation of amendments to the BS/AI king and Tanner crab fishery management plan, as well as evaluate amendments to the groundfish fishery management plan that may affect the conservation and management of BS/AI crab resources.

(i) The Plan Team may evaluate amendment proposals and forward their recommendations to the Council.

(ii) In addition, the Plan Team may develop their own amendment proposals.

(iii) Once an amendment proposal has been accepted for consideration by the Council, an analytical l team should include at least one member from the Plan Team, drawn from the appropriate working group(s), whenever possible.

(iv) Once an amendment analysis has been completed, it may be reviewed by the Plan Team. The the SSC, AP, and Council.