

Crab Plan Team Report

May 16-18, 2005

Seattle , WA

Members present:

Bob Otto (Chairman) (NMFS), Forrest Bowers (Vice-Chair) (ADF&G) , Doug Pengilly (ADF&G), Diana Stram (NPFMC), Gretchen Harrington (NMFS), Lou Rugolo (NMFS), Jack Turnock (NMFS), Wayne Donaldson (ADF&G), Tom Shirley (UAF), Joshua Greenberg (UAF), Shareef Siddeek (ADF&G), Herman Savikko (ADF&G)

Public and state and agency staff present:

Doug DeMaster (NMFS-AFSC), Pat Livingston (NMFS-AFSC), Denby Lloyd (ADF&G), Brent Paine, Glenn Reed, Jack Tagart, Dave Benson, Keith Colburn, Ken Tippit, Arni Thomson, Lance Farr, Jie Zheng (ADF&G), Gary Painter, Steve Hughes, Girard Conan, John Boggs, Tom Kohler (ADF&G, phone), Terry Cosgrove, Eric Peterson, Erik Olsen, Russ Nelson (AFSC/RACE-NMFS), Michelle Goheen, , Rob Rogers, Kevin Kaldestad, Phil Hanson, Bill Widing

Introductions, Review agenda, additions to agenda, approve September meeting CPT minutes

The meeting of the Crab Plan Team convened on Monday May 16th, 2005 at 12pm at the Alaska Fisheries Science Center, Seattle, WA. The following agenda items were agreed upon for the meeting:

- Introductions, Review agenda, additions to agenda, approve September meeting CPT minutes
- Issues related to snow crab abundance estimates based on trawl survey data, discuss analysis of spatial distribution of snow crab surveyed abundance and harvest
- Review of State/Federal action plan for Crab FMP
- Review 2004 BSAI FMP crab fisheries
- Economic aspects of BSAI crab fisheries
- Norton Sound red king crab stock status review (*Note: 1pm time certain*)
- Review of stock assessment models and stock status projections
- Summer research issues, BSFRF survey issues
- Crab overfishing amendment workgroup review
- Update on crab rationalization
- New business, September meeting schedule, other issues

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The team gratefully acknowledged the hard work and dedication of Dr. Tom Shirley who will be stepping down from his Crab Plan Team duties as he leaves UAF for a position with Texas A&M. Tom has been a dedicated member of the team for many years and his insights and participation will be sorely missed.

The team approved the September 2004 minutes. These will now be posted on the Council website.

Issues related to snow crab abundance estimates based on trawl survey data, discuss analysis of spatial distribution of snow crab surveyed abundance and harvest

The team discussed the paper entitled “AFSC Response to Questions for Crab Plan Team on Estimates of Snow Crab Abundance”. Bob Otto took the lead on reviewing the discussion items in the paper. Discussion was organized by numbered subject heading according to the questions and responses contained in the paper.

Question #1: What is the best estimate of abundance for the snow crab stock, based on the data available from 2004?

In addition to summarizing the material presented in the paper for this question, Bob provided the team with an overview of the history behind the problems encountered with the 2004 snow crab survey estimate and graphs of the 2000-2004 snow crab survey indices. There was no additional discussion by the team regarding this and no public comment.

Question #2: How did the precision of the abundance estimate change with and without the additional tows from the BSFRF charter vessel in 2004?

Bob again provided an overview of the information presented in the discussion paper and provided additional detail (following questions from the public) regarding the nature of the underlying problem with the survey results in the previous year and years past. A review by the NRC of the time series data indicated that approximately 14 stations are missing at various times throughout the series, and specifically from 1996 on there are 3 stations that are almost always consistently absent. This is likely due to a problem between decoupling the plotting procedure from the estimation procedure. The problem exists for all crab species whose assessment is dependant upon the annual survey but is less problematic for all stocks but snow crab. The relative impact on snow crab abundance estimates varies by year depending upon the relative density at the stations (and was not unidirectional). These calculations are all in the process of being re-evaluated. NRC is currently working on the blue king crab data.

Question #3: Is there a more efficient survey design for the BSFRF vessel in terms of precision?

Bob summarized the information in the discussion paper, noting that various methods of stratification and survey design are possible and changes in abundance will occur depending on how the data is stratified. Usually these data are stratified by management area. Bob provided an overview of the problems encountered and the reasons why the survey often conducts multiple tows, sometimes via cooperative surveys or unplanned additional tows.

Doug Pengilly noted that the survey was initially designed for king crab not snow crab. Bob concurred but added that there are weighting problems relative to multiple tow areas and some primary stratification (e.g. east and west of 173°) that are designed specifically for snow crab.

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Question #4: How should the precision and accuracy of the 2004 snow crab abundance estimate be factored into the GHL setting process?

Bob reviewed the summary information and noted that it is difficult to incorporate variability in the survey inside of one season. There is additional on-going research regarding the vulnerability of crab species to the net and the estimates will need to be revised accordingly when these results are available. Discussion ensued of the upwards adjustment applied to the abundance data to account for the mean net width. It was noted that this is a flat adjustment and does not vary based upon net efficiency. The snow crab assessment model incorporates net selectivity but the trawl survey estimate does not. Further discussion focused upon the different adjustments which could be made to account for catchability and the inherent gear optimization problems with using a single type of trawl for all species of crab and finfish in a multipurpose survey. However, it was noted that it would be financially impossible to utilize different nets for finfish and crab in the current survey.

Question #5: How can CPUE of the commercial harvest in a given year be used to estimate abundance directly or used to supplement the survey-based estimate of abundance?

Bob reviewed the information in the paper. Forrest noted the difficulty in using commercial CPUE as a direct correlation for abundance, particularly in short fishery seasons where there is inadequate time to monitor CPUE. Wayne Donaldson further noted that while commercial CPUE is often quite useful for fishery management, in cases where there is available survey data this should be the primary source of information. Discussion focused on the use of CPUE as an indication of a potential problem (e.g., low CPUE indicating potential conservation concerns) but for management CPUE should be used only in cases where no additional information is available. Public comments from John Boggs noted that some note should be made of commercial CPUE and some merit given when population estimates are notably flat while CPUE continues to rise. It was noted by team members that it is difficult to detect where CPUE is representing concentrated crab population rather than overall stock abundance, and that assessment information is on a broader scale and the fine-scale vessel CPUE examination is not feasible for management.

Arni Thomson requested comments on the use of CPUE data in the AI brown crab fishery as a strong source for estimated the GHL while a triennial survey is still done in this region. Forrest noted that the survey is not designed to generate overall abundance estimates, rather it is designed to estimate harvest rates in a small portion of the AI region. Therefore in this instance management is dependant on fishery data which is very useful for management, however this is only one source of the data used to manage this data-limited fishery. Other sources include tagging data, catch rate of legal males, sub-legal males, fecundity in females, distribution, shell age and size. A relative abundance estimate is used here rather than an absolute abundance estimate.

Question #6: Can the CPUE of commercial harvest be used to make inferences regarding trends in snow crab abundance (total) or the abundance of 4-inch male snow crab?

Review of this information in the paper was linked with the previous discussion of question number 5. Dave Benson asked if it would be possible to look at a fish-down effect by evaluating data from the Olympic fishery in comparison with the CDQ fishery. Discussion by team members noted that this would be difficult given the different variables for comparison and the relative timing of each. It was noted that this has been examined but in the absence of a controlled experiment, it is difficult to make any conclusions regarding this. The CPUE appears to be variable year to year thus precluding the conclusion of an absolute fish-down effect.

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Question #7: What is the best estimate of natural mortality of 4-inch male snow crabs?

Jack Turnock reviewed the summary information in the discussion paper as well as on-going work with respect to natural mortality estimates by the CPT working group for the revision of overfishing definitions. Discussion focused on how the working group estimated this new natural mortality rate for snow crabs and how this comported with snow crab aging work in other regions. Lou Rugolo noted that some Canadian tagging data corroborates these estimates. Tom Shirley also concurred that some recent research that he has been involved in estimating aging of snow crabs also corroborates these estimates. The team also discussed recent results from work elsewhere on radiometric shell aging and longevity of crabs, noting the expensive involved in these types of research projects.

Question #8: Is the estimate of snow crab abundance negatively biased?

This question was already discussed previously with respect to snow crab survey issues. The team continued previous discussions on the issues involved with the area-swept calculations and the distinction between area-swept calculation adjustments and net efficiency adjustments. Jack Tagart raised concerns that the net width estimate is negatively biased while the efficiency could be positively or negatively biased and that this should be acknowledged in the white paper. Lou Rugolo noted that it was true that there are selectivity issues with the net and the ad hoc adjustment approach was not intended to compensate for non-selectivity adjusted estimates. Additional comments from the public requested information and consideration of what portion of the net width is actually on the bottom during tows and how is this accounted for in the calculations. It was noted that previous survey results saw a distinct difference when the tickler chain was utilized.

The team members agreed that there are many issues with respect to this that need to be considered. It was noted that many of these would be better addressed through modeling techniques, though other team members disagreed and discussed that improved tuning could be looked at as well as rigging the net for stabilization and improved tow to tow performance.

Question #9: Does the current procedure for estimating snow crab abundance appropriately account for any negative bias in the survey data?

Much of this was noted to have been previously discussed with respect to the survey adjustments which are applied. Bob noted that future directions for estimating abundance are towards improved modeling techniques which would incorporate more information than simply net and survey information.

Question #10: What is the fecundity of mature female snow crab? Does the fecundity rate of mature female snow crab vary by latitude (or by water temperature)?

Bob summarized information in the paper and noted that there are two main issues here, one the relationship between size and fecundity and the other regarding the indications that in cold water areas crab do not necessarily spawn annually. The team had an extended discussion regarding the tendency towards biennial spawning dependant upon water temperature. It was noted that on-going research in Canada as well as laboratory studies at University of Washington and Juneau corroborate this finding. Discussion focused upon what the possible trigger mechanisms are that cause this biennial spawning mode. It was noted to be related solely to water temperature with hypotheses of the ability to detect the spring bloom (via excess organic material on the bottom) triggering eggs to hatch coincident with the spring bloom.

Doug DeMaster noted that the fraction of mature female crabs that have clutches compared to the fraction with fully fertilized clutches was not considered in answering this question. Bob Otto commented that while we do not have adequate data on that right now there is information

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available on Tanner crabs. He noted that additional aspects that could have been included in addressing this question include the change in snow crab distribution and the impact on annual production due to the proportion of females in biennial spawning mode. Lou noted that during the summer survey when females are observed with a clutch, the assumption is that this clutch is fertilized. He noted that we do not know at this time what the implications may be if this assumption does not hold true. The team discussed the management implications of biennial spawning and the potential to impact the threshold levels examined for the overfishing definitions. It was noted that how this will be incorporated into the harvest control rules has yet to be determined. Lou noted that he is working on developing an index of female reproductive potential in order to improve upon the existing survey convention of listing a clutch score. Bob noted that while egg production as compared to subsequent recruitment is quite useful to examine he cautioned that this is still a complicated issue and other factors are also related

Question #11: Can the 2004 survey data and commercial catch data be used to test the snow crab localized depletion hypothesis (as discussed by the CPT at the September 2004 meeting)? It was noted that localized depletion of snow crab was a discussion item at the September 2004 CPT meeting not a hypothesis. Bob presented overlays of percent of crab catch from the survey with percent of crab catch from the commercial fishery. It was noted that the fishery is concentrated because the resource is concentrated. The concentration of the resource appears to be north and east of concentrations observed in the current fishery.

Discussion focused on survey station K24 which has represents the largest station in the present survey as well as over time historically. Questions were posed regarding the possible uniqueness of K24 habitat and why crabs appear to concentrate in this region. This was noted to be an important question to resolve thought currently understanding of why the crabs concentrate here is not well known. Bob noted that in examining shell condition of crabs, "old" shells appear to be dominant in this area, though in 2004 very old shells (which have a high incidence of barrenness) were dominant.

The team discussed concerns regarding the high concentration of very old shell crabs observed in 2004, coupled with the high incidence of barrenness in this category. Lou noted that this could represent a problem given that for two years the fishery has been concentrated in this area, there is evidence of aging of females and low recruitment to this area. The question of to what extent there may be disproportionate harvest on this area was discussed. Lou indicated that the exploitation rate is inappropriately specified if it is specified for the entire stock when the fishery exploitation rate continues to concentrate on this region.

Jack Tagart noted that there is a mismatch between the summer survey and the winter fishery and that the harvest rates subscribed by area should be based upon the abundance estimates at that time. Girard Conan commented that maps of abundance by age could be made available to the fishermen in order to assist them in fishing and avoiding vulnerable segments of the population. The team discussed that while this might be a good idea the winter fishery does not necessarily coincide with the summer age distribution.

Review of State/Federal action plan for Crab FMP

The team discussed the State/Federal Action plan, which is included in the FMP and was last addressed in 1993. Doug DeMaster indicated that Doug Mecum (ADF&G) had requested that this State/Federal Action plan be revised in order to reflect the State/Federal protocol and schedule for providing the abundance estimates necessary to establish GHs (and eventually

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TACs). The team agreed that if it is the intention of both agencies to revise this agreement, that it would be appropriate for the CPT to review and comment on it.

An extended discussion was held on the language in the Action Plan with respect to the role of the Crab Plan Team and the utility of specifying a schedule for meeting dates necessary for abundance estimates to calculate GHs (and TACs). The team reviewed their existing Terms of Reference and added the following language to them to reflect the need to be specific regarding the meeting schedule and the role of the CPT.

To the section on meetings the following was added:

“The fall meeting shall be held at a time that ensures the availability of TAC specifications for the allocation of crab resources under crab rationalization”

To the section on functions, the following was added:

“(c) Peer Review. The plan team deliberations shall constitute part of the peer review process specified by current OMB policies provided that members directly involved in the production of a scientific product will recuse themselves from the review.”

The section on “Peer Review” was added per the team’s understanding that it was necessary for the team to act as a peer review group per OMB guidelines. The team had an extended discussion regarding the nature of the peer review process and what products were to be reviewed by the team: was it to be only the area-swept estimates of abundance, or were all stock assessments (state or federally authored) to be included in this peer review? Opinions on the team differed as to what should fall under the peer review process.

The team’s discussion focused on two aspects that would be included in the peer review: 1) the status of stocks relative to overfishing and 2) the NMFS abundance estimate given to the state for purposes of managing the fishery. To what extent additional items would be included in the peer review was disputed but left unresolved.

The CPT unanimously agreed to act as a peer review body, but notes that there are substantial concerns and questions remaining regarding how this process will occur and be applied. The CPT seeks guidance from both the SSC and the Agency on the appropriate means to adhere to these peer review guidelines. The team also noted that there are specific timing constraints with respect to acting as the peer review body including the timing of providing a review of data prior to the utilization of that data in assessing and managing the fishery.

Discussion by the team focused on timing needs for the September Plan Team meeting (2005) and the timing constraints imposed by the issuance of quotas in the fall. The team discussed the ability to meet and review data on a compressed schedule to meet arbitration requirements. ADF&G is committed to establishing TACs by October 1st. The team noted that the survey abundance estimates need to be reviewed by the team prior setting the TACs and in a reasonable time frame for the ability to meet both CPT review and OMB requirements. The team was unable to resolve the timing of the September meeting without further guidance on the due date for establishing TACs. The team also noted the difficulties posed by scheduling of other meetings and plan teams during that time period.

The team further recommends that both agencies carefully consider the membership on the plan team relative to those producing products to be reviewed by the team.

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The team made several recommendations and comments for revisions to the State/Federal Action plan. These are the following:

1. Change GHL to TAC where appropriate
2. Recommend that the second paragraph (under the role of the CPT) be revised to more adequately reflect the process and the role of the Crab Plan Team
3. Change the third paragraph (same section) regarding the plan team's input to the Board of Fisheries. This should be changed such that the purpose of the report is not to describe the GHL or TAC-setting process. The sentence should be changed to the following (with all remaining sentences deleted): "The Plan Team shall compile an annual SAFE report to be provided to and reviewed by the State, NMFS and the Council and made available to the public on an annual basis."
4. Recommend that the State/Federal Action plan incorporate by reference the Terms of Reference for the Crab Plan Team for further clarifications or revisions to the function of the team.

Norton Sound red king crab stock status review

Tom Kohler briefed the team (by phone) on the Norton sound red king crab fishery and an overview of the fishery history and stock status. He provided some tables and overview charts of the population estimates and modeling results. He noted that there is evidence of increased recruitment in 2004. He indicated that model estimates for 2005 are the highest on record and results indicate that the population has peaked and is now expected to decrease in 2006 and 2007. Discussed focused upon the harvest rate which is applied to this stock for the GHL. Tom indicated the harvest rate was very conservative and approximately 8% of legal males for the GHL. The harvest rate was established on the portion of the male crab population that is marketable. The harvest rate is specified such that it can be as high as 10% but that the department felt that 8% was a more appropriate exploitation rate. It was noted that this fishery is specifically constrained by ice.

Review 2004 BSAI FMP crab fisheries

Forrest Bowers provided the team with an overview of the 2004 fisheries. Preliminary handouts were provided to the team and made available to the public regarding the overview by fishery. This information was preliminary but will be finalized and included in the SAFE report in the fall of 2005.

Review of stock assessment models and stock status projections

No information on stock assessment models or projections was available for discussion at this meeting. Staff timing and availability precluded model projections at this point, however it is the intention that CPT discussion in the future will include projections of stock status at this Spring meeting to the extent that this is possible.

The spring meeting was identified as a time when models may be reviewed by the team prior to their use in stock assessments (similar to the process employed by the groundfish plan teams). It is the team's intention to review the snow crab assessment model in the spring of 2006. This model has not yet been employed to establish the abundance estimation used in establishing the GHL and will not be used for that in the fall of 2005.

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Economic aspects of BSAI crab fisheries

The team discussed the information which would be useful for inclusion in the economic chapter of the 2005 Crab SAFE report (to be compiled at the fall 2005 CPT meeting). Some team members expressed that currently economic and socio-economic considerations are not being included in the determinations of OY/MSY/TAC, although others indicated that this does occur via public testimony to the Board of Fisheries. Lou Rugolo expressed that there is a lack of fisheries economic sections in existing FMPs and that expanded economic assessments should be included.

The team seeks guidance from the SSC on what information should be included in the economic chapter of the SAFE report? The team noted that under crab rationalization additional economic information will be available and that it would be important to not duplicate existing efforts. It was discussed that it would be useful to have both pre and post IFQ discussion of data included in the SAFE report. The team felt that the SAFE report would be a useful place for summarizing and synthesizing existing information.

The team discussed the intent that both Council staff and AFSC economists will be analyzing new information following the implementation of crab rationalization. Some questions by team members on the nature of this information and questions for future studies included the following: what types of new data will be reviewed annually? How will industry realign itself in the revised fishery? What will happen to pots and fishing behavior under crab rationalization? What will be the impact of a longer time period for fishing? How might TAC procedures change?

Gretchen Harrington informed the team that NMFS and the State will be preparing annual reports summarizing much of this new data. The team requested that Council staff (Mark Fina) or AFSC staff (e.g. Ron Felthoven) participate in a fall or spring CPT meeting to brief the team on what information will be available following the implementation of the new program and if (spring meeting) information is available, to summarize some of the preliminary finding for the team at that time.

Update on crab rationalization

Wayne Donaldson updated the team on issues for the State in implementing crab rationalization. These issues include the following: season start dates, Bairdi management, pot limits and changes to observer coverage.

Gretchen Harrington provided an overview of on-going federal issues for crab rationalization including the issuance of quota, electronic reporting requirements, processor quotas, binding arbitration and economic data reporting requirements. Summer research issues, BSFRF survey issues

Summer research issues, Bering Sea Fisheries Research Foundation survey issues

Dr. Russ Nelson, deputy director of RACE (NMFS) provided the team with an overview of the summer research issues and the BSFRF cooperative. He noted that this cooperative research effort is something that the AFSC is committed to continuing and that this is likely the only means of expanding existing crab research efforts given the current budgetary constraints on increasing government resources. He reviewed the 2004 research plan and results of the

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cooperative research last summer as well as plans for 2005. 2005 plans include expanded opilio stations to the north and east of the standard survey area.

Terry Cosgrove, the president of the BSFRF provided an overview of the foundation and a list of projects planned or underway. He noted that the foundation has contracted Dr Girard Conan and Dr. Jack Tagart for research projects including reviewing model methodologies and the upcoming revision to overfishing definitions. He noted that the foundation would like to see an open peer review process.

Gary Painter discussed the long-term science goals of the foundation and indicated the interest of the foundation in including ADF&G in an upcoming MOU for cooperative research. He noted that the foundation would also like to sponsor a workshop for the exchange of scientific knowledge which would be open to the public as well.

Dr. Steve Hughes provided the team an overview of some recent finding by the NRC on the review of 2003 and 2004 red king crab and opilio survey data. He discussed some stations that were omitted by NMFS resulting in an underestimate of crab abundance estimates. He noted that results from this review indicated that how strata are handled in the abundance estimation procedure is very sensitive to population estimates and that this should be evaluated more closely.

Dr. Girard Conan provided an overview of current research on snow crab abundance estimation and survey design. He noted that summer research in 2005 in the Bering Sea will be conducted to evaluate improved survey design methodology and design. The focus in 2005 will be on red king crab.

The team had extended discussion of additional issues with respect to the summer research and noted some problems and concerns in the use of these additional data. The team commends the foundation on their continued efforts but notes that many issues remain to be resolved in the ability to incorporate these data into existing assessment and survey efforts. The foundation staff noted that the purpose was on improving the overall long-term survey methodology and greater precision of survey estimates.

Crab overfishing amendment workgroup review

Jack Turnock provided a brief update on the on-going work by the plan team's overfishing workgroup in revising the existing overfishing definitions. He noted that they do not yet have results to show to the team at this point and workgroup members are still struggling with scenarios and parameter estimation and resolving lingering details with model structure and model scenarios. He noted that there are currently two alternatives being considered by the group, 1-status quo and 2-frameworked reference points in the FMP. He noted difficulty amongst the workgroup members in reaching consensus upon some issues. The team requested that options be included under alternative 2 in cases where the work group is divided on which direction is preferable.

The team discussed the natural mortality estimates in the white paper (agenda item 1) and requested clarification on how these will be included, will M be estimated or frameworked in the plan. Jie Zheng indicated that it would be based on the 1% rule. The team questioned to what extent the FMP amendment would include a mechanism for estimating M. Jack indicated that while this idea was included in the original workplan (devised by the workgroup) it was not

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included in the on-going work and it was unclear to what extent this would be included in the revision.

Jack Tagart requested clarification on what additional options might be included and what issues the work group is struggling to come to consensus on. Siddeek provided an example of the use of females only for effective spawners or using total male and female, as well as consensus regarding the mating ratios and stock-recruitment relationships for some stocks. Natural mortality was also noted to be problematic as to the use of male or female or what the appropriate value should be.

The team discussed the timing of this amendment package and the potential for review by the team. The work group felt that a realistic timeline for completion of the analysis (and the subsequent EA) would be the following:

December 31st, 2005: workgroup report completed and sent to CPT members for review
January: CPT meeting to review and provide guidance on workgroup report. Report will be made available to the public at plan team meeting.
April: Initial Review by SSC/AP/Council of EA.

New business, September meeting schedule, other issues

The team noted that with Tom Shirley leaving, they will need to solicit an additional team member, preferably someone with a crab research perspective from academia. The timing of the September CPT meeting has not yet been determined and is contingent on resolving the timing of the start date for the season with respect to crab rationalization and binding arbitration.

The meeting adjourned at 2:30pm on Wednesday May 18th.