# Crab Plan Team Report

The Crab Plan Team convened their Fall meeting from September 16-18, 2008 at the Alaska Fisheries Science Center in Seattle, WA.

All Crab Plan Team members were present:
***Forrest Bowers (ADF&G-Dutch Harbor), Chair***
***Ginny Eckert (UAF/UAS), Vice-Chair***
***Diana Stram (NPFMC)***
***Doug Pengilly (ADF&G-Kodiak)***
***Gretchen Harrington (NOAA Fisheries –Juneau)***
***Wayne Donaldson(ADF&G-Kodiak)***
***Jack Turnock (NOAA Fisheries/AFSC-Seattle)***
***Shareef Siddeek (ADF&G-Juneau)***
***Herman Savikko (ADF&G-Juneau)***
***Lou Rugolo NOAA Fisheries /AFSC-Kodiak)***
***André Punt (Univ. Of Washington)***
***Bill Bechtol (UAF)***
***Bob Foy (NOAA Fisheries /AFSC-Kodiak)***
***Josh Greenberg (UAF)***

Members of the public (and state and agency staff) present for all or part of the meeting included: Anne Vanderhoven(BBEDC), Arni Thompson(ACC), Gretar Gundersson (Fishing Associates), Ron Nomuma, Linda Kozak,Erik Olson(NorthWest Farm Credit), Garry Loncon(Royal Aleutian Seafoods),Rob Rogers (Icicle),Jie Zheng(ADF&G), Keith Colburn(F/V Wizard),Phil Hanson(Unisea), Scott Campbell(F/V Seabrooke), John Jorgensen (Alaska Crab Producers Coop), Brett Reasor(Royal Aleutian Seafoods/UNISEA), Jeff Chrush(University of Washington), Heather Lazrus(Pacific States Marine Fisheries Commission), Jack Tagart(Tagart Consulting), Jim Stone (Ocean Fisheries), Doug Woodby(ADF&G), Mark Gleason(University of Washington), Stuart Fritz(F/V Seabrooke), Dick Tremaine(NSEDC), Kevin Kaldestad(MCH Coop).

## *Administration*

*Agenda*
The team approved the attached agenda for the meeting after noting that the assessment for St. Matthew blue king crab would be taken up first under stock assessment review. Linda Kozak requested the CPT address the proposed North Aleutian Island basin oil drilling and the potential impacts on red king crab stocks. The team noted that other agencies are already evaluating this, and the team will request a brief presentation from the relevant agency personnel in May to advise the team as to the status of the analysis and projected impacts on crab.

*Review and Approve Minutes*
The Team reviewed and approved the May 2008 minutes: Minor editorial changes from the draft version as circulated were noted.

*Revise Terms of Reference*
The team revised their terms of reference to better reflect the intent of the OFL review process and the current terms for CPT officers. The revised TORs are attached.

*Election of officers*
The team unanimously re-elected Forrest Bowers (Chair) and Ginny Eckert (Vice Chair) for two year terms.

*Annual Catch Limit (ACL) discussion*
Diana provided the team an overview of the status of the proposed rule for ACLs, and the Council's comment letter to the agency regarding the proposed rule. She noted that the Crab FMP will need to be revised to allow for ACLs, which may be equal to or less than ABCs. This will represent a major amendment to the Crab FMP and to the nature of State/Federal management given that ABCs are not currently established annually for crab stocks. For the Pribilof blue king crab stock or any stock where overfishing is occurring, the FMP amendment to revise the rebuilding plan and accommodate new ACLs needs to be approved in 2010 (i.e. possibly by the end of 2010). The CPT will receive copies when the final ACL rule is published and then plan to discuss amending the FMP accordingly.

*Upcoming CPT meetings*
May 2009 meeting: week of May 11th. Timing: 3-4 days (May 12-15th), Location: Anchorage or Girdwood.
September 2009 meeting: September 15-17th Location: AFSC, Seattle.

## *Economic discussions*

*Crab Rationalization Program overview*
Glenn Merrill provided an overview presentation of the Crab Rationalization Program; its structure, and current modifications and concerns. A short overview document was provided for the team (appended to minutes). The Team commented on the extent to which other economic factors may be affecting observed economic impacts in the fishery. Forrest noted that consolidation of the crab processing sector began prior to the implantation of the CR program. Trends in other fisheries provide information on observed changes such as consolidation of the fishery. The concerns of exceeding TAC is less of an issue now under rationalization; previously the risk of overharvesting was always high despite stringent management efforts to conservatively manage the fishery

Lou requested a summary of information regarding the net economic impact of the program with respect to crew size, efficiency, employment and other factors. The intent of the economic reporting requirements were to begin to characterize these changes. However, Glenn noted that the complexity in evaluating crew data is difficult and pre-rationalization data against which the current employment situation can be compared are limited. Obtaining estimates of the value of quota shares is difficult given that there are not many trades (such as with the halibut and sablefish quotas) on which to estimate relative value. Josh questioned the ability to track quota value changes to better characterize trends. Siddeek requested additional information regarding the highgrading issue. Glenn noted that the only example of highgrading to date was in the BBRKC fishery during the first year of implementation, following a decrease in the TAC. The snow crab fishery continues to be an issue however with respect to the difference between the legal size and the preferred market size.

Discussion by members of the public referred to the Council's ability to choose to hold auctions under the MSA and the problems this could pose. Glenn noted that to date this has not occurred and in fact seems unlikely.

*Economic SAFE discussion*

Brian Garber-Yonts provided the team an overview of plans for contributions to a Crab Economic SAFE report modeled on the Groundfish Economic SAFE. This includes development of a core set of tables to be updated annually in the Crab Economic SAFE. He also noted several draft papers that were provided to the team for possible inclusion in the SAFE report. The team discussed what, if anything, to include in this year's SAFE report and to what extent the presented contributions are to be included this year given the inability of team to review and comment effectively on them. Garber-Yonts noted that AFSC was not advocating for inclusion of the papers in the SAFE, but that he had been contacted regarding the Crab SAFE on short notice and the documents provided had been requested by members of the CPT despite his explanation that they would not be available in time to review.

The team discussed the timing for reviewing economic information in order to include and synthesize this information into the Economic SAFE for Crab annually. The team discussed how these documents should be reviewed annually, and how to formulate a crab economic SAFE. Team members noted that many analyses are being directly reported to the Council and should not necessarily be included as a plan team contribution, both to avoid repetition as well as avoid some inappropriate plan team approval of something outside of the team's expertise by virtue of including it in the SAFE report.

The team decided to appoint a work group (Josh Greenberg, Forrest Bowers and Gretchen Harrington) to meet with AFSC economists and discuss what should be included in an economic report. This would facilitate the CPT's ability to take ownership of the information presented in the SAFE report. The team discussed the necessity of reviewing some form of draft chapter at the May 2009 meeting so that it can be included in the following SAFE report.

*Summary of EDR data*

Brian Garber-Yonts provided a summary of EDR available information, the context under which data are collected, and the status of a validation review (PNCIAC public review). The SSC and Council will discuss and deliberate on this at the October meeting. Reports from PNCIAC and AFSC will be provided to the Council. Some issues with data quality were noted. Brian noted that resolving the data quality issues has slowed down the ability to do any analysis on these data for the 3 year review.

Glenn Merrill requested clarification regarding other papers being prepared and to what extent they rely on EDR data, noting that the validity of those data are being currently examined. Brian noted that agency peer-review requirements for academic publications and the Council's determination of the utility of the data are not necessarily similar. Thus some scientific publications are being prepared using the EDR data irrespective of the Council's determination of the adequacy of these data. Diana and Glenn both commented regarding the difficulty this may pose when these peer-reviewed publications are then employed elsewhere and/or cited to the Council for management purposes if the underlying data itself were flagged initially as questionable. There was considerable concern expressed that EDR data would be used for scientific publications by AFSC economists prior to resolving issues related to the validity of these data. Brian replied that the distinction he had drawn was a technical point and that in fact, regarding the EDR data, AFSC has determined to use the Council's process for data quality assessment and the SSC as the peer-review body for purposes of satisfying federal Data Quality Act requirements for the EDR database. He also noted that none of the studies referred to have advanced to the stage of performing analysis of EDR data and none included EDR variables that have been identified in the Council's data quality review as problematic.

*Crew Community issues*

Heather Lazrus provided an overview of a draft paper on crew member issues. She highlighted where some of the sectors of the target community are under-represented in this research (eg. former crew members) and how the authors are trying to either caveat this or work to increase their data in these categories. She indicated the author's desire for additional feedback on their data limitations and findings to continue to improve their study. Forrest suggested that captains or boat owners be contacted to obtain contact information for crew members (current or past). The team discussed the conclusions in the paper as related to safety. Heather indicated that rationalization is a necessary step to improving safety, but it does not on its own ensure any increase in the safety of operations. Forrest noted that while delivery schedules between processors and harvesters may be agreed upon preseason, in practice they are not closely adhered to and that conclusions in the paper suggesting that delivery schedules are compromising safety might warrant further attention. Heather commented that there may be a difference in scheduling constraints based upon the season and fishery in which sampling occurred with differences among fisheries and individual vessels based on their historical relationships with processing plants..

Heather noted that one purpose of this paper is that it will be used as a platform to highlight issues that may merit further consideration. This could be to focus further study or suggest augmentation of existing data collections efforts. However she noted that the paper is final as currently drafted and will be published as preliminary findings. Questions were posed regarding the statistics as reported in Table 4. Glenn noted that the use of pre- and post-rationalization impacts are also affected by issues such as fuel costs and quotas and other background changes in the prosecution of the fishery. These are qualitative issues but important to discuss in conjunction with expressed conclusions regarding consolidation.

*Import pricing model*
Mike Dalton provided an overview of a model being constructed to evaluate import prices and Alaska wholesale prices for king crab. This report is being provided in conjunction with the Council's 3 –year review of the CRP. André noted that the author could explore models in which: (a) there is a 0-lag covariate to allow immediate impacts to be considered, and (b) test the restriction of zero-correlation in errors between prices. There could be some possibility of a within-season effect that is not yet considered.

The author responded to André's suggestions by noting that the form of the system with i) zero-correlation between errors and ii) contemporaneous (i.e. 0-lag) covariates is known as a structural VAR. The structural VAR has a parameter identification problem and can yield inconsistent parameter estimates. This problem is overcome by writing the structural VAR in reduced-form which is the model that was presented. In this case, the reduced-form error terms are linear combinations of the (uncorrelated) structural errors. Consequently, the covariance matrix of the reduced-form VAR can have non-zero correlation between error terms even though the structural errors are uncorrelated. If zero-correlation between errors in the reduced-form VAR is not rejected, then effects of 0-lag terms in the structural VAR are not significant.

André noted that the length of the time series (n=16 years) probably means low power in the tests that were presented.

André noted a trade-off between forecast intervals among the 3 models that were presented. In particular, the order-3 model involves estimating more parameters, creating wider forecast intervals, and thus may only give the appearance of a better comparison between predicted and observed values.

The team greatly appreciated the presentations provided by the AFSC economists and looks forward to cooperative efforts to develop an Economic SAFE report for BSAI crab.

## *Survey Overview*

Bob Foy provided an overview of the 2008 NMFS EBS trawl survey results for crab. Bob noted that several stations were re-sampled after the survey due to the delayed molt status of red king crabs in the original sample. Average bottom water temperatures were much colder this year than in previous recent survey years. The team discussed the implications of the strategy of re-tows and how these tows are treated in stock assessments Bob noted that the NMFS Kodiak lab will be working this winter to revise their calculations and to standardize and document their methods. Bob noted that the lab intends to also revisit historical hot spot calculations (including cold spot calculations) and evaluate the impact of modifying these calculations using data for historical surveys. New survey estimates of abundance will include coefficients of variation (CV). Consideration will be given to effects of hot spots on abundance estimates, fixed versus actual footrope width in the CPUE estimates, and differences in fishing power between vessels.

Steve Hughes presented an overview of the results of the BSFRF trawl survey. He noted the differences between the NMFS survey and the BSFRF survey, including the survey area, the sampling protocol, the net width and the tow time. The ability to have comparable data by virtue of the changes to the footrope, doors and other changes may compromise the ability to compare with historical data from NMFS due to effective changes in selectivity. Lou commented that the observed differences in length frequency modes between 2007 and 2008 could not be a consequence of growth alone, as was indicated in the presentation.

Scott Goodman provided additional comparative information on the results from the NMFS and BSFRF surveys. Jack noted that the two surveys do not occur at the same time so there is the potential for animals to shift locations between when the two surveys take place. Plots of bottom water temperature and crab density between years show inconsistent relationships. Andre noted that it would be useful to use the results from the NMFS and BSFRF surveys to enable estimates of survey catchability (with associated measures of precision) to be computed. These estimates could be used to inform whether the results of the assessment would be impacted by their inclusion.

Steve Hughes discussed the potential to continue this survey as a cooperative venture with ADFG and NMFS. He noted that they will hold a workshop with NMFS and ADFG early in 2009 to review the science and background of the survey and to discuss policy issues in the cooperative effort. He requested any comments from CPT members on this cooperative survey and presence at the workshop.

## *Groundfish Fishery Bycatch*

Jennifer Mondragon provided an overview of the NMFS catch accounting system and bycatch estimation procedure. Brian Mason was available to answer questions regarding the observer program procedures for sampling. Questions have been raised in the past by the team and assessment authors regarding the spatial and temporal availability and resolution of groundfish bycatch data. Crab are estimated by number not weight and no mortality rate is applied to the data. This estimate is then extrapolated to the unobserved fleet by federal reporting area. Jennifer noted that the data could be reported at finer resolution (ADF&G statistical areas) than federal reporting areas, but this was not possible at present. She stated that she could work within the needs of assessment authors to provide data at the resolution needed for assessments and management advice. Assessment authors need to provide Jennifer with specification (spatial, temporal and fishery) for how they would like the bycatch data to be reported.

Historical reports will be only available at the federal reporting area level, but future reports will be available on finer scales because each trip will be reported by state statistical area on production reports next year. Data are estimated by week, target and fishery.

Team members asked questions regarding the availability of VMS data and the potential for more spatially explicit resolution for catch reporting. Steve Lewis is currently working on a model which could use these data.

Some authors noted that having the information on both the gear and target of the fishery is useful. This would also allow for additional information on the relative level of observer coverage. The team discussed the necessity for variance estimates on bycatch to meet proposed ACL requirements. NMFS Catch Accounting is working on assessing this for the future. Mid-June is still the target time period for acquiring annual bycatch data from groundfish fisheries. Data are reported by crab fishing year from July 1-June 30$^{th}$.

The estimates of the weight of crab in bycatch is currently calculated by multiplying bycatch in number by the average weight of crabs in the sample. Jennifer requested feedback from the CPT on this procedure. André suggested that these data (bycatch in number, bycatch in weight, and average weight) should be reported to the individual assessment authors. The team agreed that there should be an approved protocol for calculating bycatch (in weight) for each assessment to avoid the application of *ad hoc* subjective decisions on annual basis. There is an explicit difference between data that would be useful to the assessment authors for model fitting (i.e.

using numbers of crabs not mean weight) from the data that is needed to debit against the accounting for OFL purposes to determine annual overfishing.

Authors commented that bycatch length-frequency information is also necessary, but is limited. Jennifer noted that a subset of the team could evaluate an appropriate protocol for estimating bycatch length-frequencies. The team requested that Bob Foy be the point person between the assessment authors and NMFS Catch Accounting for obtaining bycatch data at the appropriate scale to be useful to assessment authors. Bob Foy is continuing to work with NMFS Catch Accounting to clarify the explicit weight relationship from the reported estimate of numbers of crab. The authors will also provide to CA the finer spatial resolution by stock in anticipation of more fine scale reporting by ADFG reporting area.

Brian noted that observers take length and weights of all crabs sampled. No shell condition information is noted. He noted that hybrid crabs are not delineated to species just noted that there are hybrids. All of this information is contained in the observer manual.

*Handling Mortality discussion*
The team discussed the need for literature review to identify the scientific basis for the rates employed for handling mortality in groundfish and scallop fisheries. Diana and Bob agreed to work on compiling relevant information for a possible presentation to the team in May 2009.

## *OFL Stock Assessment Review:*

The team conducted a detailed review of each stock assessment and provided detailed comments to the assessment authors. To the extent possible, the assessment authors revised the stocks assessments to reflect the team comments for the final assessments provided in the 2008 SAFE report. The SAFE report executive summary contains the status determination criteria recommend by the team and provides a brief summary of the assessment information. The team made additional comments on the assessments to be incorporated in the next assessment cycle.

## General remarks

- The team agreed that assessment documents presented to September meetings should be the "track changes" version of the May assessment, to facilitate evaluating changes from that version.
- The team agreed that it is important to fully justify the basis for the use of weights, 'lambdas,' that are assigned to different data types. It was noted that weighting by survey CVs was ideal, but that the validity of this depended on CVs be correctly calculated.
- Jennifer Boldt should be requested to give an overview presentation on AIFEP and Ecosystem Considerations information to the team at its September 2009 meeting. Assessment authors working on the two AI stocks should incorporate the AIFEP into the ecosystem considerations portion of their assessments where applicable.
- The choice of weighting factors, survey CVs, and effective sample sizes can effect the outcome of an assessment as well as measures of uncertainty. The team recommends that an effort be made to develop standard methods for specifying (and justifying) the assumptions regarding how different data sources are weighted. (Andre and Diana! This is bullet 2 repeated in a different way!! )
- A checklist of the items which should be included in stock assessments on which OFL determinations are based should be developed. This checklist would include a table of survey estimates (and their associated CVs) by year. Having a standard approach to reporting assessment results will help the review process as well as how the work of the team is documented.

- Whenever possible survey estimates of abundance should be accompanied by measures of their precision because it is hard to assess model performance without this information.

## St. Matthew Blue King crab

Jie Zheng provided an overview of the St. Matthew blue king crab assessment including his responses to team recommendations from May. The team discussed the availability of historical Pacific cod pot bycatch data which the author believed led to the inability to estimate a total catch OFL for this stock. Bob asked for clarification that this comment is specific to the 'historical' bycatch estimates for this stock. The team would like the St. Matthews blue king crab OFL to be a total catch OFL and requested that the assessment author include the groundfish bycatch data in the model and assessment.

The CPT noted an error in the SAFE executive summary from May. This summary indicates that the preferred model had fixed values for $M$ and $q$ (model 1) However, Jie clarified that although $q$ was fixed and $M$ was fixed for all years except 1999, the value for $M$ for 1999 was treated as an estimated parameter. The CPT agreed to the recommendation of an OFL based on model (1), and thanked Jie for providing models 4 and 5, which helped to understand the behavior of the model. The team noted that key information on the reliability of the model (4) [fixed $M$ and $q$] was provided by the retrospective patterns, but that this did not appear in the assessment, but should be added along with other information on the performance of model (4).

The time period for calculating $B_{MSY}$ selected by the CPT and SSC was 1989-2008. However, this time-period was not included in the draft assessment report, but should be. Jie agreed and made this change in the final stock assessment for the SAFE.

André noted that a choice between the five models could be based on either: (a) evidence for model-mispecification based on, for example, a runs test, or (b) the application of model selection methods. He noted that it did not appear that any of the models could be rejected on the basis of runs tests and that the ability to use values for the likelihood as the basis for model selection (and construction of likelihood profiles) relied on the values assumed for the weights ('lambdas'), but these were not fully justified in the assessment report.

Jack commented that selectivity might be changing not the actual abundance and this should be further examined.

André requested clarification on why the model is predicting such extreme increases in MMB when none of the data seems to suggesting this. Jie noted that part of the reason for the increase is that the catch for 2008/09 was assumed to be zero because the fishery will remain closed. The CPT noted that this approach for projection has not been adopted for any other stock and recommended that the MMB series be updated under the assumption that catch equals the OFL. Jie agreed and made this change in the final stock assessment for the SAFE.

Jack provided some slides on ACLs and OFLs for St. Matthew blue king crab to illustrate the consequences of decisions on the relative risks of exceeding the OFL. He presented calculations using survey biomass estimates of calculated OFL and biomass reference points for the St. Matthew stock.

## Snow Crab

Jack Turnock presented an overview of the Snow crab assessment, noting changes from the May version as well as the consequences of including the 2008 summer survey data. Jack noted that

with the model tends to fit the 2008 survey estimate better than the 2007 estimates because it is more precise. Including the 2008 survey information indicated a decline in biomass to ~55% of $B_{MSY}$ in February 2009. The team noted that the assessment was not modified to incorporate any of the team's requests from the May 2008 review. The team recommended that these recommendations and those identified for the next assessment be made in the next stock assessment for review by the CPT in May 2009.

The team discussed the observed change in biomass and relative length between the 2007 and 2008 surveys. Projections last year predicted an increase in survey biomass as compared to model results after fitting to the observed decline in 2008.

André commented that it would be useful to see the results from the May and September versions of the model to help assess the impact of the additional data..

The large males were further south in the 2008 survey compared to the 2007 survey. In contrast, the location of the fishery in 2008 was fairly similar to than in 2007. Figure 54 shows the retrospective indication of overfishing and the updated model results indicate that fishing mortality has exceeded $F_{35\%}$ during the last several years. While this does not trigger an overfishing declaration, it is an indication that there might be a need for an increase in the buffer between the OFL and the TAC.

Jie commented on indications that survey catchability estimates might be too high. It was noted that this could arise because the assessment fails to account for the spatial structure of the population, survey and fishery. The team supports work to construct a spatially structured assessment model to better examine this issue.

The team discussed the need to revise the rebuilding plan for snow crab to incorporate the Amendment 24 reference points and hence a rebuilt target of $B_{MSY}$ based on mature male biomass. The previous $B_{MSY}$ was based on total spawning biomass. The stock assessment included the projected rate of rebuilding using both estimates of $B_{MSY}$. The stock was intended to be rebuilt by 2010 under the rebuilding plan. However, the project rebuilding probabilities for both rebuilding targets is very low, as detailed in the stock assessment.

Siddeek questioned the negative value for likelihood in Table 8 for fishery length retained. Jie expressed concern that this is not possible under the formulas provided in the documentation in the assessment itself although it is possible in general with a multi-nomial distribution. Siddeek requested that "lambdas" be reevaluated.

The team discussed the issue of splitting the OFL between the north and south, catch as noted on page 4 of the assessment reported. Doug noted that if additional conservation measures are warranted it might be better to lower the overall TAC rather than attempting to spatially divide the OFL or TAC because the dividing line may shift overtime but a line dividing the TAC, and hence the quota share, would need to be set in both state and federal regulations.

## Bristol Bay Red King Crab

Jie Zheng provided an overview of the Bristol Bay red king crab assessment. Jie noted that his estimates of survey biomass differed only slightly from those computed by NMFS. The team noted that it was anticipated a single time-series of abundance estimates and survey length-frequencies will be developed and agreed by NMFS and ADF&G so that they can be included in

the May 2009 assessments. It was noted that likelihood component for the survey estimates of abundance should be modified so that it is clear that the survey CV depends on year.

Jie noted that per suggestions by SSC and CPT all weighting factors will be reevaluated and this information will be included in the May 2009 assessment.

The team recommended that the assessment author consider estimating the extent of highgrading in 2005, 2006 and 2007 inside the model and setting the extent of future highgrading when calculating OFLs based on recent years (i.e. not 2005). Members of the public requested that it remain outside the model for that single year ((because the highgrading incident occurred in only one year).

The team requested reevaluating the residual patterns and suggested that the results of this re-evaluation be presented to the team in May 2009 for further discussion.

The team requested additional information be included in the May 2009 assessment regarding which parameters are fixed and which are estimated. It was noted that the likelihood profiles in the assessment report indicate that catchability (q) is estimable and different from the assumed values. This may be a consequence of the assumed weights and the issue of the values (and treatment) of q should be explored during the next assessment.

The team noted that in the May 2008 meeting that a model using the whole time series of available data (1969 to present) was requested but not provided in the assessment. Jie Zheng said that he will provide a model using the 1969 to present data at the May 2009 CPT meeting.

## Tanner crab

Lou Rugolo provided an overview of the Tanner crab assessment, highlighting changes from the May assessment and the results of the 2008 survey as compared to the 2007 survey. Lou highlighted some new information acquired on the directed fishery discards for the last few years as well as the groundfish fishery bycatch. This information was not available in May. The assessment uses a different way of estimating the projected trawl fishery bycatch than was used in May (using an average of the 2003-2007 groundfish fishery trawl bycatch). A one-to-one ratio of males to females (by number) is assumed for the trawl bycatch and estimates are made for the mean weight of males in the bycatch.

The team requested additional clarification regarding the bycatch information, in particular, the assumptions made about the size, sex and weight of bycatch. If data are collected to shed additional light on these assumptions they should be included in future assessments.

The team discussed the bycatch and discards as estimated in the model. It was noted that (a) the OFL for Tanner crab is explicitly linked to the estimated catch of snow crab (assumed to be based on the $F_{40\%}$ control rule), and (b) the directed Tanner crab fishery has much higher discards than previously realized (which reduces the component of the OFL available which can be landed).

Lou reviewed the SSC recommendations from June 2008 and mentioned that the authors' recommendations differ from those of the SSC. Lou presented additional information from that presented in the assessment to address SSC recommendations. The team discussed the position of adopting or disregarding the SSC's recommendations. For example, the authors chose to use a different gamma than the one (2.1) recommended during the June SSC meeting (based on May CPT recommendations). Lou revised the final assessment for the SAFE to reflect the SSC's

recommendations for the years used to estimate $B_{MSY}$. The team also requested that the total catch OFL include all catch, male and female, from all fisheries. A new table 7 will replace that in the text containing the OFL stock and fishery metrics.

Jack Turnock presented an overview of the appendix to the Tanner crab assessment report. This document was provided to the team after the assessment was distributed but prior to the meeting (Friday before the meeting it was posted). This appendix addresses the SSC's recommendation regarding the value of gamma, specifically an attempt was made to calculate $F_{35\%}$ using fishery and biological information (based on defining the $B_{MSY}$ proxy using the survey data for 1975-80). The team welcomed the calculations but noted that they were by necessity preliminary. In particular, the team noted that fishery bycatch and retained selectivity were estimated from the data for the two most recent years (under the assumption that a change in selectivity had occurred) and that future selectivity will be the same as selectivity in those two years. However, this estimation was not conducted in the context of a stock assessment. The team endorsed the approach of using the last two years of data rather than information included in the EA due to the dramatic change in the prosecution of the fishery since it reopened as a directed fishery. However, Siddeek requested that further exploration be done of the full data set in order to estimate selectivities.

Pat Livingston (SSC Chair) participated to provide further guidance on the intent of the SSC's comments in this topic. She indicated She indicated the SSC was interested in seeing a methodology for incorporating selectivity and growth in the stocks assessment and from this analysis, then determining if it is more appropriate for this calculation.

Jack Tagart expressed concern with the application of the process as observed in the first year, believing that the SSC has recommended (directed) that a gamma of 2.1 be used to calculate the OFL. The team noted there is no agreed stock assessment for this stock which makes developing a basis for providing OFL recommendations particularly difficult.

In summary, the CPT considered two major issues regarding the OFL for Tanner crab:

- Specification of the $B_{MSY}$ proxy. It considered two options (1975-80 – the period recommended in May; 1969-80 – the period recommended by the SSC). The ideal period should 'represent the reproductive pattern of the stock, encompassing highs and lows'. The team noted that there are several concerns with the early survey data, including availability of the raw data and coverage.
    - Jie indicated that the survey expanded its area in 1975 to encompass more of the Bering Sea and Tanner crab habitat.
    - Bob Foy provided the team with an overview of the historical coverage of the crab survey since 1971 (information for 1969 was not available). The team noted that survey coverage throughout the 1970s is somewhat similar as compared to the more extensive more standardized coverage from 1980 on. Survey coverage in 1971 is patchy but that for 1974-75 seems similar.
    - Jack and Lou expressed concerns about the use of the 1969 data from INPFC reports. Lou noted that from the data perspective there is a break in data quality of relative bin sizes from 1976 on. The team discussed that rationale seems to exists to include 1974 rather than a cut-off of 1975. The team notes inclusion of 1974 could be requested for the 2009 assessment to evaluate for $B_{MSY}$ proxy.

  The team recognized that the SSC had made a specific recommendation regarding the period to be included when calculating the OFL and discussed to what extent this new information allows the team to disregard the SSC's recommendation to use all years until

1980. After much discussion, the team found no compelling evidence that data from 1975 onwards is markedly improved over the data for 1969-74, and, recognizing that the SSC had specifically recommended 1969-80, recommended that the OFL for 2008-09 be based on a $B_{MSY}$ proxy defined over the years 1969-80.

- The choice of gamma. Although the team appreciated the work conducted by the authors to estimate $F_{35\%}$, and noting that results were not markedly sensitive to whether gamma was set to 1 or $F_{35\%}$ was used to calculate the OFL, it agreed to continue to use the author's selection (gamma = 1) for this year. The team agreed that using a gamma of 2.1 would be inappropriate because it is based on fishery selectivity patterns which contradict those estimated from the most recent data.

Lou presented updated calculations on three definitions for the $B_{MSY}$ proxy (e.g, 1969-1989; 1975-1980; 1969-2007). The full time series (1969-2007) was requested by the SSC for comparative purposes but is not considered to be a viable option for the $B_{MSY}$ proxy.

The team notes that we need to strive for consistency in assessment methodology for Tier determination for stocks. The team notes that the Tanner crab stock is particularly problematic given that more information exists for this stock than for all other Tier 4 stocks. In striving to incorporate all information as it exists to the extent possible the team feels that the Tiers 3 and 4 are becoming blurred and some Tier 3 applications (calculation of $F_{35\%}$) are being striven for with a Tier 4 stock. It continued to support the development of a full stock assessment model for eastern Bering Sea Tanner crab.

The Team would like to request that the SSC in the future provide more specific details and rationale regarding recommendations as noted in their minutes.

## Norton Sound red king crab

Jie Zheng provided an overview of the Norton Sound red king crab assessment. This is one of those stocks where an OFL is determined in the spring so the assessment is unchanged since May 2008, except for the addition of some response to the team's May comments on the assessments. The team reiterates its comments on the model from May and anticipates the revised assessment will address those comments.

## Aleutian Island golden king crab

Doug Pengilly presented an overview of the SSC's changes in June 2008 which modified the CPT's recommended OFL for the 2008/09 fishing season.

Siddeek presented an overview of the AI golden king crab stock assessment model. If approved by the CPT and SSC this model would be employed next year for assessment purposes and would serve to elevate the AIGKC stock to Tier 4. The team raised the following technical comments on the assessment:

- Use of CPUE data. Standardization of the data prior to their incorporation is desirable. Sensitivity should be examined to ignoring these data owing to concerns regarding the use of catch-rate as an index of relative abundance in stock assessments.
- Tag loss. The model ignores systematic tag loss, which could be important as the tagging data likely have an important impact of the outcome of the assessment and systematic tag loss could be confounded with fishing mortality. Sensitivity should be conducted to various plausible levels of systematic tag loss.

- Weighting of the tag data. The tagging data are treated as if each tag is independent of the others. Sensitivity to the assumed weighting scheme should be examined (e.g. by treating each 'tag event' as an independent observation).
- Parameters hitting bounds. Many of the estimated fishing mortality rates are on the bounds assumed for these parameters. This is undesirable and should be explored further.
- Initial size structure. Consideration should be given to estimating the initial size-structure (perhaps penalized in some way).
- Fits to the discard data for the western area. The model overpredicts discards in early years in the time-series (this may be related to the assumption that size-structure in the first year is known in relative terms).
- Realism of the population trajectory for the western area. The MMB for the western stock drops in 1998. Fishing industry previously indicated that the mesh size on pot gear changed in this period. The team noted the predicted trajectory of population size seems contrary to the data.
- The 1998/99 catch. The team discussed why the fleet did not harvest the available GHL in 1998/1999, noting that outside of this one year the catch trajectory is smooth. A sensitivity test should explore increasing the assumed harvest for this year to the GHL to see what impact this has on the relative trajectory and trend.

Different selectivity patterns are used to represent the different time periods of the fishery. The assessment author may wish to reevaluate the time periods chosen as more information on changes in gear used in the fishery becomes available. André noted that the equations in the assessment report do not reflect the time-varying selectivity and need to be revised accordingly. In additional CVs need to be included in all tables and the OFL control rule needs to specifically mentioned and the information needed to apply it summarized in the assessment report. Forrest agreed to help compile information on changes in gear configuration based on port sampling which observes gear and summarize any changes due to regulatory requirements.

## Pribilof Island blue king crab:

Bob Foy provided an overview of the changes made to the PIBKC assessment since May. Specifically estimates for $F_{OFL}$ are presented. The team discussed the recommendation for assessing gamma and the difficulties that may be encountered in doing so given lack of information available for this stock to calculate gamma. Bob noted that the surveyed blue king crab (similar to other species) were in a later stage of reproduction in the 2008 survey due to the colder bottom water temperatures. Bob noted that only area 513 was used to calculate bycatch for PIBKCs for the calculation of the OFL, but notes that more spatially explicit bycatch will be considered next year as some of the bycatch is underestimated by not including the portion of 521 that includes PIBKC bycatch. There is limited trawl bycatch of PIBKC given the trawl closures surrounding the Pribilofs but bycatch does occur in the fixed gear groundfish fisheries, particularly the Pacific cod pot fishery.

The 2008 survey estimate is 3% of the $B_{MSY}$ proxy, well below β, the threshold for setting the directed fishery F is 0. The stock is closed and has been since 1998 with additional trawl restrictions in place and remains under a rebuilding plan.

The team discussed how the (bycatch) $F_{OFL}$ could be set, and the necessity of revising the rebuilding plan for this stock. Given the current status of the stock, the team is concerned about the need for additional restrictions on bycatch in other groundfish fisheries to (possibly) allow the stock to rebuild. The team expressed concerns regarding recent bycatch trends in the Pacific cod pot fishery.

The team discussed the (bycatch) $F_{OFL}$ for this stock given the continuing downward trend in stock size (and hence the lack of any indication of stock recovery). The team feels strongly that any bycatch in this fishery is impeding stock recovery, and would like to see an analysis which identifies which changes in the Pacific cod fishery that has led to increased bycatch of blue king crab.

The team feels that the Council should consider closing the Pribilof Island habitat conservation area to all groundfish fishing, noting that the stock remains overfished and that the higher bycatch in groundfish fisheries may, in fact, be overfishing. The team feels that NMFS and the Council need to communicate regarding the necessity of prioritizing the revision of the existing rebuilding plan to examine further measures to restrict bycatch in the groundfish fishery.

The team discussed the following alternatives for the (bycatch) $F_{OFL}$ for the non-directed fisheries:

- A zero OFL – considered inappropriate because it would impede any research on this stock.
- 0.016 million lbs (the average bycatch over the last 10 years) – considered inappropriate because this period includes the two recent years of high (and perhaps unsustainable) bycatch
- 0.02 millions lbs (last years bycatch rate scaled by the 2008 survey estimated) – considered inappropriate because this period includes a year of high (and perhaps unsustainable) bycatch
- 0.007 millions lbs (the average bycatch from 1999/00 – 2005/06; years after the closure of the directed fishery until the bycatch increased markedly in 2006/07). [This estimate is 0.004 million lbs when handling mortality is accounted for]

The team chose to select the fourth alternative for OFL determination noting that this level of catch may still be unsustainable given the stock's current reproductive capacity. However, the team felt that this level of bycatch better represented the historical amounts given that it excludes the last two years when a radical shift in fishing practices appeared to have occurred.

The team requests the Council consider revising the existing rebuilding plan to prevent overfishing by examining further measures to restrict bycatch in the groundfish fisheries. The team discussed alternative management measures to be analyzed in a revised rebuilding plan analysis for this stock. The team recommends consideration of the following alternatives:

1. PIHCZ closed to all groundfish fishing
2. PIHCZ closed to Pacific cod pot cod fishing
3. Analyze ADF&G closures for all groundfish and just Pacific cod pot fishery: 168-$170^0$W, south of 58 north -57 lat
4. Analyze new closure configurations which cover the entire distribution of the PIBKC stock (all groundfish or Pacific cod pot fishery only)
5. Gear modifications to Pacific cod pot gear that could reduce bycatch of blue king crab

Analysis should cover changes in the Pacific cod pot fishery distribution in recent years. The ADF&G pot survey is on-going and may provide additional information on stock status and distribution of PIBKC and this information should be included in the analysis.

## Pribilof Island red king crab

Bob Foy provided an overview of the red king crab assessment noting changes from May and survey results from the 2008 survey. Here bycatch information summarizes only 521 so as not to include BBRKC contribution from 513. This likely underestimates bycatch of PIRKC given the observed bycatch in the northwest corner of the 513 management area.

The team notes continued issues with the uncertainty estimates inherent in the survey biomass estimates for this stock. The team discussed the necessity of establishing an OFL with additional precaution due to high uncertainty with this stock estimate The team concluded the the OFL should be calculated using the best available information and that TAC level is the more appropriate place for adding additional precaution in acceptable catch levels.

The team requested additional information for the next year's assessment which further evaluates the individual fishery contributions to the bycatch. The team also requests the addition of CVs for all historical estimates from the survey.

## Pribilof Island golden king crab

Doug Pengilly explained that there are no changes to the assessment from May. The fishery operates on a Commissioner's permit and no applications have been made for directed fishing on this stock in recent years. No new catch information is available for this stock. There may be some additional information available from the recent EBS trawl survey on the AIGKC stock. These data will be processed over the winter and available information will be provided to the stock assessment author for the following year.

## Adak red king crab

Doug Pengilly provided an overview of the Adak red king crab assessment. Changes from the May assessment include incorporation of SSC recommendations from June 2008 on OFL determination as well as responding to comments to the extent that this was possible. The remaining comments from the SSC and CPT will be addressed in the May 2009 version.

In June 2008, the SSC disagreed substantially with the plan team's recommendation in June 2008. The team discussed the difference between what the SSC and CPT OFL recommendations, noting that the teams concerns regarding the status of the stock remain. The team had a lengthy discussion of the inherent problems in the process put in place for Tier 5 stocks. In particular, the OFL relates to retained catch only and the value recommended by the SSC allows for effectively unconstrained exploitation of this stock.

Linda Kozak commented on the CPT's previous recommendation as compared to the SSC's decision. If the OFL is established at a very low level she remains concerned that test fisheries for research purposes cannot be conducted. ADF&G staff discussed that to have a test fishery, a TAC must be established. Any OFL established this year would not impact a test fishery the following year.

Wayne suggested that in May a longer discussion be held for this stock particularly with regards to how to best assess long-term stock status. Forrest indicated that ADF&G is trying to include this stock in a plan for triennial surveys. The team will include an agenda items to discuss on long-term assessment methods for this stock.

The team discussed the problems with being able to regulate the unconstrained bycatch in this stock. If the stock were in a higher Tier this would be possible thus the team discussed what would be necessary to move it to Tier 4. Forrest noted there is increased interest in Pacific cod fishing in the Aleutian Islands and no bycatch limits are established in this fishery thus there is potential for increased groundfish effort in this region and the associated bycatch in these fisheries.

The team proposes a one day workshop prior to the May meeting to discuss some of the issues that pertain to the assessment and model configuration for next year. ?? Is this different from the stock assessment workshop described below??

The team considered the need for a one day workshop prior to the May meeting to discuss some of the issues that pertain to the assessment and model configuration for next year.

Options considered by the team for OFL setting for this stock are:

1. Concur with SSC's retained catch OFL (with caveats)
2. CPT recommendation from May 2008 for a bycatch OFL
3. Recommend the CPT's bycatch OFL the as the retained catch OFL.
4. Calculate a total catch OFL by adding in the bycatch to the retained catch estimate.

Calculating a total catch OFL would cause the OFL to be applied to total catch but would allow for an increase in the OFL over the bycatch OFL. The team requested that the assessment author analyze a total catch OFL for the next assessment cycle.

The team disagrees strongly with the SSC on their OFL. However after lengthy discussions and heated arguments regarding balancing the process of OFL setting, SSC recommendations and the need for stock conservation, the team without consensus forwarded the SSC's OFL for this stock.

Bob Foy suggested that Tier 5 assessments with no new data should not be on our agenda and that the OFLs provided by the SSC in June should be the final OFL for those stocks.

## *Stock assessment workshop*

The plan team discussed the value of having a one-day workshop to resolve issues related to how data sources are weighted and alternative models compared when an assessment include several data sources. Diagnostics, residuals, lambda weighting, other issues with how to appropriately weight data sources could be discussed. How to determine the gamma value for Tier 4 stocks can also be discussed. Team members noted that the intent of the workshop would have to be to compile a workshop report that is prescriptive enough to provide guidance to assessment authors.

This idea will be brought forward to the SSC at the upcoming Council meeting for comment and consent on this approach and organization thereof.

Meeting adjourned to a formal work session to finalize the SAFE report at 2pm on 18 September.

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

**TERMS OF REFERENCE**
(as revised by the Plan Team 9/08 changes from 2005 are in **bold/and ~~strikeout~~**)

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 meetings will be held annually in so far as practicable to discuss 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 stock assessment modeling, preliminary stock assessments for OFL recommendations and any additional issues pertinent to the summer research schedule. A following fall meeting will be held with the intention to discuss the status of stocks. This meeting would be intended to occur prior to the TAC determinations by the state. It is understood that this status of stocks meeting does not preclude additional Inter-agency meetings prior to TAC 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 Chair, Vice Chair and **W**ork group leaders) will be selected at the meeting preceding the annual Plan Team meeting or as vacancies arise. The Plan Team Chair and Vice Chair will be selected at the **Fall** meeting for two-year **renewable** terms. ~~It is the intent of the Team that after two years the Vice Chair will succeed as Chair and the following election will be for the position of Vice Chair..~~ 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 team may be assembled by the responsible agencies. Every analytical team should include at least one member from the Plan Team, drawn from the appropriate working group(s), whenever possible.
      (iii) Once an amendment analysis has been completed, it may be reviewed by the Plan Team. The Plan Team's comments, if any, are then forwarded to the SSC, AP, and Council.

   (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.
   (d) Stock assessment review and recommendations for annual OFL specifications. The plan team shall annually review stock assessments at the spring plan team meeting for

recommending OFL levels for two stocks (Norton Sound red king crab and AI golden king crab) and for providing recommendations on appropriate tier levels and model and assessment methodology for the remaining 8 stocks**(10 stocks annually).** These recommendations are provided to the NPFMC SSC for their subsequent review and recommendations in June. The team shall review **updated** stock assessments in the fall including final OFL levels for all stocks. These assessments shall be included in the final Crab SAFE report provided to the Council to inform them of the annual status of BSAI Crab stocks.

**Crab Plan Team**
**Background on Crab Rationalization Program**
**NMFS Alaska Region**

**General Background**

All nine major BSAI crab fisheries are managed under the crab rationalization program (Program), a limited access privilege program implemented on April 1, 2005. One of benefits expected to arise from the Program is ending the "race for fish," thereby allowing participants time to tailor their business operations to achieve the greatest market benefit, reduce costs, and improve safety.

The Program allocates exclusive harvesting and processing privileges to holders of transferable harvester quota share (QS), and processor quota share (PQS). QS and PQS are derived from historic harvesting and processing activities. NMFS issued QS to catcher vessel owners, catcher/processor owners, and crew. Most of the total QS issued went to catcher vessel owners. PQS was issued to historically active processors. QS and IFQ may be held only by U.S. citizens. PQS and IPQ are not subject to this restriction. QS and PQS can yield an annual harvesting individual fishing quota (IFQ) individual processing quota (IPQ), respectively.

Each year, ADF&G determines the total allowable catch (TAC) of the various crab fisheries, and NMFS allocates that TAC. First, NMFS allocates 10 percent of the TAC to the Western Alaska Community Development Quota (CDQ) Program which represents specific coastal communities adjacent to the Bering Sea and Aleutian Islands. The CDQ allocation is further allocated among six CDQ groups representing specific groups of communities. NMFS also allocates 10 percent of the TAC for the Western Aleutian Islands golden king crab fishery to a specific entity representing the community of Adak, which is managed similar to a CDQ group. Second, NMFS then allocates the remaining amount of the TAC to each qualified QS holder as IFQ. NMFS will issue IFQ to a QS holder only if they meet requirements to apply for IFQ by August 1 of each year, submit an annual economic data report, and pay required fees. Each year, harvesters can choose to assign their QS and resulting IFQ to a harvesting cooperative. A harvester cooperative must comprise at least four unique QS holders who are not affiliated with each other through more than a 10 percent direct or indirect ownership interest, or do not otherwise control each other.

The Program limits the amount of QS that any one person may hold, and the amount of IFQ that a person may use. These limits, commonly called use caps vary for each fishery, whether the QS is held by vessel owners or crew, and the nature of the QS/IFQ holder. For example, QS/IFQ holders that also hold PQS or IPQ are subject to a specific use cap, persons who hold QS or IFQ only another use cap, and CDQ groups who also hold QS and IFQ a different cap. The method for calculating the use cap differs for each of these three groups of QS/IFQ holders. The Program has a "grandfather exemption" that allows harvesters initially allocated more QS than the use cap to continue to hold their initially allocated QS, and use any resulting IFQ, above the use cap.

The Program also establishes limits on the amount of PQS a processor can hold and the amount of IPQ from that PQS that they can use. This limit is set at 30 percent of the initially allocated PQS pool. The Program has a grandfather exemption for processors over this use cap.

The Program also limits the amount of IFQ that can be harvested by a vessel. This use does not apply if all of the crab harvested by a vessel is derived from IFQ that is assigned to a cooperative.

Harvesters and processors can transfer their QS/IFQ and PQS/IPQ to other harvesters and processors respectively subject to limits on the amount transferred and the person eligible to receive the transfer. For example, a person cannot transfer crew QS/IFQ to a person who is not a valid crew member meeting specific requirements. Also, transfers are not approved if they would cause a person to exceed a use cap. The IFQ held by the cooperative can only be transferred to

other cooperatives, and IFQ not assigned to a cooperative can only be transferred to other non-cooperative IFQ holders.

Ninety percent of the IFQ derived from catcher vessel owner QS must be delivered to a processor holding IPQ. This type of IFQ is called Class A IFQ. Each year, harvesters and processors must match up their Class A IFQ and IPQ shares on a one-to-one basis. The remaining 10 percent of the IFQ issued to catcher vessel owners is called Class B IFQ and can be delivered to any processor without matching to a specific amount of IPQ. NMFS issues an amount of IPQ to each IPQ holder that is equal to the amount of Class A IFQ provided the PQS holder meets requirements to apply for IPQ by August 1 of each year, submit an annual economic data report, and pay required fees. For most crab fisheries, Class A IFQ and IPQ shares are also subject to requirements that they be delivered within specific geographic regions, known as regionalization.

Most crab fisheries, including the two largest crab fisheries, Bristol Bay red king crab and Bering Sea snow crab, are regionally designated for the North Region (i.e., north of 54º 20' N. lat.), or the South Region (i.e., any location south of 54º 20' N. lat.) based on historic delivery patterns. St. Paul is the only significant crab processing port in the North Region. Dutch Harbor (Unalaska), King Cove, and Kodiak are some of the larger crab processing ports in the South region. The Western Aleutian Islands golden king crab fishery is regionally designated with 50% of the Class A IFQ and IPQ for the West Region (i.e., West of 174 º W. long.) and the remaining 50% is undesignated and may be delivered anywhere. The Eastern and Western tanner crab (*C. bairdi*) fisheries are not subject to regional delivery. The table below shows the proportion of the Class A IFQ and IPQ that must be delivered within these regions.

| Crab fishery | Percentage of Class A IFQ & IPQ by region | Pounds of Class A IFQ & IPQ by region (2007/2008) |
|---|---|---|
| Eastern Aleutian Islands golden king crab (EAG) | 100 % South | 2,243,082 lb. South |
| Western Aleutian Islands golden king crab (WAG) | 50 % West<br>50 % Undesignated | 570,932 lb. West<br>569,855 lb. Undesignated |
| Western Aleutian Islands red king crab (WAI) | 100 % South | Fishery Not Open –<br>No Class A IFQ or IPQ |
| Eastern Bering sea Tanner crab (C. bairdi) (EBT) | 100 % Undesignated | 2,525,080 lb. Undesignated |
| Western Bering sea Tanner crab (C. bairdi) (WBT) | 100 % Undesignated | 1,592,952 lb. Undesignated |
| Bristol Bay red king crab (BBR) | 2.7 % North<br>97.3 % South | 388,006 lb. North<br>14,893,400 lb. South |
| Bering Sea snow crab (*C. opilio*) (BSS) | 47 % North<br>63 % South | 21,073,807 lb. North<br>23,957,111 lb. South |
| Pribilof Islands red and blue king crab (PIK) | 67.5 % North<br>32.5 % South | Fishery Not Open –<br>No Class A IFQ or IPQ |
| St. Matthew's blue king crab (SMB) | 78.3 % North<br>21.7 % South | Fishery Not Open –<br>No Class A IFQ or IPQ |

Historic processing ports, such as Dutch Harbor, St. Paul, King Cove, and Kodiak, are also provided a right-of-first-refusal that gives them the first opportunity to purchase any PQS that is offered for transfer if that PQS was earned from processing in their communities. During the first two years of the Program, IPQ for most crab fisheries was subject to a "cooling off" period that limited the ability of crab to be delivered outside of the community where the PQS was earned.

The Program requires that Class A IFQ and IPQ holders establish an arbitration system to resolve any price or delivery disputes. Class A IFQ holders who are not otherwise affiliated with IPQ holders can unilaterally trigger a binding arbitration proceeding if disputes cannot be settled.

The Program limits the ability of vessels used in the snow crab fishery from fishing in the GOA. Specifically, vessels are limited to sideboard limits that control the total amount of Pacific cod that can be harvested to reduce impacts on other GOA groundfish fisheries. The Program also includes extensive monitoring & enforcement, and recordkeeping and reporting requirements, including a detailed annual economic data report.

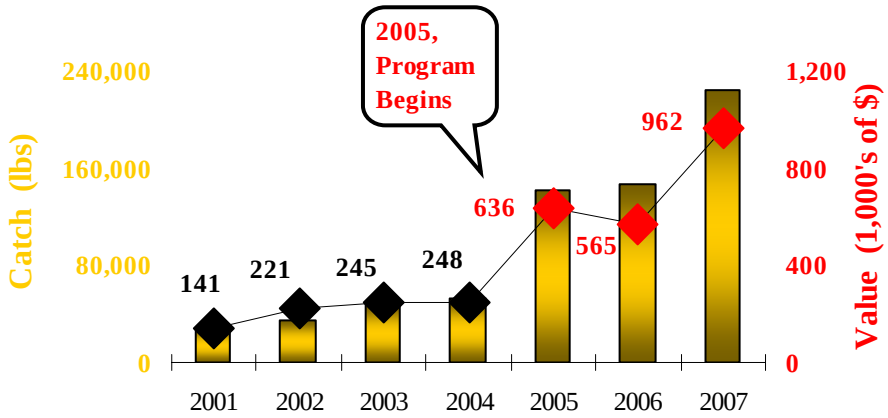
**Trends in Fishery Performance Under the Program**

- The number of vessels fishing decreased by nearly 2/3 from the number actively fishing prior to the Program. Some of the decrease in the number of vessels active may be due to 25 vessels being removed in the crab buyback program in December 2004, just prior to the first year of fishing under the Program in 2005/2006. The following table shows the total number of active vessels in the BSAI crab fisheries managed under the Program.

| Crab Fishing Year | Number of Active Catcher Vessels | Number of Active Catcher/Processors | Total Number of Active Vessels |
|---|---|---|---|
| 2000/2001 | 246 | 10 | 253 |
| 2001/2002 | 235 | 11 | 243 |
| 2002/2003 | 238 | 11 | 247 |
| 2003/2004 | 247 | 9 | 254 |
| 2004/2005 | 245 | 9 | 256 |
| 2005/2006 (1st year) | 100 | 5 | 101 |
| 2006/2007 | 87 | 5 | 91 |
| 2007/2008 | 83 | 5 | 87 |

- An increasing number of QS holders have chosen to participate in cooperatives. In 2007/2008, more than 99 percent of all IFQ was issued to cooperatives. In most fisheries, the number of active cooperatives is decreasing, indicating that harvesters have found substantial organizational or financial benefits to collaboration through better coordination on landings, tailoring fishing capacity to TAC, and collective price negotiation.
- The remaining vessels harvest a greater proportion of the catch and appear to be more profitable. Figure 1 provides an example for catcher vessels for one fishery.

**Figure 1: Median catch & mean exvessel value per catcher vessel Bristol Bay red king crab** (Source: NMFS, NPFMC)



- To a varying extent, in all crab fisheries, actual fishing time has increased. The greatest increase is observed in the snow crab fishery, and least in the Bristol Bay red king crab fishery. Prior to the rationalization program, in most fisheries vessels made a single delivery after a fishery closing. Under the rationalization program, almost all vessels make multiple deliveries in a season, fishing closer to the vessel's capacity prior to making deliveries.
- Crew employment has decreased with the consolidation of the fishery. The precise number of crew previously employed on vessels that are no longer employed is not known, but various estimates suggest several hundred up to a thousand crew positions may have been lost. Prior to the Program, many of the crew positions were short term positions and may not have provided the total annual income to crew.
- In most cases, crew employed by vessels fishing in the program are reported to have more stable and better paying positions than prior to the program's implementation. Many crew are reported to rely exclusively on crab fishing for their income. Other crew are reported to work on the crab vessel in other fisheries or tendering, relying on employment from their crab fishing vessels for all of their income. Precise data on crew employment pre and post-Program implementation are not available.
- The amount of QS transferring varies per fishery per year. For the Bristol Bay red king crab fishery ranged from 1.3 % in 2007/2008 to 7.7 % in 2006/2007, and in the snow crab fishery ranged from 1.9 % in 2007/2008 to 6.8 % in 2006/2007. An average of roughly 5 % of the QS pool transferred per year.
- In almost all crab fisheries, there has been limited consolidation of the amount of vessel owner QS held per person, and there are roughly the same number of QS holders now as in the first year of implementation. The average and mean amount of QS held by crew has increased by roughly 10 % in most crab fisheries, and there are roughly 10 % fewer QS holders. Little or no consolidation in crew QS has been observed in the Western Aleutian Islands golden king crab, St. Matthew, and Pribilof Island fisheries. Overall, roughly 10 % of the QS in all fisheries is now held by persons who were not initially allocated QS in any of the BSAI crab fisheries.
- Overall, a greater percentage of the PQS pool has transferred. At a minimum only none of the Western Aleutian Island red king crab PQS pool transferred in 2005/2006, and at a maximum 43.6 % of the Western Aleutian Island golden king crab fishery PQS pool transferred in 2007/2008. Generally, extensive IPQ transfers, or leases have occurred each year. Initially, there were substantially fewer persons holding PQS, roughly 20 unique persons among all the fisheries. Overall there has been greater consolidation of PQS and IPQ than QS and IFQ. One large merger between two companies (Nichiro-Maruha) is responsible for much of this consolidation, although other new PQS holders have purchased into the fishery. In both the Eastern and Western Aleutian Islands golden king crab fishery there are two new PQS holders who now hold roughly 30 % of the combined PQS pools in those fisheries that had not previously held PQS in any crab fishery.
- Since implementation of the Program no crab fishery has exceeded its TAC, and in most cases the TAC is fully harvested. Prior to the Program, harvest relative to the GHL was often less fully harvested or exceeded, though by a somewhat limited amount.
- Deadloss in the Bristol Bay red king crab and the Aleutian Islands golden king crab fisheries has decreased post-rationalization, compared to the seasons immediately preceding implementation of the Program. In the Bering Sea *C. opilio* fishery, the rate of deadloss is comparable to that which occurred in the two most recent years before rationalization.
- There is no clear pattern indicating that rail dumping or handling mortality has changed in the fishery. Some conjecture that because the seasons are longer and vessels tend to avoid poor weather that may increase handling mortality. However, there are no conclusive data on handling mortality changes.

- Although soak times in the fisheries have increased and a definite correlation exists between extended soak times and legal male catch exists, the levels of sublegal and female catch under the Program remains within the range of bycatch levels from years prior to rationalization.
- Pot loss and ghost fishing may have decreased under the Program, but conclusive data are not available. With the decrease in the number of vessels participating in the crab fisheries, overall there is less gear on the fishing grounds post-Program implementation. Although each pot is used more frequently during a fishing season, the higher catch per unit effort under the Program still results in an overall reduction in gear.
- For all fisheries, fewer pots are registered, fewer pot lifts recorded, and on average greater CPUE per pot has been observed for all crab fisheries after Program implementation. The following table provides simple statistics on pot use in the various fisheries.

| Fishery | Season | Number of pots registered* | Registered pots per vessel | Number of pot lifts * | Lifts per registered pot* | Average catch per unit effort (crabs per pot lift) * | Pounds per pot |
|---|---|---|---|---|---|---|---|
| **Bering Sea *C. opilio*** | 2001 | 40,379 | 195 | 176,930 | 4.4 | 97 | 129.7 |
| | 2002 | 37,807 | 199 | 308,132 | 8.2 | 76 | 96.1 |
| | 2003 | 20,452 | 108 | 139,279 | 6.8 | 154 | 182.4 |
| | 2004 | 14,444 | 76 | 110,087 | 7.6 | 157 | 199.3 |
| | 2005 | 12,840 | 77 | 69,863 | 5.4 | 239 | 324.3 |
| | 2005 - 2006 | 13,734 | 176 | 108,320 | 7.9 | 204 | 306.9 |
| | 2006 - 2007 | 10,851 | 155 | 80,112 | 7.4 | 332 | 408.2 |
| | 2007 - 2008 | 13,647 | 175 | 129,457 | 9.5 | 349 | 438.2 |
| **Bristol Bay red king crab** | 2000 | 26,352 | 108 | 98,694 | 3.7 | 12 | 75.7 |
| | 2001 | 24,571 | 107 | 63,242 | 2.6 | 19 | 121.5 |
| | 2002 | 25,833 | 107 | 68,328 | 2.6 | 20 | 128.4 |
| | 2003 | 46,964 | 188 | 128,430 | 2.7 | 18 | 110.9 |
| | 2004 | 49,506 | 197 | 90,976 | 1.8 | 23 | 152.7 |
| | 2005 - 2006 | 15,713 | 177 | 99,573 | 6.3 | 25 | 165.4 |
| | 2006 - 2007 | 14,685 | 181 | 64,325 | 4.4 | 34 | 215.9 |
| | 2007 - 2008 | 11,885 | 161 | 101,734 | 8.6 | 28 | 180.1 |
| **Eastern Aleutian Islands golden king crab** | 2000 - 2001 | 10,598 | 707 | 71,551 | 6.8 | 10 | 43.1 |
| | 2001 - 2002 | 12,927 | 680 | 62,639 | 4.8 | 12 | 49.9 |
| | 2002 - 2003 | 11,834 | 623 | 52,042 | 4.4 | 12 | 53.1 |
| | 2003 - 2004 | 12,518 | 695 | 58,883 | 4.7 | 11 | 49.3 |
| | 2004 - 2005 | 13,165 | 658 | 34,848 | 2.6 | 18 | 81.7 |
| | 2005 - 2006 | 8,833 | 1,262 | 21,898 | 2.5 | 25 | 117.3 |
| | 2006 - 2007 | 8,150 | 1,358 | 23,839 | 2.9 | 24 | 112.9 |
| | 2007 - 2008 | 4,200 | 1,050 | 20,496 | 4.9 | 28 | 131.3 |
| **Western Aleutian Islands golden king crab** | 2000 - 2001 | 8,910 | 743 | 101,239 | 11.4 | 7 | 28.7 |
| | 2001 - 2002 | 8,491 | 943 | 105,512 | 12.4 | 7 | 25.5 |
| | 2002 - 2003 | 6,225 | 1,038 | 78,979 | 12.7 | 8 | 33.0 |
| | 2003 - 2004 | 7,140 | 1,190 | 66,236 | 9.3 | 10 | 39.8 |
| | 2004 - 2005 | 7,240 | 1,207 | 56,846 | 7.9 | 12 | 46.4 |
| | 2005 - 2006 | 4,800 | 1,600 | 27,503 | 5.7 | 21 | 86.6 |
| | 2006 - 2007 | 6,000 | 2,000 | 22,694 | 3.8 | 20 | 88.2 |
| | 2007 - 2008 | 4,800 | 1,600 | 25,287 | 5.3 | 21 | 88.8 |

Sources: *ADFG Annual Management Report and **fishtickets and ***NMFS RAM catch data (for 2005-2006, 2006-2007, and 2007-2008)

- During the first year under rationalization of the Bristol Bay red king crab fishery, the number of legal male crabs captured during the fishery and subsequently discarded was dramatically higher than discard rates in previous years, and represented approximately 20 percent of legal male red king crab caught. ADF&G reacted to the 2005-2006 discard issue by downwardly adjusting the TAC determination for the 2006-2007 season, thus resulting in an economic penalty for the share holders in that season. Discarding of legal males did not occur on a similar scale in 2006-2007, and no further downward adjustment was made for the 2007-2008

season. High grading and increases in discard rates have not been an issue in other fisheries or seasons.

- Overall fuel use in the fleet has decreased. Although vessels are active for a longer period of time, the total number of vessels active is lower. Many vessel owners report that under the Program vessel operators have made efforts to operate the vessels more efficiently (e.g., traveling to the grounds at optimal speeds, coordinating deliveries to minimize travel distance). The precise reduction in fuel use is not known because data of fuel use pre and post-Rationalization are not adequately comprehensive. Some have asserted that the overall "carbon footprint" of the BSAI crab fisheries is smaller.
- Safety has improved. Fatalities in the BSAI crab fisheries averaged 3 per year from 1996 through March 31, 2005 prior to implantation. From April 1, 2005 through the 2007/2008 there have been no fatalities in any BSAI crab fishery managed under the Program. In most fisheries, the average size of the vessels actively fishing increased after Program implementation. Some of this may be due to the buyback of smaller vessels in December 2004.
- Price negotiations, though still complex and contentious, appear to be more successfully addressed through private contractual arrangements rather than relying on the arbitration system. Unlike previous years, during the 2007/2008 crab fishing year, no binding price arbitrations occurred. The process for determining the historic revenue share between harvesters and processors continues to be reviewed by industry participants.

**Current Concerns**

- The decrease in the number of active vessels concerned that some crew and community representatives, primarily from Kodiak, that the Program has unduly limited employment opportunities. Others have argued the crew still working are long-term skilled participants who are better paid then before the Program. The Council has considered
- Some allege that the requirement that 90% of the Class A IFQ must be delivered to processors with matching IPQ decreases potential market opportunities. The Council is considering a range of modifications that would eliminate PQS & IPQ in some or all fisheries, or reduce the percentage of Class A IFQ issued to catcher vessel owners from 90% to some lower level.
- Processors and some communities and harvesters have argued that eliminating PQS & IPQ or reducing the Class A IFQ percentage below 90% would harm processing investments, destabilize communities reliant on crab, and introduce additional complexity to a relatively new system that could increase costs and have unintended consequences. Some have pointed to the fact that there were no arbitrations between Class A IFQ and IPQ holders this year over price or delivery disputes as an indication that the market is balanced between harvesters and processors.
- Some harvesters have proposed the Council should develop emergency relief exemptions from regional delivery requirements. NMFS has expressed concern that it may not be possible to establish objective emergency criteria. St. Paul has expressed concerns that it may lose out on substantial catch if the vessel operator makes the emergency declaration unilaterally. The Council is reviewing options to allow a vessel operator, processor, and community to jointly declare an emergency and relieve a harvester and processor from regional delivery requirements.
- Harvesters remain concerned that Council considerations to reestablish a vessel use cap for cooperative IFQ would reduce many of the economic efficiencies gained under the Program.
- Many harvesters have expressed frustration that NMFS has not yet published a proposed rule for a loan program to allow crew to purchase QS. The Council provided NOAA Financial Services its preferred options in February 2008.

# NPFMC CRAB PLAN TEAM

**Draft Agenda** 9/9/08vers. –September 16-18, 2008

## Observer Training Room, AFSC, Seattle

| | | |
|---|---|---|
| **Tuesday September 16** | | |
| **Administration** | 9:00 am | • Introductions<br>• Additions to agenda and approval of agenda<br>• Review and approval of May 2008 minutes<br>• Review Terms of Reference<br>• Election of officers (*not since May 2006*)<br>• ACL update |
| **Economic Discussion** | 9:30 am | • Overview of Crab Rationalization Program (Glenn Merrill)<br>• Discussion of Economic Data Review (EDR) issues (Garber-Younts)<br>• Summary of 3-year review documentation for CRP (Garber-Younts)<br>• Economic SAFE report, AFSC paper overview for poss. Inclusion in SAFE<br>• Structure and content plan for future<br>• How to merge with existing reports, and studies<br>• Economic analyses by Council and NMFS economists |
| **Survey overview** | 11:00am | • NMFS 2008 summer trawl survey overview, discuss recalculated historical results (Foy)<br>• BSFRF update(Hughes), BSFRF-NMFS plans for collaboration |
| *LUNCH* | *12:00 pm* | |
| **Bycatch** | 1:00 pm | • NMFS catch accounting data (Jennifer Mondragon)<br>• Handling mortality rates utilized for Crab, Groundfish and Scallop fisheries necessity for research and review as applicable |
| **OFL Stock assessment Review:** | 2:15 pm | • General discussion of objectives for review, SAFE structure revisions and timing |
| *BREAK* | *2:45pm* | |
| **EBS snow crab** | 3:00 pm | • Stock assessment overview<br>• Stock status and OFL determination |
| **Bristol Bay red king crab** | 4:00 pm | • Stock assessment overview<br>• Stock status and OFL determination |
| **Wednesday September 17** | | |
| **EBS Tanner crab** | 9:00am | • Stock assessment overview, changes recommended by CPT, SSC<br>• Stock status and OFL determination |
| *BREAK* | *10:15* | |
| **EBS Tanner crab (cont)** | 10:30 am | *continued* |
| **St. Matthew blue king crab** | 11:15 am | • Stock assessment overview: changes recommended by CPT, SSC<br>• Stock status and OFL determination |
| *LUNCH* | *12:00 pm* | |
| **Norton Sound red king crab** | 1:00 pm | • Stock assessment model review: changes recommended by CPT, SSC |
| *BREAK* | *2:45pm* | |
| **AI golden king crab** | 3:00pm | • Stock assessment model review (for 2009 OFL) |
| **Thursday September 18** | | |
| **Pribilof Island blue king crab** | 9:00 am | • Stock assessment overview: changes recommended by CPT, SSC, discuss rebuilding plan revisions<br>• Stock status and OFL determination |
| **Pribilof Island red king** | 9:45 am | • Stock assessment overview: changes recommended by CPT, SSC |

| | | |
|---|---|---|
| **crab** | | • Stock status and OFL determination |
| *BREAK* | 10:15am | |
| **Pribilof golden king crab** | 10:30am | • Stock assessment overview as necessary |
| **Adak red king crab** | 11:00 am | • Stock assessment overview as necessary |
| *LUNCH* | *12:00 pm* | |
| **SAFE Report finalization** | 1:00 pm | **Review OFL recommendations, Report writing, Report finalization, Discuss plans for improvements for 2009 SAFE** |
| *ADJOURN* | 5:00 pm | |