AGENDA D-3
JUNE 2006

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver
Executive Director

ESTIMATED TIME
1 HOUR

DATE: May 30, 2006

SUBJECT: Crab Management

ACTION REQUIRED

a) Crab Overfishing Definitions update and snow crab assessment (SSC only)
b) Receive report from Crab Plan Team and PNCIAC
c) Review State/Federal Action Plan

BACKGROUND

a) Crab Overfishing Definitions update and snow crab assessment (SSC only)

Progress continues on refining alternative overfishing definitions for the BSAI crab stocks. An inter-agency working group has been providing updates to the SSC on a periodic basis to solicit their advice on the direction of the analysis. The preliminary analyses was mailed to you on May 22nd. The Center for Independent Experts (CIE) met at the AFSC in Seattle April 24-28 to review the interagency working group's draft analysis. The report from the CIE review will be available June 1st and will be provided at the meeting. Members of the working group will be available to present their preliminary analyses. A member of the CIE review team will provide an overview of the review findings.

The draft eastern Bering Sea Snow Crab assessment report (appendix A to the 2005 Crab SAFE report) was mailed to you on May 22nd. The SSC is scheduled to review the model and assessment at this meeting. Jack Turnock (NMFS) will be available to present his assessment.

b) Receive report from Crab Plan Team and PNCIAC

The BSAI Crab Plan Team met at the AFSC in Seattle May 16-18th. The agenda from the meeting is attached as Item D-3(b)(1). The team reviewed the snow crab assessment, the preliminary overfishing definitions analysis, discussed the 2005/2006 fishery and commented on a number of additional issues. Minutes from the plan team meeting will be provided at the Council meeting. A representative from the plan team will provide an overview of the plan team's report.

The Pacific Northwest Crab Industry Advisory Committee (PNCIAC) met in Seattle on May 23 to discuss industry concerns with the improving retention of king and Tanner crab in the rationalized crab fisheries. Minutes from the meeting are attached at Item D-3(b)(2). Steve Minor, the Chair of PNCIAC, will be available to present the committee's report.

c) State/Federal Action Plan

The Alaska Department of Fish and Game (ADF&G) and the National Marine Fisheries Service (NMFS) have revised the State/Federal Action Plan for Commercial King and Tanner crab fisheries of the Bering Sea and Aleutian Islands. The primary difference in the revised action plan (from the previous 1993 version) is in the timeline provided for data exchange between ADF&G and NMFS. The revised State/Federal Action plan is attached as Item D-3(c). The concurrence of the Council is sought on the revisions and details laid out in the action plan.

NPFMC Crab Plan Team meeting

May 16-18, 2005

Observer Training Room (Room 1055), AFSC, Seattle, WA

Agenda

May 16

9am-12pm:

Membership issues:

- Election of vice-chair
- Membership needs: Discussion of need for additional CPT members (replacement of vacancies, need for additional expertise)

Review of 2005/06 Fisheries:

- Review of 2005/06 fisheries (incl. Norton Sound) – ADF&G (Bowers)
- Review 2005/06 Bristol Bay red king crab bycatch data – ADF&G (Barnard)

Trawl Survey overview

- Trawl survey overview from 2005

12:00 – 1:00 lunch

1pm-5pm:

Review of snow crab assessment

- CPT discussion of consideration for adoption

May 17

9am-12pm:

Crab Overfishing Analysis (time certain)

- Review of preliminary analysis of crab overfishing definitions revision (including report from Crab Workshop)
- CIE review of crab overfishing analysis
- Discussion of analytical needs, timing, SSC presentation in June and Initial Review by Council (Dec 2006)

12:00 – 1:00 lunch

1pm-5pm:

- Continue crab overfishing analysis.

May 18

9am-12pm:

Economic review of crab fisheries data from Crab Rationalization program

Review of stock assessment models (incl. Norton Sound)

Projection of the status of stocks which will be updated and modified for the Fall CPT meeting – ADF&G/NOAA

12:00 – 1:00 lunch

1pm-5pm:

Bering Sea Crab EFH Measures considered by Council – St. Matthew blue king crab and EBS snow crab discussion paper for June Council meeting.

- CPT comments on adequacy of existing measures.

Summer research issues/schedule – NOAA/ADF&G (Pengilly)

State/Federal action plan and timeline for fall TAC setting

Review of recent ABOF actions on Bering Sea Tanner TAC and CDQ fishery management plan – ADF&G (Donaldson)

Discussion of SAFE and other reporting issues

Other issues/new business

Adjourn (5pm)

AGENDA D-3(b)(2)
JUNE 2006

PACIFIC NORTHWEST CRAB INDUSTRY ADVISORY COMMITTEE (PNCIAC)
P.O. Box 969
Edmonds, WA 98020
360 440 4737
Fax 425 640 7267
steve@wafro.com

May 23, 2006

PNCIAC Meeting Minutes from May 23, 2006.

Committee area and species: Bering Sea and Aleutian Islands, king and tanner crab

Committee present: Steve Minor, Chair, CBSFA; Gary Painter, Trailblazer; Vic Scheibert, Trident Sfds.; Gary Stewart, Polar Lady; Lance Farr, Kevleen K; Phil Hanson, UNISEA; Garry Loncon, Royal Aleutian Sfds. (via teleconference); Rob Rogers, Icicle Sfds., Tom Suryan, Skippers for Equitable Access (SEA); Kevin Kaldestad, Mariner Boats; Keith Colburn, Wizard; Arni Thomson, Secretary, ACC; Absent, Clyde Sterling, Peter Pan Sfds.

ADFG present via teleconference: Forrest Bowers, Dave Barnard, Wayne Donaldson and Doug Pengilly.

Industry present: Joe Haugen, PPSF; Glenn Guffey, PPSF; Gary Covich, W. Mariner; Gretar Gudmundsson, Notorious Partnership; Brent Paine, UCB; David Harris, Arctic Mariner; Norm Huswick, Adventure; Louie Lowenberg, Arctic Lady; Malcom McClellan, AK Crab Processors Assn.; Ken Tippett, AK Boat Co.; Harold Rice, Bering Star; Gordon Kristjanson, Aleutian Mariner; Mike Shelford, Shelford Fisheries; John Jorgensen, Alaska Crab Producers Coop; Ed Poulsen, Arctic Sea and Sea Boat Coop; John Iani, North Pacific Crab Association; Paul Duffy, Lou Leferrier, Pro Surveyor; Ron Lloyd, Pacific Mariner; Jorn Kvinge, Arctic Sea; Gudjon Gudjonsson, Autumn Dawn; Owen Kvinge, North Sea; Kevin Kaldestad, Kaldestad Fisheries; Doug Wells, Courageous and Baranof; Mark Casto and Walt Casto, Pinnacle; Eric T. Olson, Farm Credit. Via teleconference, Frank Kelty and Linda Kozak.

Call to order: 9:15 am

Introductory remarks: Steve Minor presented several minutes of introductory remarks that focused on:

- The discard and bycatch issues that have been raised by the ADF&G report that was released just prior to the Crab Plan Team meetings.

- The potential economic impacts on the industry if voluntary measures to address increased legal discards and bycatch are not adopted.

- PNCIAC's role in providing a forum for the industry to seek consensus on voluntary measures; given the scope of PNCIAC's mandate and the anti-trust provisions of the Crab rationalization program.

Addition to agenda approved:
Presentation by John Iani, on startup of MSC certification

The Chair then reviews the substance of February 23rd meeting, appointment of the committee of the whole to work with industry to develop consensus on voluntary measures to resolve the issue of excessive discarding of legal crabs.

Committee approves the minutes from the February 23rd meeting.

2. MSC certification, presentation by John Iani

The North Pacific Crab Association has initiated the pre assessment phase of the MSC certification process for Aleutian Islands golden king crab, Bristol Bay red king crab, Bering Sea tanner crab and Bering snow crab. Confidential Pre assessment cost of $10,000 is being sponsored by NPCA

Pre assessment will take 3-4 months.

The MSC assessment process cost $150,000, 9-10 months time; the entire process will require 15 months.

Wal Mart moving to buy MSC only seafood products in 3-4 years. This will likely set a trend for other major buyers in the U.S.

Consultant on MSC is confident that crab fisheries are certifiable, discards and bycatch are important issue to overcome, industry and ADFG response to these issues is important.

Proportional sharing of the costs is required, costs will be allocated between harvesters and processors—based on individuals' proportional share of QS and PQS.

MSC classification will give Alaskan crab products an advantage over Russian products which due to management practices, appear to be non-certifiable.

PNCIAC motion adopted unanimous: Garry Loncon moves that PNCIAC recommends endorsement of pre assessment phase of MSC certification process.

3. Review Discussion Paper on Industry Proposed Solutions to the Bristol Bay King Crab Discard and Bycatch Issues That Occurred in the First Rationalized Fishery in the Fall of 2005.

Phil Hanson, UNISEA, co chair of the committee of the whole on the discards issue, presides over this discussion.

Kaldestad speaks in favor of improved retention, and he recognizes that ADFG must take measures to protect the resource.

Suryan speaks in favor of the recommendations to reduce discards of legal crabs. He also notes that he thinks ADFG should review the soak time estimates, as in conversations with other skippers it seems most were not letting the gear soak more than 36 hours. The longer soak times occurred when boats making two or more trips, let their gear soak for five or more days while they went to town to make a delivery.

Farr speaks in favor of the motion. Overall, the fleet will gain revenue by landing the crabs. He passes out a simplified model (attachment) that shows a conservative estimate of the cost to the average QS holder if ADFG moves to withhold a percentage of the TAC to account for discarding of legal males.

Painter, recognizes the need to retain legals at the same level as in the pre rationalized fishery of 1999-2004.

At this point the committee members engaged in a dialogue with ADFG in an attempt to ascertain what the historical percentage of legal discards was in the period 1999-2004, in an effort to determine an ADFG benchmark for comparisons. However, ADFG stated that the staff have not had that discussion yet, as to what standard level of discards will be acceptable.

The following are responses to questions about estimates of old shell king crab ADFG, Dave Barnard and Forrest Bowers.

> Observed percentages of old shell king crab 2005-06: 24% old shell; 4% very Old shell, total 28%.
>
> NMFS 2005 survey estimates of old shell, 40%.

PNCIAC motion adopted unanimous: Gary Painter, recommends adoption of recommendation No. 1, from the discussion paper, improve retention of legal size animals, to the level of the pre rationalized fishery in the years 1999-2004, including the strategies and tactics.

Painter notes that the average of non-retained legal males 1999-2004 appears to be .1 to .2 on Table 2 of the Barnard report, non retained legal males. This is very low compared to 5.8 in 2005 and clearly illustrates there is a problem.

Farr, speaks in support of the issue.

In response to further committee questions about a benchmark standard, Forrest Bowers states what comes up in the pots onboard the observed vessels, should be close to what is actually delivered by other vessels and observed by dockside samplers.

Rogers, how do we enlarge industry support for PNCIAC position on retention?

Suryan, need to have coops, individual harvesters and processors sign onto the PNCIAC discussion paper.

Kaldestad asks Bowers if PNCIAC is working in the right direction, will this activity be satisfactory?

Bowers, yes, we are very encouraged, this is what we are looking for. We have to have strong assurances from harvesters, processors and cooperative members to enact measures to improve retention.

Minor adds that PNCIAC has set up an email correspondence list for crab coop managers, and crab processors, in addition to PNCIAC, to generate widest possible circulation of information and recommendations on the discard and bycatch issues.

PNCIAC motion adopted unanimous: Tom Suryan moves that PNCIAC endorse the bycatch reduction recommendations listed under item No. 2., bycatch reduction in the discussion paper.

Keith Colburn and Gary Painter recommend the escape panel and mesh restriction recommendation be amended, due to the uncertainties of what is practical and what will work the best to maximize escapement. The escape mesh provision language in the discussion paper was modified to: "encourage immediate experimentation and analysis of bycatch with varying escape mesh panels in use, and seek to increase vertical surface area and horizontal surface area of escape mesh and then consider adoption of new recommendations."

The committee adjourned at 11:45 a.m.

Respectfully submitted,

Steve Minor, Chair
Pacific Northwest Crab Industry Advisory Committee

Attachments: 4
Discussion paper; Legal discards cost estimate model for QS holders;
Sample discard decal placard; Sign in list;

Revised, May 23 2006

Discussion Paper on Industry Proposed Solutions to the Bristol Bay King Crab Discard and Bycatch Issues That Occurred in The First Rationalized Fishery in the Fall of 2005

Introduction:

The Alaska Department of Fish and Game (ADFG) has identified significant increases in the discard of legal size king crabs and the bycatch of sub-legal male king crabs and female king crabs in the first rationalized Bristol Bay king crab fishery in the fall of 2005. * ADFG, through personal communications, is encouraging industry solutions to minimize discard and bycatch concerns related to ADFG biological concerns about resource sustainability.

The BSAI crab industry acknowledges there were unanticipated discard and bycatch increases that occurred in the fishery, and expresses its intent to develop immediate voluntary actions that will be implemented for the fall 2006 Bristol Bay Red King Crab Fishery, to remedy the resource concerns identified by ADFG.

I. Voluntary solutions to consider regarding the discards of legal size king crabs:

Recommendation: Improve retention of legal size animals, to the level of the pre-rationalized fishery in the years 1999 through 2004.

Strategies and tactics:

Encourage industry acceptance of NMFS annual survey estimates of new and old shell legal BBRKC crabs to form the basis to establish shell condition standards.

Need commitments from all participants on retention goals.

Encourage the development of new king crab markets.

Encourage fleet communication on the fishing grounds in an effort to avoid old shell crab areas, when possible.

Encourage education of all industry participants to familiarize themselves with ADFG shell condition classifications as described in Biological Field Techniques for Lithodid and (Snow) Chionoecetes Crabs, published by Alaska Sea Grant.

* Estimates of Red King Crab Bycatch....., ADFG, Barnard and Pengilly, May 2006

II. Voluntary solutions to consider for reducing the bycatch of females and sub legal king crabs:

Recommendations:

Encourage fleet communication on the fishing grounds to avoid areas, when possible, of high bycatch.

Encourage fishery participants to maximize pot soak times throughout the season.

Encourage immediate experimentation and analysis of bycatch with varying escape mesh panels in use, and seek to increase vertical surface area and horizontal surface area of escape mesh and then consider adoption of new recommendations.

Encourage vessel owners to improve vessel discard chutes, to reduce handling mortalities, but also insure safety measures to prevent injuries on deck when chutes are revamped.

Need commitments from all fishery participants to reduce bycatch rates.

Encourage use of discard decal placards to educate deck men on the need for careful return of all discards:
"Fragile! Handle With Care, Discards are <u>your</u> future. Help protect your resource by REDUCING HANDLING MORTALITY."

The undersigned agree to the long-term recommendations proposed by PNCIAC and incorporated into this letter.

NAME	COMPANY/ORGANIZATION

PACIFIC NORTHWEST CRAB INDUSTRY ADVISORY COMMITTEE (PNCIAC)
P.O. Box 969
Edmonds, WA 98020
360 440 4737
Fax 425 640 7267
steve@wafro.com

NOTICE OF PNCIAC MEETING

Date: Tuesday, May 23, 2006

Time: 9:00 AM to Noon

Place: Leif Erikson Lodge Hall, 2245 N.W. 57th St., Seattle, WA 98107; 206 783 1274

All PNCIAC meetings are open to the public.

Agenda:
This meeting is a follow-up from the PNCIAC meeting of February 23rd, 2006, where the major focus of the committee was to initiate discussion about mechanisms, issues and incentives to improve retention of king crab and snow crab in the Bering Sea rationalized fisheries. At the meeting, PNCIAC formed a committee of the whole to be co-chaired by Gary Stewart and Phil Hanson.

The ADFG analysis of observer data defining the extent of the problem of discarding in the Bristol Bay king crab fishery was not available for the February meeting, however it will be released at the May 16-18 Crab Plan Team meeting in Seattle, and the results available at the upcoming PNCIAC meeting. Preliminary information from ADFG concerning the report indicates that significant hygrading of legal size king crabs occurred on twenty-two of twenty-four vessels observed in the Bristol Bay king crab fishery.

The problem regarding discards needs to be addressed and resolved on a fleetwide basis. Otherwise, the industry could be faced with a reduction in the TAC (total allowable catch) for next fall's king crab fishery. It is our hope that a PNCIAC initiative can be instrumental in developing consensus on a solution(s) prior to ADFG initiating the TAC setting process. We also need to bear in mind, the 2006-07 NMFS crab fishing year and the deadline for submission of cooperative applications is July first.

Depending on availability of ADFG Westward Region staff, PNCIAC will have teleconference capability available for the meeting.

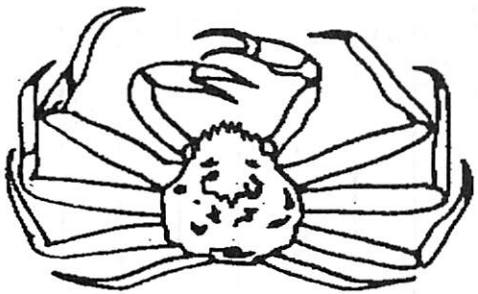
For additional information, contact Steve Minor, Chair of PNCIAC at 360 440 4737; or the Secretary of PNCIAC, Arni Thomson, at 206 547 7560; or 206 769 3474.

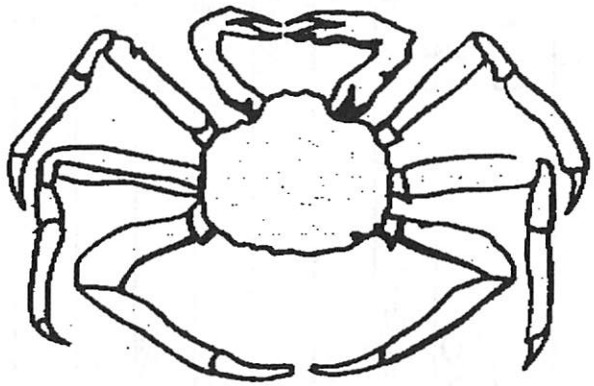
Legal Discards Model

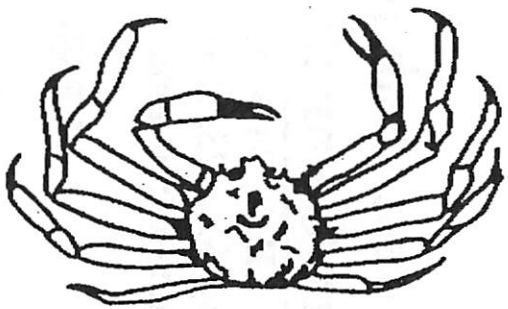
Quota	% Legal Discards	Lbs Discarded	Mortality Rate	Tac Reduction	Price/LB 60% no1 4.60 40% no2 3.80	Value	Average Share	Avge Cost/ QS Holder
18,000,000	20%	3,600,000	20%	720,000	4.28	3,081,600	0.50%	15,408.00

More will be deducted from the TAC to account for higher sub legal and females that is not in this model

FRAGILE!
HANDLE WITH CARE!







Discards are <u>your</u> future.
Help protect your resource by
REDUCING HANDLING MORTALITY.

ALASKA CRAB COALITION
SINCE 1986

Pacific Northwest Crab Industry Advisory Committee

Leif Erikson Hall, Ballard, Wa
Tuesday, May 23, 2006
9:00 am –12:00 noon

NAME	VESSEL/COMPANY
JOE HOUGEN	PETER PAN
GLENN GUFFEY	PETER PAN
GARY COVICH	W. MARINER
GARY STEWART	G. Stewart
Gretar Gudmundsson	Notorious Partnership
BRENT PAINE	UCB
Paul Harris	Arctic Mariner
Norm Hunswick	Adventure - Icicle Stfds.
Louie Lonewood	ARCTIC LADY / LIAISON
Gary Painter	F/V Trailblazer
Malcolm McLellan	AK Crab Producers AO
PHIL HANSON	UNI SEA
Kenneth Tippett	AK. Boat Co.
Harold Rice	Bering Star
GORDON KRISTJANSON	ALEUTIAN MARINER
Mike Sheffield	Sheffield Fisheries
JOHN JORGENSEN	ALASKA CRAB PRODUCERS COOP
Ed Poulsen	F/V Arctic Sea
J. IANI	North Pacific Crab Assoc.

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NAME	VESSEL/COMPANY
Paul Duffy	PRO Surveyor
Jan Lafenie	Pro Surveyor
Ron Lind	PACIFIC Mariner
Durem Nvinge	North Sea
Gudjon	Autumn Dawn
JORN KUINGE	ARCTIC SEA
Kevin Kaldestad	BACTAC
Doug Wells	Brant / Gardens
MARK CASTO	F/V PINNACLE
Arni Thomson	ACC
Matt Casto	PINNACLE
Erik Olson	Northwest Farm Credit

STATE OF ALASKA

FRANK H. MURKOWSKI
GOVERNOR

DEPARTMENT OF FISH AND GAME
OFFICE OF THE COMMISSIONER

P.O. BOX 115526
JUNEAU, AK 99811-5526
PHONE: (907) 465-4100
FAX: (907) 465-2332

April 17, 2006

Ms. Stephanie Madsen, Chair
North Pacific Fisheries Management Council
605 West 4th, Suite 306
Anchorage, AK 99501-2252

Mr. Art Nelson, Chair
Alaska Board of Fisheries
P.O. Box 115526
Juneau, AK 99811-5526

Dear ~~Chairwoman~~ Stephanie Madsen and Chairman ~~Nelson~~ ART:

On behalf of the Alaska Department of Fish and Game (ADF&G), Mr. Doug Mecum of the National Marine Fisheries Service (NMFS) Alaska Regional Office, and Dr. Doug DeMaster of the NMFS Alaska Fishery Science Center, I am providing the attached State/Federal Action Plan for Commercial King and Tanner crab fisheries of the Bering Sea and Aleutian Islands. This revision differs from the original 1993 agreement primarily in providing a specific timeline for data exchange between ADF&G and NMFS. The revision was undertaken due to the advent of crab rationalization, as well as new requirements for peer review, as stipulated in the Information Quality Act.

I ask that you review this document, and upon completion of your review, I seek your concurrence with its provisions.

Sincerely,

McKie Campbell
Commissioner

Enclosure

STATE/FEDERAL ACTION PLAN FOR MANAGEMENT OF COMMERCIAL KING AND TANNER CRAB FISHERIES OF THE BERING SEA AND ALEUTIAN ISLANDS MARCH 2006

PURPOSE: To foster improved coordination and communication between the Alaska Fisheries Science Center (AFSC) and the Alaska Department of Fish and Game (ADF&G) with respect to crab management under the Fishery Management Plan (FMP) for the Commercial King and Tanner Crab Fisheries in the Bering Sea and Aleutian Islands (BSAI) Area.

BACKGROUND: The FMP approved in 1998 extended a State/Federal cooperative management regime first established in 1989. Under this regime, the Secretary of Commerce defers to the State's regulatory system in setting Total Allowable Catch (TAC) as frameworked in the FMP. NOAA Fisheries is responsible for setting overfishing levels (OFL), which must be consistent with the FMP, the Magnuson-Stevens Fishery Conservation and Management Act, and other Federal law.

Management goals and specific objectives are identified in the FMP. ADF&G, in consultation with AFSC and the North Pacific Fishery Management Council (NPFMC), recommends to the Alaska Board of Fisheries (Board) appropriate management measures, including harvest strategies, to accomplish the objectives. NOAA Fisheries reviews the expected performance of these management measures and harvest strategies relative to the OFLs and stock rebuilding. The OFLs are reviewed by the NPFMC. Three categories of management measures are available for consideration: (1) those that are specifically fixed and require an FMP amendment to change, (2) those that are framework-type measures that can change without an FMP amendment while following specified criteria, and (3) measures that are neither rigidly specified nor frameworked in the FMP. The measures in categories (2) and (3) may be adopted by the State subject to the appeals process outlined in the FMP.

If the State plans to adopt other management measures the need for such action must be justified based upon consistency with the FMP objectives, the Magnuson-Stevens Act, and other applicable Federal law.

In response to past criticisms with regard to pot limits, registration areas, and setting of guideline harvest levels, the first State/Federal Action Plan was agreed to by NOAA Fisheries and ADF&G in 1993. In recent years, there have been ongoing problems with the tight schedule for establishing harvest levels following completion of the annual AFSC trawl survey and the opening of the major fisheries.

Given that ADF&G and NOAA Fisheries share responsibilities for management of Bering Sea crab stocks, there is a need to agree on a timeline for data exchange to ensure that the two agencies meet their respective management mandates. Two recent

developments necessitated changes to the existing memorandum of agreement. First, the advent of rationalized crab fisheries in the Bering Sea and Aleutian Islands Area in 2005, led to a change in the timing of when assessment advice is needed. Second, the information quality act (IQA) directs NOAA Fisheries to adopt more stringent requirements for peer review. To address the problem of tight timelines, AFSC and ADF&G will adopt this action plan with new provisions for scheduling and peer review, as well as carrying forward prior provisions still deemed important and necessary, to continue the formal implementation of State/Federal cooperation in crab management (Appendix 1). It is understood that for both ADFG and AFSC all commitments for surveys and data analysis are contingent on the availability of funding.

AFSC and ADF&G will meet annually with the crab industry, preferably after announcement of TACS (October 1) and before commencement of the major Bering Sea crab FMP fisheries (October 15), to discuss crab management issues such as, but not limited to, setting of TACs, stock status determinations relative to overfishing, stock assessment analyses, current research, and harvest strategies. The location of meetings will alternate between Washington and Alaska. Meetings in Alaska will alternate between Anchorage and Kodiak. These meetings will provide an opportunity for review of crab management issues and industry input to management agencies.

STATE/FEDERAL COORDINATION REVIEW GROUP:

The purpose of the State/Federal Coordination Review Group will be to review the process of coordination envisioned by this Action Plan and to effect changes when needed. This group will also ensure that responsibilities for the actions described in this plan are assigned to appropriate individuals in the respective agencies. Members of this group are to include the Director of the Alaska Fisheries Science Center, the Director of the Commercial Fisheries Division of ADF&G, and their appropriate support staff and legal counsel.

RESEARCH PLANNING GROUP:

The purpose of this group will be to

1) encourage and enhance sharing of recent research results and

2) to develop and revise long-term crab research priorities relevant to the needs of crab management for FMP species in the BSAI area, as well as for other crab stocks in Alaska. The group will include AFSC, ADF&G, the US Geological Survey, and university crab biologists, as well as representatives from other appropriate resource management agencies and research institutions.

The group will convene at an Interagency Crab Research meeting held annually for a one to three day period at a time and place convenient for the majority of group members. ADF&G (HQ) will plan the meeting with input and concurrence by NMFS (AFSC). These meetings will provide an opportunity for participants to update each other with presentations on current and proposed research, and are expected to foster a healthy exchange of ideas.

The purpose of developing long-term research priorities will be to focus future research efforts on issues relevant to management of crab stocks and to function as a vehicle to coordinate the expenditure of crab research funds by ADF&G, NMFS, and external funding agencies such as the North Pacific Research Board. The priorities will be updated at least once every three years.

Both AFSC and ADF&G agree to jointly request Council and Board concurrence on this Action Plan and its role in the cooperative management of the king and Tanner crab fisheries in the BSAI.

This State/Federal Action Plan for management of commercial king and Tanner crab fisheries of the BSAI has been approved by:

Doug Mecum
Acting- Director, Alaska Region
National Marine Fisheries Service

4/6/06
Date

McKie Campbell
Commissioner
Alaska Department of Fish and Game

4/6/06
Date

Dr. Douglas DeMaster
Director, Alaska Fisheries Science Center
National Marine Fisheries Service

4 April 2006
Date

Appendix: Timeline for Annual Procedure for Data and Information Exchange regarding Crab Fisheries between the Alaska Fisheries Science Center and the Alaska Department of Fish and Game

APRIL

By April 1[1] - ADF&G and NMFS stock assessment scientists update stock assessments they have agreed to undertake. Stock assessments must contain detailed descriptions of the analytical approach, the data, key vital rates and other parameters used in the assessment. Stock assessments should incorporate the most recent catch estimates or if catch estimates are not available they should include projected catches for the latest available fishing season.

MAY

By May 1: Survey data and methods : Identification of data requirements and changes in methods. The ADF&G Westward (WW) Regional Research Supervisor provides to AFSC a list of stock measures (e.g., biomass and abundance estimates by sex, size and maturity class, and shell condition) and other data summaries (e.g., size frequencies and survey distribution) required for application of state harvest strategies and determination of the TACs for each FMP stock surveyed by the Eastern Bering Sea trawl survey: Bristol Bay red king crab (*Paralithodes camtschaticus*), Bering Sea Tanner (*Chionoecetes bairdi*) crab, Bering Sea snow (*C. opilio*) crab, Pribilof Islands red and blue (*P. platypus*) king crabs, and St. Matthew blue king crab. The requested information would be provided by AFSC in early September (see below). AFSC provides to ADF&G a list of information (e.g., fishery dependent data) required to estimate the OFL and stock status relative to B_{MSY} or its proxy. The requested information would be provided by ADF&G by 15 August (see below).

AFSC provides information to ADF&G (Headquarters [HQ] Shellfish Fishery Scientist and WW Regional Research Supervisor) on any planned changes to survey methods that could affect the estimation of stock measures and on any changes in estimation procedures (including any changes made to accommodate changes in survey methods).

AUGUST

By August 15: Trawl survey data. AFSC provides edited haul and crab data from the NMFS eastern Bering Sea trawl survey to ADF&G (HQ Shellfish Fishery Scientist and WW Regional Research Supervisor). These survey data will be preliminary data and authors should acknowledge that some adjustment to the numbers may occur during the remainder of the year. Nonetheless, the AFSC recognizes that ADF&G needs to provide management advice based on these data. Therefore, the AFSC will make every effort possible to eliminate the need to revise the survey data used for biomass estimates.

[1] Dates are advanced to the preceding workday if the specified date falls on a weekend.

By August 15, ADF&G (WW) provides fishery information requested by NOAA Fisheries needed to estimate overfishing and overfished levels.

SEPTEMBER

Stock assessment authors will update their models with the available AFSC and ADF&G data. AFSC will identify what stock assessment model configurations they will need to estimate the OFL in the upcoming year.

By September 5: Survey and stock assessment results and determinations of stock status.
NMFS (AFSC) provides to ADF&G (HQ Shellfish Fishery Scientist and WW Regional Research Supervisor), and NMFS (Alaska Region):

1) stock parameter estimates and trawl survey data summaries identified as needed by ADF&G for determination of TACs (see "By May 1," above);
2) estimates of stock size and other parameters used by AFSC to determine stock status relative to overfishing and overfished levels for FMP crab stocks; and
3) determinations of stock status for FMP crab stocks indicating a) if they are overfished, b) whether they are approaching overfished status, and c) what would constitute a level of overfishing for the upcoming season.

AFSC provides any other estimates or observations from the survey data that have been identified by AFSC as warranting consideration in determination of TACs or stock status.

By September 17: Draft TAC review documents.
ADF&G (WW Regional Research Supervisor) distributes draft TAC review documents to AFSC and NMFS (Alaska Region). A document will be prepared by ADF&G (HQ and WW) for each of the Bristol Bay red king crab, Bering Sea Tanner crab, Bering Sea snow crab, Pribilof Islands red and blue king crab, and St. Matthew blue king crab stocks. The documents will summarize and include the information provided by both agencies and determinations by ADF&G (HQ and WW) of appropriate TACs as provided for in FMP section 8.2.2 and subject to Board of Fisheries harvest strategies identified in state regulation.

Any updates or corrections to data summaries, estimates, stock status determinations, and observations by AFSC will also be provided by September 17 to ADF&G (HQ Shellfish Fishery Scientist and WW Regional Research Supervisor), and NMFS (Alaska Region). These data, estimates, determinations, and observations, as they exist on September 17, will be considered final in so far as TAC setting is concerned for the rationalized BSAI FMP crab fisheries. Any changes that affect the draft TAC determinations will be noted and taken into account during the TAC review process.

OCTOBER

By October 1: TAC Announcement
ADF&G (WW) announces final TACs for the surveyed stocks.

Fishery Data Series No. 06-23

Estimates of Red King Crab Bycatch during the 2005/2006 Bristol Bay Red King Crab Fishery with Comparisons to the 1999-2004 Seasons

by

David R. Barnard

and

Douglas Pengilly

May 2006

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries

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ABSTRACT

The 2005/2006 Bristol Bay red king crab *Paralithodes camtschaticus* fishery was the first fishery to be completed under the federal Crab Rationalization Program for Bering Sea/Aleutian Islands (BS/AI) king and Tanner crab fisheries. The Crab Rationalization Program replaced a competitive fishery regime with a system for allocating the harvest as quota shares (QS). Expected benefits of rationalization included a reduction in the bycatch of females and sublegal males that had occurred under the competitive fishery regime, although there were also concerns that rationalization could result in highgrading of legal males. We estimated the catch per pot lift of retained legal males, females, sublegal males, and non-retained legal males using data collected by observers during the 2005/2006 Bristol Bay red king crab fishery and compared those estimates with estimates for the 1999-2004 seasons. The results for the 2005/2006 season did not show a reduction in bycatch of females and sublegal males relative to the pre-rationalized fisheries, but did show an increase in the discard rate of captured legal males.

Key words: Alaska Department of Fish and Game, Bering Sea, Aleutian Islands, crab rationalization, Bristol Bay, red king crab *Paralithodes camtschaticus*, bycatch reduction, highgrading.

INTRODUCTION

The Fishery Management Plan (FMP) for the commercial king and Tanner crab fisheries of the Bering Sea and Aleutian Islands (BSAI) establishes a State-Federal cooperative management regime in which management is deferred to the State of Alaska with federal oversight (NPFMC 1998). In March 2005 new federal regulations were issued to establish the BSAI Crab Rationalization Program according to the provisions adopted by the North Pacific Fishery Management Council (NPFMC) in Amendments 18 and 19 to the FMP (NPFMC/NMFS 2006). Federal actions in 1998 had previously allocated 7.5% of the harvests from Bering Sea king and Tanner crab fisheries to a Community Development Quota (CDQ). The Crab Rationalization Program, however, established a quota system for allocating the entire harvest in each of the Bristol Bay red king crab *Paralithodes camtschaticus*, St. Matthew blue king crab *P. platypus*, Pribilof red and blue king crab, Bering Sea snow crab *Chionoecetes opilio*, Bering Sea Tanner crab *C. bairdi*, Eastern Aleutian Islands golden king crab *Lithodes aequispinus*, Western Aleutian Islands golden king crab, and Western Aleutian Islands red king crab fisheries. The 2005/2006 commercial fishery season was the first to be prosecuted under the new Crab Rationalization Program.

Prior to the 2005/2006 BSAI crab season, the commercial fleet participating in the "general" (i.e., non-CDQ) fisheries fished competitively towards that portion of the harvest not allocated to the CDQ program. The Alaska Department of Fish and Game (ADF&G) managed the competitive general fisheries by establishing a guideline harvest level (GHL) prior to the season, monitoring the harvest during the season, estimating the date and time that the harvest would attain the GHL, and closing the general fishery at that estimated date and time. After closure of the general fishery, the CDQ fishery for the season would open and participating vessels were allowed to fish until the CDQ allocation was harvested or until the regulatory season closing date. With implementation of the Crab Rationalization Program, ADF&G now establishes a total allowable catch (TAC) for each fishery according to State regulations and the National Marine Fisheries Service (NMFS) distributes the TAC as quota shares (QS), with 10% of the TAC allocated to the CDQ and the remaining 90% of the TAC allocated to qualifying vessels as individual fishing quotas (IFQs). ADF&G no longer manages the rationalized fisheries inseason; harvesters may harvest their QS at any time within the fishery seasons established in State regulations. Federal regulations also established other provisions for implementing the Crab Rationalization Program, including those for allocating processor shares to processors, those for

governing the consolidation of quota shares by vessels through leasing or purchasing of IFQs, and those for governing the formation of vessel cooperatives.

Crab pots are the legal gear for the BSAI commercial crab fisheries and only males meeting or exceeding the minimum size limits established in State regulations can be harvested. Females, sublegal males, and non-targeted species are also captured by the crab pots and, although State regulations require harvesters to immediately return any captured females and undersized males to the sea, there remain concerns about the mortality due to handling suffered by the discarded crabs (NPFMC 2005). Under the pre-rationalized, competitive fishery regime that the general fishery was prosecuted, high levels of vessel participation relative to the GHL often resulted in fast-paced, "derby-style" fisheries. In an attempt to control fishery effort to the level that the fisheries could be managed inseason, per-vessel pot limits were instituted in State regulations for the Bering Sea king and Tanner crab fisheries. Pot limits varied among fisheries, among vessel size classes (within fisheries, pot limits for vessels $\leq$ 125 ft in length were 80% of those for larger vessels) and, in some fisheries, the pot limits varied positively with the preseason GHL; 250 pots per vessel was the maximum limit for any fishery and vessel size class.

Among the problems that the Crab Rationalization Program was intended to address was the need to "... develop a management program which slows the race for fish, [and] reduces bycatch and its associated mortalities..." (NPFMC's *BSAI Crab Rationalization Problem Statement*; quoted in NMFS 2004). Replacing the competitive fishery regime with a QS-based regime under the Crab Rationalization Program was expected to obviate the need to "race for fish." Eliminating or slowing the race for fish, in turn, was expected to result in longer soak times for the crab pots, thereby increasing the effectiveness of pot escape mechanisms (escape rings or minimum mesh sizes as required by State regulations) in allowing females or undersized males to escape prior to being handled on deck and discarded (NMFS 2004). To further facilitate use of increased soak times under the Crab Rationalization Program, the Alaska Board of Fisheries in March 2005 increased pot limits to 450 pots per vessel in the Bristol Bay red king, Bering Sea Tanner, and Bering Sea snow crab fisheries and to 250 pots per vessel in the St. Matthew blue king and Pribilof red and blue king crab fisheries, regardless of vessel size or TAC. Additionally, a slower-paced fishery was expected to allow harvesters more opportunity to move their gear to areas with fewer non-retainable or undesirable crabs. On the other hand, prior to implementation of the Crab Rationalization Program, there were concerns that a QS-based regime could allow for, or even promote, "highgrading" by harvesters; i.e., discarding legally retainable, but lower-valued, crabs in order to maximize the contribution of higher-valued crabs towards the harvested QS. The concern was specifically cited during development of the Crab Rationalization Program that harvesters may sort through captured legal males for retention of the largest, cleanest-shelled crabs and discard, with the associated handling mortality, the remaining legal crabs (NMFS 2004).

The Crab Rationalization Program has, in fact, slowed the pace of the BSAI crab fisheries. For example, the 2005/2006 Bristol Bay red king crab season was prosecuted towards the 18.329-million pound TAC over the 3-month period following the October 15, 2005 season opening date; the first delivery was made on October 20, 2005 and the last delivery was made on the day after the regulatory closure date of January 15, 2006 (F. Bowers, ADF&G, Dutch Harbor, personal communication). In contrast, the season lengths for the Bristol Bay red king crab general fisheries during 1996-2004 had all been less than one week, requiring only 3 to 5 days to harvest 7.5-million to 14.5-million pounds annually (Bowers et al. 2005).

In this report we provide information for beginning to assess the expectations and concerns relative to bycatch reduction and highgrading associated with the slower-paced rationalized fisheries. Using data collected by crab observers deployed on fishing vessels by ADF&G, we present estimates on the capture rates of female, sublegal male, and non-retained legal male crabs of the targeted species in the first fishery to have been completed under the Crab Rationalization Program, the 2005/2006 Bristol Bay red king crab fishery. We also compare those estimates with estimates for the 1999-2004 general and CDQ Bristol Bay red king crab fishery seasons and compare estimates of the size and shell-condition distributions for retained and non-retained legal males during the 2005/2006 Bristol Bay red king crab season.

METHODS

The data that we report on here was collected by observers deployed by ADF&G on vessels fishing for red king crabs during the 2005/2006 Bristol Bay season. We compared those data with summaries of data collected by observers during the general and CDQ fisheries of the pre-rationalized 1999-2004 Bristol Bay seasons, which were previously reported in annual summaries of ADF&G's Mandatory Shellfish Observer Database (Barnard 2001, Barnard and Burt 2004, Barnard et al. 2001, Burt and Barnard 2005, Burt and Barnard 2006, Moore et al. 2000, Neufeld and Barnard 2003). We limited our comparison with the pre-rationalized fisheries to the 1999-2004 seasons because the 1999 season was the first season for which catch rates of non-retained legal males were estimated from observer data. The general and CDQ fisheries were analyzed separately for the 1999-2004 because of the distinct natures of the general and CDQ fisheries in those seasons. The general fisheries during 1999-2004 opened on October 15 and remained open for 3-5 days, with GHLs ranging from 6.6-million pounds to 14.5-million pounds and 230 to 257 vessels participating annually (Bowers et al. 2005; Table 1). The CDQ fisheries during the 1999-2004 seasons opened after the closure of the general fishery with only 10 to 13 vessels participating and were prosecuted at a reduced pace relative to the general fishery until the CDQ allocation (ranging from 0.6-million to 1.2-million pounds) was harvested. We analyzed the 2005/2006 season as a single fishery, however, with no distinction made between the IFQ and CDQ fisheries because the IFQ and CDQ fisheries were prosecuted concurrently and some individual vessels simultaneously participated in both the IFQ and CDQ fishery.

Observer coverage levels varied over the seasons considered here and between the general and CDQ fisheries within the same season (Table 1). Catcher-processor vessels were required to have 100% observer coverage during all fisheries and seasons covered by this report. In the 1999 general fishery observers were deployed only on catcher-processor vessels. During the 2000-2004 general fisheries, however, observers were also randomly deployed on approximately 10% of the catcher-only vessels 75-125 ft in length and on approximately 10% of the catcher-only vessels >125 ft in length. Prior to the 2005/2006 season, the CDQ fisheries were prosecuted after the general fishery for the season had closed and observer coverage levels on catcher-only vessels were higher than in the general fishery. During the 1999 and 2000 CDQ fisheries, observers were deployed on 100% of the participating vessels. During the 2001-2004 CDQ fisheries observers were deployed on one catcher-only vessel per CDQ group, as well as on any participating catcher-processing vessels, resulting in 60% of the participating vessels carrying observers in each of those fisheries. Because the 2005/2006 Bristol Bay red king crab IFQ and CDQ fisheries were conducted concurrently and individual vessels could fish for multiple QSs

(both IFQ and CDQ), no distinction was made between the IFQ and CDQ fisheries during the selection of vessels to carry observers. Twenty percent of the catcher-only vessels that pre-registered for the 2005/2006 season in each of the 75-125 ft and >125 ft size classes were randomly selected to carry observers. In actuality, fewer vessels fished than had pre-registered for the 2005/2006 season and observers were deployed on 27% of the 89 vessels that fished in the season, including the 4 catcher-processor vessels that received 100% observer coverage.

Three sources of data collected by observers were used in this analysis: data collected from randomly-selected pot lifts during the fishery; data collected from crabs sorted and retained by the vessel crew for delivery or processing; and data collected from confidential interviews with the captain of the vessel. The methods for obtaining these data are briefly described below; the ADF&G Shellfish Observer Manual (ADF&G 2003) provides detailed descriptions of crab observer sampling duties.

Observers were directed to randomly select 3 pot lifts each day during the 1999 season and 10 pot lifts per day during each of the 2000 to 2005/2006 seasons and to record information on the location, depth, soak time, and contents of each randomly-selected pot lift. Specifically, with regard to the data collected on red king crabs captured in randomly-selected pot lifts, observers recorded: the sex, carapace length (CL) in mm, and shell condition of each red king crab; the legal status relative to the minimum legal size of 6.5-in carapace width of each male; the fate of each legal male as either retained (i.e., for delivery or processing) or non-retained (i.e., discarded); and data on the reproductive condition (clutch fullness, egg development, and egg color) of each female. Although sex, CL, and legal status can be either objectively scored or directly measured, scoring of shell condition is a more subjective determination. Shell condition is recorded to provide an estimate of the time since a crab's last molt (ADF&G 2003, Donaldson and Byersdorfer 2005). Observers scored the shell condition of sampled red king crabs as either "new", "old" or "very old" on the basis of the presence and amount of abrasions, discoloration, and wear on the ventral surfaces, the presence and amount of epibionts on the dorsal surface, the color of the dorsal surface, and the degree of wear on spines and dactyls (ADF&G 2003). Observers consulted with the vessel crew and observed the sorting practices of the vessel crew to ascertain the characteristics of legal king crabs that were retained or non-retained. Observers gained further information on the characteristics needed to score legal males as either retained or non-retained by observing if the legal males that they had scored as retained or non-retained were treated as such by the vessel crew after the sampling of a pot lift was completed.

In addition to and independent of obtaining data on red king crabs in randomly-selected pot lifts, observers also sampled from the crabs that were sorted and retained by the vessel crew for delivery or processing. Observers deployed on catcher-only vessels were assigned to record the CL and shell condition from at least 100 randomly-selected retained red king crabs at the time of each delivery. Observers deployed on catcher-processor vessels were assigned to record the CL and shell condition from at least 100 randomly-selected retained red king crabs, prior to being processed, on a daily basis.

Observers also collected information on the fishing activities of their assigned vessel through daily interviews with the captain of the vessel. From the information collected during the daily interviews, the data used in this report were the number of pot lifts performed by the vessel for each day.

The data on red king crabs in randomly-selected pot lifts and on daily vessel effort from confidential interviews were used to estimate the catch per pot lift (CPUE) of female, sublegal male, retained legal male, and non-retained legal male red king crabs. CPUE was estimated using a weighted mean formula for stratified sampling (Burt and Barnard 2006). Briefly, each day an observed vessel fished (vessel-day) was considered a separate stratum and data within a vessel-day stratum was weighted by the vessel's effort (number of pot lifts) for that day relative to the vessel's total effort for the season. Hence data from pot lifts sampled on vessel-days with more effort were given greater weight in the estimates. Beginning in 2003, data were further stratified by vessel category to account for the differences between vessel size classes in pot limits and for the difference in observer coverage levels between catcher-only vessels and catcher-processor vessels. The 3 strata for vessel category were catcher-only vessels ≤125 ft, catcher-only vessels >125 ft, and catcher-processor vessels. For the 2005/2006 season vessels were stratified into only two vessel classes, catcher-only vessels and catcher-processor vessels. Catcher-only vessels were not stratified by size class in 2005/2006 because pot limits were no longer applied differentially by vessel size class. The total number of red king crabs by sex-size class caught by the entire fleet during a fishery was estimated by multiplying the estimated CPUEs by the total number of pot lifts for the entire fleet during the fishery. The value used for total fishery pot lifts in the 2005/2006 season (117,079) was a preliminary value provided by F. Bowers (ADF&G, Dutch Harbor, personal communication).

There is no other data source on bycatch during these fisheries that can be used to directly assess the accuracy of the CPUE estimates for females, sublegal males, and non-retained legal males that were obtained using data collected by observers from pot lift samples. However, the data recorded on fish tickets and on confidential interviews with vessel captains by observers and dockside samplers provide an independent data source for assessing the accuracy of the CPUE estimates for retained legal crabs. Data from fish tickets and confidential interviews are compiled annually to compute and report (e.g., Bowers et al. 2005) the actual fishery CPUE (i.e., the number of all live and dead crabs that were delivered or retained for processing during the season divided by the total number of pot lifts performed during the season by all participating vessels). The annually reported summaries of ADF&G's Mandatory Shellfish Observer Database provide comparisons for each observed fishery of the estimated CPUE of retained crabs with the actual fishery CPUE. Those comparisons show that the CPUE estimates of retained crabs are generally accurate; in particular, the CPUE estimates of retained crabs for each of the 1999-2004 Bristol Bay red king crab general fisheries have been within ± 9% of the actual fishery CPUE (Barnard and Burt 2004, Barnard et al. 2001, Burt and Barnard 2005, Burt and Barnard 2006, Moore et al. 2000, Neufeld and Barnard 2003).

Data collected from randomly-selected pot lifts were also used to compare the estimated size and shell-condition frequency distributions of captured male red king crabs across seasons and to estimate the size and shell-condition frequency distributions of captured legal, retained legal, and non-retained legal red king crabs during the 2005/2006 season. Additionally, for the 2005/2006 season only, the shell-condition data collected from legal males in randomly-selected pot lifts were compared on a vessel-by-vessel basis with the shell-condition data collected from samples of the crabs that were sorted and retained by the vessel crew for delivery or processing. The statistical significance of vessel-by-vessel differences between the shell-condition distributions of legal males in randomly-selected pot lifts and the shell-condition distribution of legal males sorted for delivery or processing was tested using methods for analyzing multiple independent contingency tables (Cox and Snell 1989).

RESULTS

The mean soak time of the pot lifts that were randomly selected for sampling by observers during the 2005/2006 season was 65 hours (Table 2). Of the seasons and fisheries considered here, that value was exceeded only by the mean soak time for pot lifts sampled during the 2004 CDQ fishery (67 hours) and is more than twice that for any of the general fisheries in the 1999-2004 seasons. The CPUE of retained legal males estimated from randomly-sampled pot lifts during the 2005/2006 season was 23.8 per pot lift (Table 2); by comparison, the actual fishery CPUE for the 2005/2006 season has been preliminarily determined to be 23.3 crabs per pot lift (F. Bowers, ADF&G, Dutch Harbor, personal communication). That value was higher than those for the 1999-2003 general fisheries, comparable to that for the 2004 general fishery, but lower than those for the 2003 and 2004 CDQ fisheries.

The estimated CPUE of discarded red king crabs (i.e., females, sublegal males, and non-retained legal males) for the 2005/2006 season was 49.8 crabs per pot lift, a value exceeded only by that for the 2004 CDQ from among those estimates that we report here (Table 2). Expressed as a percentage, discarded red king crabs were estimated to have comprised 68% of the total (i.e., retained and discarded) red king crabs captured during the 2005/2006 season, the second highest percentage estimated for any of the fisheries or seasons considered here (Figure 1). An estimated 5.831-million red king crabs were captured and discarded during the 2005/2006 season. That estimate is comparable to the highest estimate for total number of discarded red king crabs in any one season among the 1999-2004 seasons (general and CDQ fisheries combined), 5.807-million crabs in 2003 (Figure 2).

As in the 1999-2004 seasons, sublegal males were estimated to constitute the largest component (53%) of the discarded red king crab catch during the 2005/2006 season (Table 2, Figure 2). The size distribution of males in sampled pot lifts during the 2005/2006 season tracks well with those for the previous 5 seasons (Figure 3). In particular, a mode at approximately 98-mm CL in the size distribution for the 2003 season tracks to a mode at approximately 128-mm CL in the size distribution for the 2005/2006 season. Seventy-four percent of the non-retained males (60% of the sublegal males and all the non-retained legal males) in sampled pot lifts during the 2005/2006 season were $\geq$ 120-mm CL, the size used to identify mature male red king crabs for management of the Bristol Bay fishery (5 AAC 34.816 (b) (3); Figure 4). Females accounted for an estimated 35% of the red king crab bycatch during the 2005/2006 season and 87% of the females in sampled pot lifts during that season were classified as mature on the basis of the presence of eggs or empty egg cases.

Particularly notable in the CPUE estimates for the 2005/2006 season as compared to the 1999-2004 fisheries was the estimated CPUE of non-retained legal red king crabs (5.8 crabs per pot; Table 2) and their estimated contribution to the total legal males captured (20%), total non-retained red king crabs captured (12%), and total red king crabs captured (8%). The percentage of the total captured red king crabs that were non-retained legal males during the 2005/2006 season was markedly higher than the percentages estimated for any of the general fisheries during 1999-2004 and nearly twice the highest percentage estimated for the CDQ fisheries during 1999-2004 (Figure 1). An estimated 677-thousand legal male red king crabs were captured and discarded during the 2005/2006 season, whereas the highest estimate for total discarded legal males among any of the 1999-2004 seasons (general and CDQ fisheries combined) was 80-thousand crabs in the 2002 season (Figure 2).

Non-retention of the legal males captured by the pot lifts sampled by observers during the 2005/2006 season was correlated with shell condition. By comparison with all (retained and non-retained) legal males in the pot lifts sampled during the 2005/2006 season, crabs classified as new-shell were over-represented in the legal males scored as retained and crabs classified as old- and very-old-shell were highly over-represented in the legal males scored as non-retained (Table 3, Figure 5). There was also some association between non-retention of legal males and their size, with a tendency for higher proportions of the larger legal males in sampled pot lifts to be scored as non-retained than the smaller legal males (Figures 4 and 5). Among the legal males measured by observers in sampled pot lifts during the 2005/2006 season, 16% of the 12,453 that were 131-145 mm CL in size, 23% of the 34,617 that were 146-170 mm CL in size, and 31% of the 3,496 that were 171-195 CL mm in size were scored as non-retained. As a result, there was a slight difference in the mean size between the legal males in sampled pot lifts scored as retained (153.4-mm CL, n = 39,578) and non-retained (156.1-mm CL, n = 11,036); the 95% confidence interval for the difference in mean CL was 2.4 - 2.9 mm.

The tendency during the 2005/2006 season for legal males in new-shell condition to be over-represented in the retained catch as compared to all captured legal males (retained and non-retained) was also revealed by a vessel-by-vessel comparison of the shell-condition data collected from legal males in randomly-selected pot lifts with the shell-condition data collected from the legal males that were sorted and retained for delivery or processing by the vessel crew (Figure 6). For all but 2 of the 24 observed vessels, the percentage of legal males classified as new-shell by observers in the sample of the legal males that were sorted by the vessel crew for delivery or processing exceeded the percentage classified as new-shell in the sample of the legal males (regardless of scoring as retained or non-retained) contained in the randomly-selected pot lifts from the same vessel. For 18 of the 24 vessels the difference in new-shell percentages was 8% or greater and the average of the differences for the 24 vessels was 15%; the differences in new-shell percentages over the 24 vessels is statistically significant ($P << 0.001$, $z = 39.9$).

DISCUSSION

Data on soak time of randomly-selected pot lifts from observed vessels during the 1999 through 2005/2006 Bristol Bay red king crab fishery seasons were consistent with the increased soak times anticipated for a QS-based fishery regime under the Crab Rationalization Program. Mean soak time for sampled pot lifts sampled during the 2005/2006 season was more than double that for any of the 1999-2004 general fisheries and was, at 65 hours, comparable to that for the 2004 CDQ fishery. An experimental study conducted with commercial king crab pots in Bristol Bay has shown that increased soak times, in conjunction with the pot-escape mechanisms required in State regulations, result in a decrease in the ratio of non-legal to legal red king crabs captured (Pengilly and Tracy 1998). The actual catch or CPUE of non-retained crabs relative to retained legal crabs during a commercial red king crab fishery, however, also depends on other factors, such as the size-sex distribution of the red king crab population, where fishing is conducted relative to the spatial distribution of non-legal and legal crabs, and the sorting of legal crabs for retention or non-retention. Despite the longer soak times used in the 2005/2006 Bristol Bay red king crab season, estimates of CPUE and catch of non-retained red king crabs and of the percentage of the red king crabs that were captured but not retained were generally high relative to the general and CDQ fisheries of the preceding six seasons.

The estimated number of non-retained red king crabs for the 2005/2006 season (5.831-million) was higher than for any of the combined general and CDQ fisheries in the 1999-2004 seasons. That may be partly attributable to the TAC for the 2005/2006 season (18.329-million pounds) being higher than harvests during the 1999-2004 seasons (i.e., the highest combined general and CDQ harvest during 1999-2004 was 15.697-million pounds for the 2003 season; Bowers et al. 2005). However, the estimated catch of non-retained red king crabs as a percentage of the total red king crabs captured in the 2005/2006 season (68%) was amongst the highest of the estimates made for any of the fisheries (general or CDQ) since the 1999 season. Preseason data from the NMFS eastern Bering Sea trawl survey indicated that the abundance of sublegal males and mature females in the Bristol Bay red king crab population was relatively high in 2005 (J. Zheng, ADF&G, Juneau, personal communication) and that may account for the high bycatch of sublegal males and females during the 2005/2006 season. Most of the non-retained crabs sampled during the 2005/2006 season (74% of the males and 87% of the females) were mature or of the size used to identify maturity for management purposes.

The observer data from the 2005/2006 season was unique relative to the other seasons considered in the degree to which legal males contributed to the non-retained catch. For the first time since the annual estimation of the CPUE of non-retained legal males in the Bristol Bay red king crab fishery was initiated in 1999, legal males were estimated to account for a substantial portion of the total discarded red king crabs in the 2005/2006 season. The number of legal males estimated to have been captured and discarded during the 2005/2006 season (677-thousand crabs) represents 12% of the estimated total catch of non-retained red king crabs and 20% of the estimated total catch of legal males for the season. Prior to the 2005/2006 season, it had been noted that a "...small level of highgrading has been observed in the CDQ crab fisheries..., but this is not widespread" (NMFS 2004). The 2003 and 2004 Bristol Bay red king crab CDQ fisheries did, in fact, have higher estimates of CPUE for non-retained legal males than for those of the 1999-2004 general fisheries. By all measures, however, the catch rates of non-retained legal males during the 2005/2006 season were markedly higher than for the CDQ fisheries in previous seasons. Additionally, although the discard rates of legal males during the recent CDQ seasons were high relative to the general fisheries, the CDQ fisheries accounted for only 7.5% of the total harvest and a smaller percentage of the total effort for a season. Hence the catch of non-retained legal males in each of the complete (i.e., general and CDQ fisheries combined) 1999-2004 seasons was negligible in comparison to the 2005/2006 season.

Concerns that highgrading for the retention of only the largest, cleanest-shelled legal males would occur in rationalized fisheries (NMFS 2004) were only partially borne out by the data collected by observers during the 2005/2006 Bristol Bay red king crab season. Shell condition, specifically a strong preference for new-shell crabs over old-shell or very-old-shell crabs, was a more important correlate of retention or non-retention than size. In fact, the legal males in pot lift samples that were scored as non-retained tended to be slightly larger than the legal males in pot lift samples that were scored as retained. That size difference probably reflects a positive association between size and the proportion of males in old and very-old-shell conditions, coupled with the tendency to retain new-shell legal males and discard old and very-old shell legal males, rather than any selection for retention based on size.

The estimates of CPUE based on data collected from randomly-selected pot lifts are, in fact, estimates. Moreover, the estimated CPUEs of retained legal males and non-retained legal males are based on the scoring of sampled legal males as such by observers. Hence it is worth

considering the accuracy of the CPUE estimates, particularly for the estimated CPUE of non-retained legal males for the 2005/2006 season. Two lines of evidence provide support for the validity of the CPUE estimate for non-retained legal males during 2005/2006. The first is the accuracy of the CPUE estimate for retained males. The CPUE estimate for retained legal males for the 2005/2006 season (23.8 crabs per pot lift) was within 2% of the actual fishery CPUE that has preliminarily determined from the reported deliveries, processing, and effort for the entire season (23.3 crabs per pot lift; F. Bowers, ADF&G, Dutch Harbor, personal communication). The second is the higher percentage of new-shell crabs in legal males that were retained for delivery or processing than in the legal males that were in randomly-selected pot lifts prior to sorting for retention by the vessel crew. Hence the data collected by observers on retained males, independently of the data that they collected on legal males from pot-lift samples, were consistent with a tendency for the harvesters to preferentially retain legal males in new-shell condition and to discard legal males in old- or very-old-shell condition.

In summary, the data collected by observers during the 2005/2006 Bristol Bay red king crab season provided no indication that the first fishery completed under the Crab Rationalization Program achieved the goal of reducing the bycatch and discarding of females and sublegal males. Instead, those data substantiated the concerns that a fully-rationalized, QS-based fishery regime could lead to increased discarding of captured legal males, concerns that had earlier gained some validity from results for previous CDQ fisheries. It is possible, but entirely conjectural, that the bycatch of sublegal males and females would have been higher during the 2005/2006 season if it had not been managed under a QS-based regime that allowed for longer soak times. However, relatively high abundance of sublegal males and mature females does not account for the estimated 12% of the discarded catch that were legal males. Moreover, the discarding of an estimated 20% of the captured legal males during the 2005/2006 season also likely had the effect of increasing the bycatch of females and sublegal males by increasing the number of pot lifts necessary to harvest the TAC.

Finally, note that we do not generalize these findings from the 2005/2006 Bristol Bay red king crab season to the four other fisheries that opened under the Crab Rationalization Program in the 2005/2006 season (i.e., the Bering Sea snow crab, Bering Sea Tanner crab, Eastern Aleutian Islands golden king crab, and Western Aleutian Islands golden king crab fisheries). Those fisheries were still being prosecuted and observer data from those fisheries were not fully available at the time of this report.

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TABLES AND FIGURES

Table 1.-Number of participating fishing vessels, number of observed fishing vessels, total number of pot lifts, and number of pot lifts sampled by observers during the 1999-2005/2006 Bristol Bay red king crab fisheries.

Season-Fishery	Number of Vessels	Number of Observed Vessels	Number of Total Pot Lifts	Number of Pot Lifts Sampled
1999-General	257	9	146,997	178
1999-CDQ	10	10	2,976	263
2000-General	246	21	98,694	673
2000-CDQ	11	11	4,663	428
2001-General	230	30	63,242	494
2001-CDQ	10	6	3,158	166
2002-General	242	28	68,328	487
2002-CDQ	10	6	3,909	251
2003-General	252	31	129,019	731
2003-CDQ	13	8	5,814	279
2004-General	251	29	90,972	536
2004-CDQ	12	8	5,359	226
2005/2006[a]	89	24	117,079	1,855

[a] IFQ and CDQ fisheries combined.

Table 2.-Estimated catch per pot lift (CPUE) with standard errors (in parentheses) of red king crabs by category (retained legal male, non-retained legal male, sublegal male, and female) from randomly-selected pot lifts sampled by observers during the 1999-2005/2006 Bristol Bay red king crab fisheries.

Season-Fishery	Retained Legal Males	Non-retained Legal Males	Sublegal Males	Females	Total Discarded [a]	Mean Soak Time (hr)
1999-General	13.4 (1.1)	<0.1 (<0.1)	6.1 (0.8)	0.2 (0.1)	6.3	25
1999-CDQ	[b]	[b]	[b]	[b]	[b]	36
2000-General	12.8 (1.3)	<0.1 (<0.1)	13.3 (1.7)	2.3 (0.8)	15.1	22
2000-CDQ	[b]	[b]	[b]	[b]	[b]	26
2001-General	18.4 (2.0)	<0.1 (<0.1)	24.7 (4.4)	12.2 (2.1)	36.9	24
2001-CDQ	[b]	[b]	[b]	[b]	[b]	34
2002-General	19.0 (1.4)	1.1 (<0.1)	21.3 (3.0)	0.7 (0.6)	23.1	18
2002-CDQ	[b]	[b]	[b]	[b]	[b]	45
2003-General	17.8 (1.5)	0.2 (0.1)	26.5 (3.4)	16.5 (3.1)	43.2	31
2003-CDQ	30.1 (3.3)	3.2 (0.8)	26.9 (4.7)	11.2 (2.5)	41.3	42
2004-General	23.1 (1.5)	0.1 (<0.1)	14.2 (2.5)	9.6 (6.2)	23.8	28
2004-CDQ	33.8 (2.1)	3.5 (0.5)	42.5 (3.9)	10.3 (1.3)	56.2	67
2005/2006 [c]	23.8 (1.6)	5.8 (0.9)	26.6 (3.7)	17.4 (2.0)	49.8	65

[a] Sum of CPUEs for non-retained legal male, sublegal male and female crabs.
[b] Confidential.
[c] IFQ and CDQ fisheries combined.

Table 3.-Relative frequency (percent) distributions of shell condition for all legal male, retained legal male, and non-retained legal male red king crabs sampled and scored as retained or non-retained by observers from randomly-selected pot lifts during the 2005/2006 Bristol Bay red king crab season.

Shell Condition	All Legal Males (n=50,614)	Retained Legal Males (n=39,578)	Non-retained Legal Males (n=11,036)
New	71.5%	82.9%	30.3%
Old	24.2%	15.1%	56.7%
Very old	4.3%	1.9%	13.0%

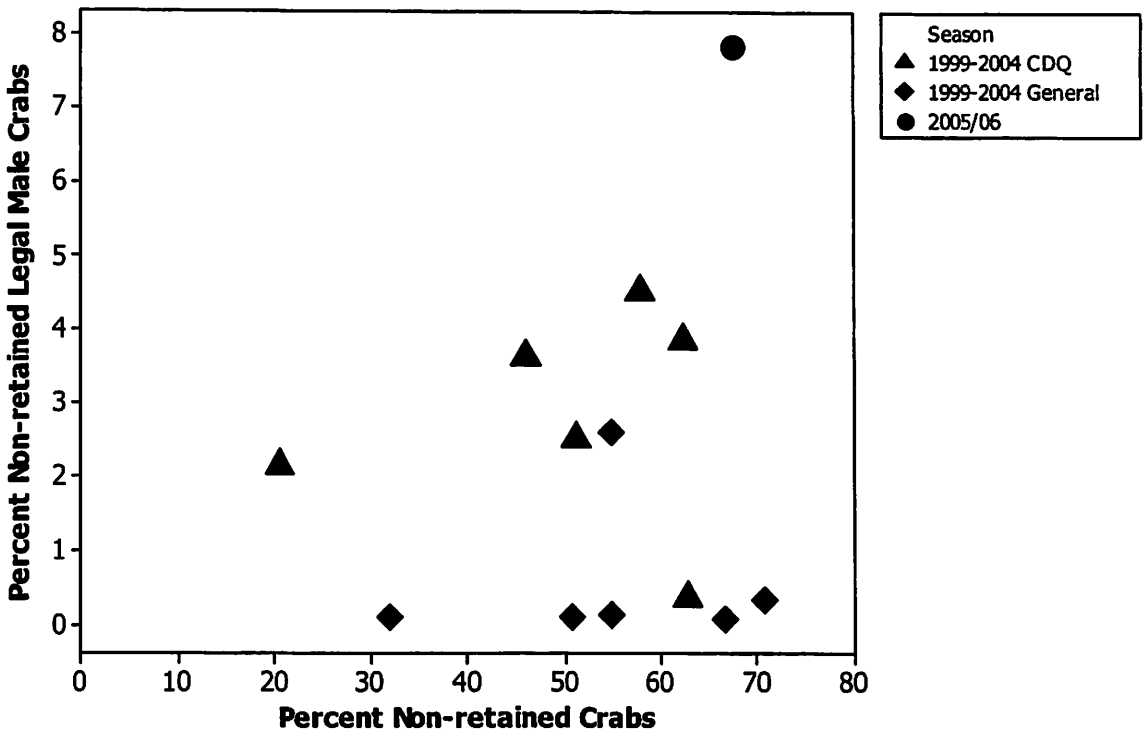

Figure 1.-Estimated percent of red king crabs captured during a Bristol Bay red king crab fishery season that were non-retained (females, sublegal males, and non-retained legal males; horizontal axis) versus the estimated percent of red king crabs captured during the same fishery season that were non-retained legal males (vertical axis) for the 2005/2006 Bristol Bay red king crab season, the 1999-2004 Bristol Bay red king crab CDQ fishery seasons, and the Bristol Bay red king crab general fishery seasons 1999-2004.

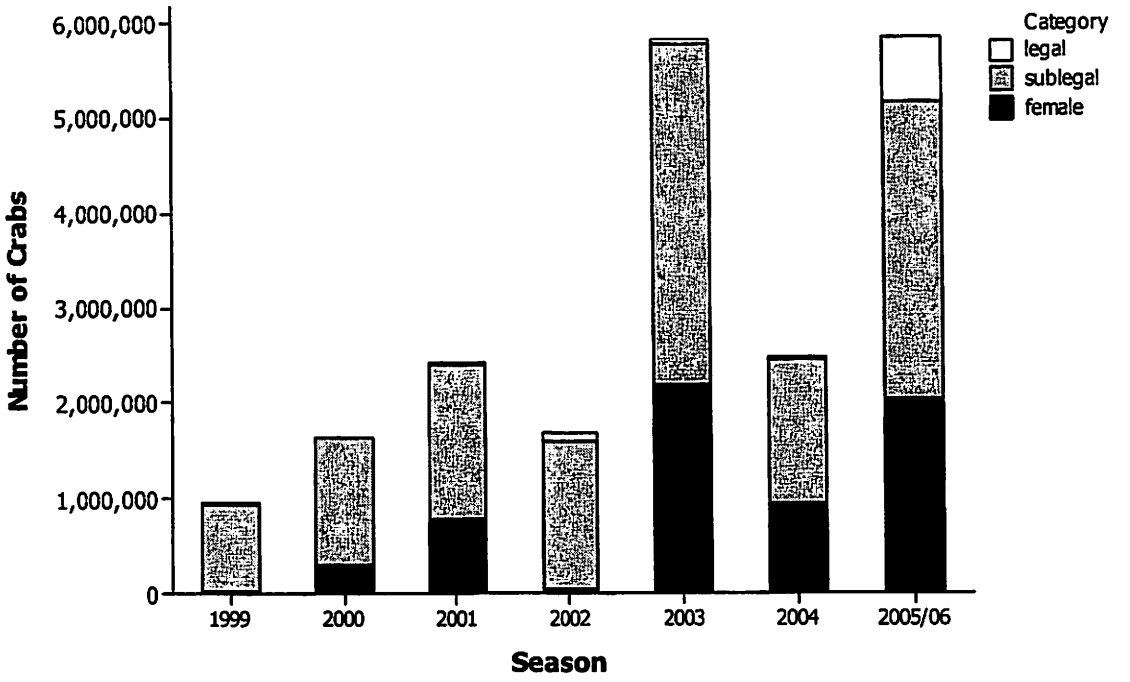

Figure 2.-Estimated numbers of discarded red king crabs by sex and by legal status of males during each of the 1999-2004 Bristol Bay red king crab seasons (general and CDQ fisheries combined) and the 2005/2006 Bristol Bay red king crab season.

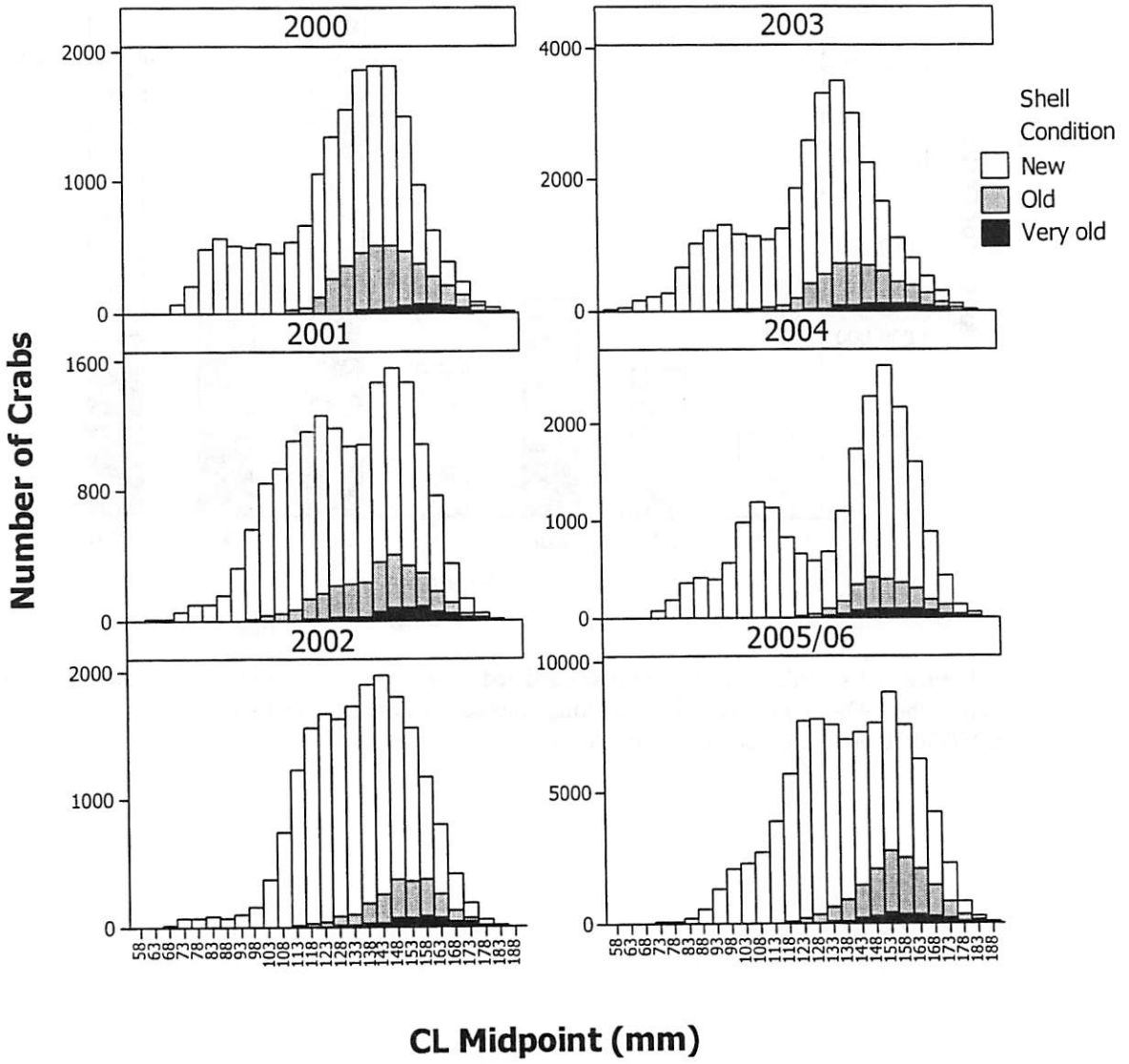

Figure 3.-Carapace length (CL) frequency distributions by shell condition for male red king crabs sampled from randomly-selected pot lifts during the 2000-2004 Bristol Bay red king crab general fisheries and the 2005/2006 Bristol Bay red king crab season.

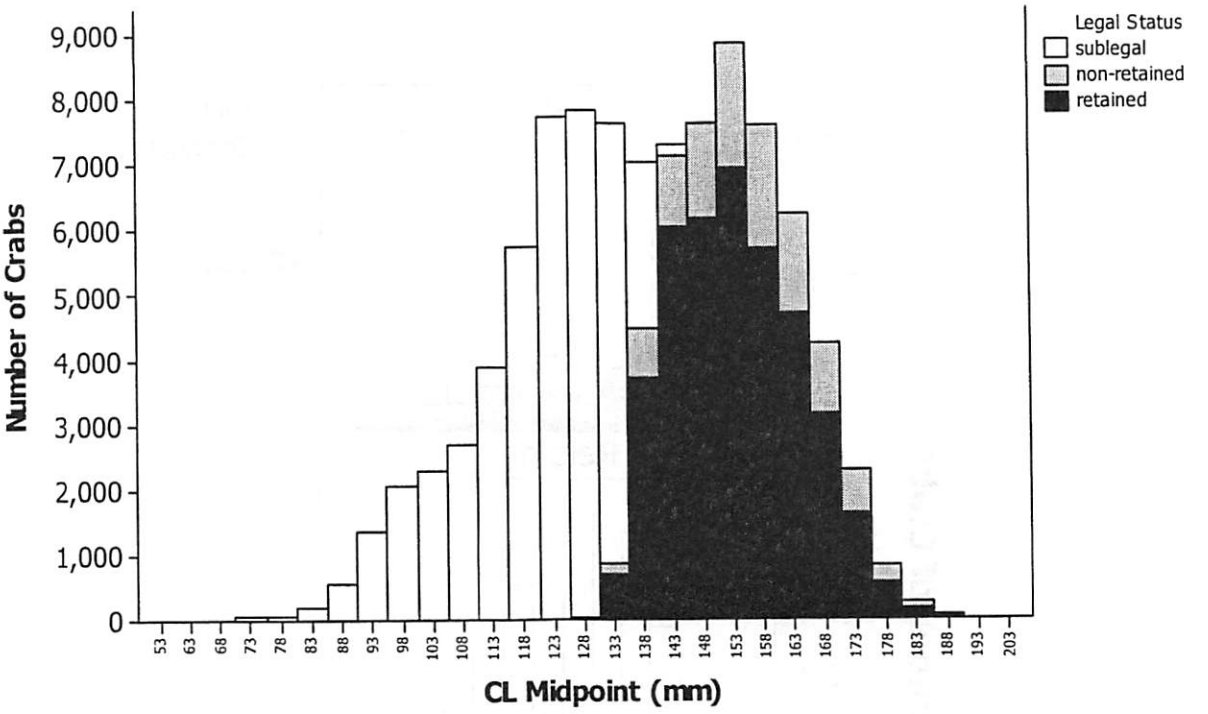

Figure 4.-Carapace length (CL) frequency distribution of sublegal male, non-retained legal male, and retained legal male red king crabs sampled by observers from randomly-selected pot lifts during the 2005/2006 Bristol Bay red king crab season.

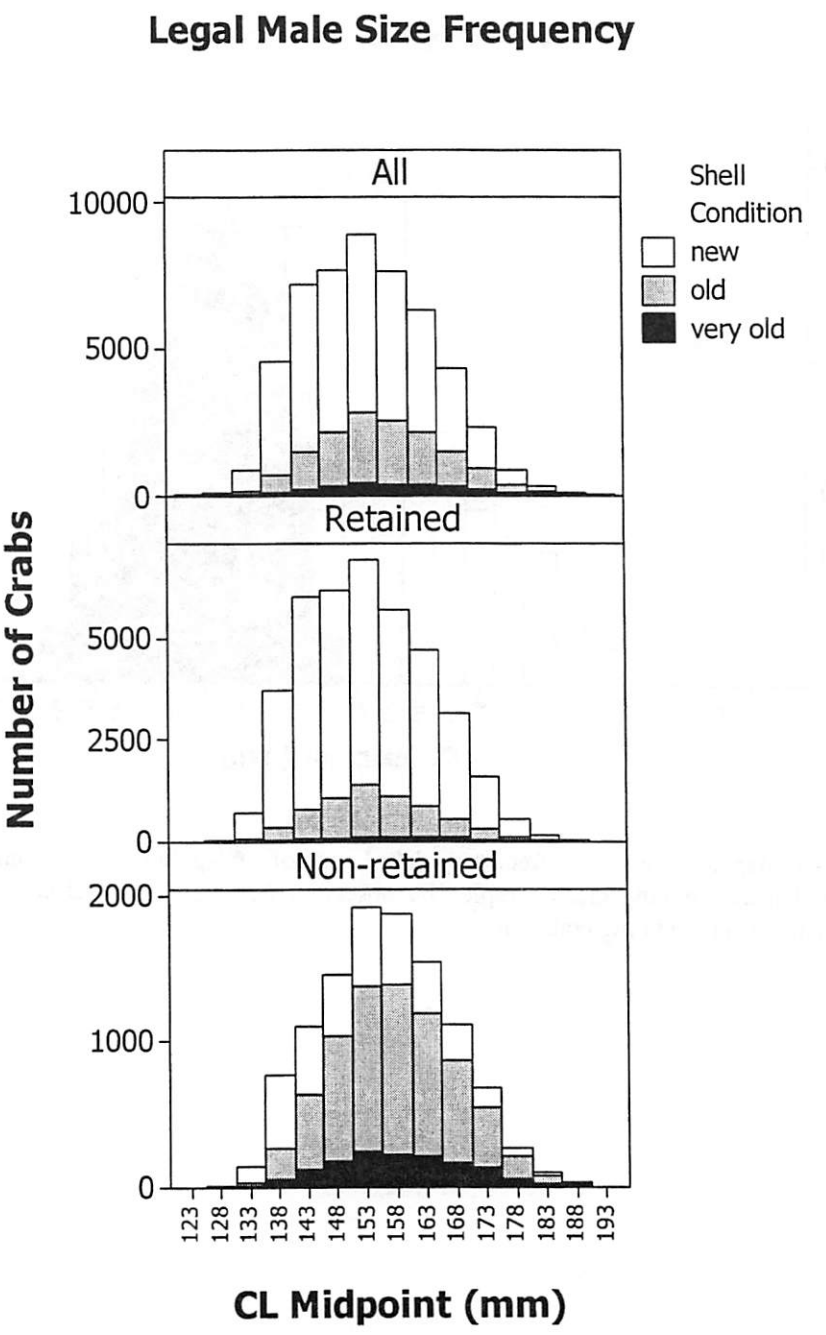

Figure 5.-Carapace length (CL) frequency distributions by shell condition for all legal male (top panel; n=50,614), retained legal male (middle panel; n=39,578), and non-retained legal male (bottom panel; n=11,036) red king crabs sampled and scored as retained or non-retained by observers from randomly-selected pot lifts during the 2005/2006 Bristol Bay fishery.

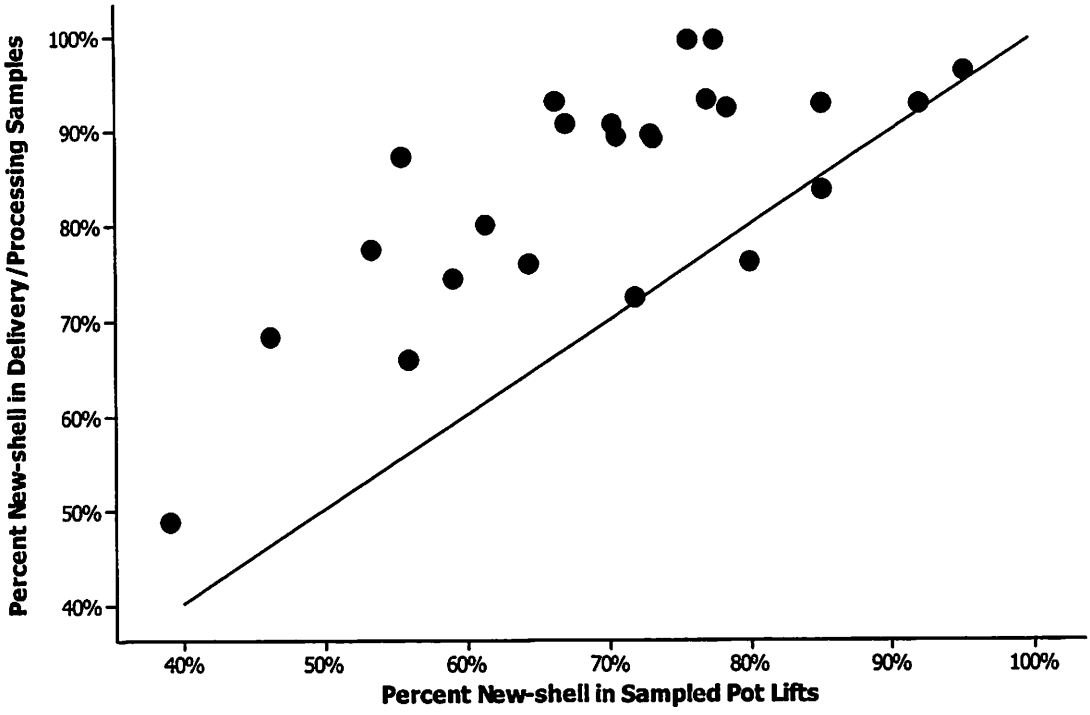

Figure 6.-Percent new-shell condition for legal male red king crabs in randomly-selected pot lifts from a vessel (horizontal axis) versus the percent new-shell condition in samples of the legal male red king crabs retained for delivery or processing by the same vessel (vertical axis) for each of the 24 fishing vessels that carried observers during the 2005/2006 Bristol Bay red king crab season; the line represents equal percent new-shell condition in the two sample types for the same vessel.

D-3 Staff (HO)
6.9.06 4:45p

Crab Plan Team Report

The Crab Plan Team convened their Spring meeting from May 16-18th at the Alaska Fisheries Science Center in Seattle, WA. Members present included the following:

Forrest Bowers (ADF&G-Dutch Harbor), Chair
Ginny Eckert (UAF/UAS), Vice-Chair
Diana Stram (NPFMC)
Doug Pengilly (ADF&G-Kodiak)
Gretchen Harrington (NMFS–Juneau)
Wayne Donaldson(ADF&G-Kodiak)
Jack Turnock (NMFS/AFSC-Seattle)
Joshua Greenberg (UAF)
Shareef Siddeek (ADF&G-Juneau)
Herman Savikko (ADF&G-Juneau)

Lou Rugolo (NMFS/AFSC-Kodiak) was absent.

Members of the public (and state and agency staff) present for all or part of the meeting included: Pat Livingston (AFSC/NMFS), Anne Hollowed (AFSC/NMFS), Keith Colburn, Doug Wells, Dave Barnard (ADF&G-Kodiak), Arni Thomson, Gordon Kristjansin, Ed Poulson, Dave Benson, Kevin Kaldestad, Steve Hughes, Jie Zheng (ADF&G-Juneau), Jack Tagart, Phil Hanson, Frank Kelty, Braxton Dew (AFSC/NMFS), Doug Woodby (ADF&G-Juneau), Mike Bell (CIE)

The agenda for the meeting is attached. Changes to the agenda included removal of the industry review of the snow crab assessment, rearranging agenda items for scheduling purposes on the morning of May 18th (Norton Sound assessment and State/Federal action plan), and adding approval of the minutes to the membership issues agenda item. The agenda was then approved with these changes.

Membership Issues

Forrest Bowers (formerly Vice Chair) replaced Bob Otto as Chair of the Crab Plan Team. Ginny Eckert was elected as Vice Chair. The team discussed the terms of reference section regarding the two-year succession of chairmanship and the possibility that this should be revised to allow some flexibility on an annual basis. The team decided to revisit the terms of reference at their meeting in September.

The team noted the continued need to add additional expertise to the plan team. It was noted that when the position to replace Bob Otto in Kodiak is filled this person will also sit on the plan team and should have considerable expertise to add to the team makeup. Additional biological and stock assessment expertise is desirable. The team formed a committee to work on soliciting ideas and personnel for potential membership on the plan team. The committee consists of Doug Pengilly, Ginny Eckert and Diana Stram. The

search committee will report back to the CPT in September and hope to have additional membership on the team for approval at the December Council meeting.

The team approved the revised minutes from the September 2005 CPT meeting. These minutes will now be posted on the Council's website.

Review of 2005/2006 Fisheries

Forrest Bowers provided the team an overview of the 2005/2006 crab fisheries. This is the first season that the fishery has been prosecuted under rationalization.

Red King Crab:
Forrest noted that there was a general decline in catch rates over the time period of the fishery and a general westerly shift in harvest from the 2003/2004 fishery.

Snow crab:
2005/2006 had the highest GHL/TAC in recent years. The fishery was still open and it appeared unlikely that the fishery would harvest the entire TAC. Snow crab on average had the highest weight in recent years. Pot limits were noted to have been liberalized last year. Jack Turnock questioned the observed drop in CPUE regarding to what extent this could represent a possible vessel effect. Other questions from the team involved why the fleet did not begin fishing before January and whether a CPUE decline is an indication of less crab. Forrest noted that the start date was likely market driven this year. There was limited interest in fishing for snow crab before January between the red king crab season ending in December and the Pacific cod fishing season in January.

The team discussed the different indication that CPUE provides under a rationalized fishery. Reductions in CPUE are related to the availability of crab (in the absence of an Olympic fishery it can be harder to locate crab), the amount of IFQ available by vessel and an increase in the diversity of operations. The fleet is less homogenous now.

Members of the public commented that fishermen are actually more likely to share information now under rationalization and that the graph of CPUE is directly related to effort. Some public noted that fishermen going after traditional grounds might have affected their CPUE, as well as an icing event in January that moved fishermen off productive grounds and impacted fleet behavior during that time period.

Some preliminary graphs of the distribution of the fishery showed no fishing west of St. Matthew and more effort concentrated southeast of the Pribilofs. Members of the public commented that it was not possible to fish in the northwest this year due to weather and ice cover but this area is still of interest to the fleet.

Tanner crab:
This is the first time this fishery has been open (western section only) since 1996. There was a notably high deadloss in the fishery. Forrest noted that there was limited indication that this was due to highgrading but more sublegal sized crabs were observed than normal. There were no instances of bitter crab syndrome observed. Low catch rates

were attributed to the fleet's lack of knowledge of the closing date for the fishery since it was the first time it had been open since 1996. Members of the public noted that this will not happen again next year.

Aleutian Islands Golden King Crab:
This fishery has the highest catch rate. Harvest by location was slightly more compressed in 2005/06 particularly in the western AI. Wayne Donaldson noted that the fleet appears to be fishing in the same areas but the relative harvest from those areas has changed.

Norton Sound Red King Crab:
These crab are notably smaller than Bristol Bay red king crab but have a decent market price. The fleet is smaller and is a more local Norton Sound area-based fleet. The fishery occurs over the summer. Braxton Dew noted the increased deadloss for red king crab. Forrest replied that because the fishery is prosecuted as a single trip there is often a considerable waiting period to offload catch resulting in high deadlosses.

Review of 2005/06 Bristol Bay red king crab bycatch data

Dave Barnard (ADF&G) presented an overview of a recent report on bycatch in the 2005/06 Bristol Bay red king crab fishery (Barnard and Pengilly 2006). This report was distributed to plan team members prior to the meeting and copies were available at the meeting for the public as well.

The team discussed the increase in soak times in the fishery under rationalization and the indication that shell condition rather than size of crab seems to influence retention rates. Observations indicated a higher number of new shell crabs in delivery than in sampled pot lifts. Very old shell crab appear less likely to be delivered.

Members of the public questioned how increased trends in apparent highgrading might influence TAC estimates for next year. Doug Pengilly noted that the harvest strategy assumes a 20% handling mortality. Additional considerations in the harvest strategy are that discards include crabs other than legal males and that additional effort is being expended to catch the TAC which increases bycatch. Forrest Bowers reiterated that these data are still preliminary and the department has not yet made any decisions on how best to evaluate and incorporate these results.

Lance noted that PNCIAC will be meeting next week to discuss the industry concerns with observed evidence of highgrading and how best to discourage this practice. Keith Colburn noted the need to track bycatch relative to the survey trends. Phil noted that if PNCIAC were to offer suggestions that they would need some degree of confidence in the summer survey estimates for sorting based upon projections from the survey. He questioned how well estimates of 20% highgrading (of old shell and very old shell) in addition to industry's 20% corresponds to the survey estimate. Forrest Bowers noted that the survey estimate is roughly 40% but that this should be taken as a conservative estimate. Doug Pengilly noted that it is unclear how well the observer cataloguing of shell condition corresponds to processor grading.

Kevin commented that similar to the evolution of understanding in prosecuting the CDQ fishery, the general fishery can be educated to reduce the amount of highgrading in subsequent years. This year may not be the best indication of how the fleet will operate in years to come. Ed Poulson noted that the industry needs to move towards full retention and to deal with this pressing issue of discarding of legal crab. He noted that by the end of the season most crabs had been picked over. Keith concurred that there were indications that areas had been picked over multiple times and discards were likely discarded more than once. He noted that some members of the fleet tried to fish outside of the high CPUE areas specifically to avoid that.

Dave Barnard noted that similar data are not yet available for the 2005/06 Tanner or snow crab fisheries but that data will be available for stock assessments in August with a full report on those fisheries possible by November.

Trawl survey overview

Bob Lauth (AFSC/NMFS) provided the team with an overview of the 2005 survey, with specific emphasis on the problems encountered last year with the survey and the means by which they are working to eliminate these issues in the future. The team greatly appreciated the presentation by Dr. Lauth and would greatly benefit by a similar presentation following the 2006 survey (i.e. for the September 2006 plan team meeting).

Braxton Dew commented that the current methodology for evaluating hot spots and the stratification protocol (i.e. a 5 station average surrounding the hot spot) may bias the estimate low. He solicited comments from the team on to what extent this should not be considered adaptive sampling.

Doug Pengilly commented that it is representative of an adaptive sampling protocol, but is not post-stratification sampling which would imply an optimal sampling design. Jack Turnock commented that is represents a form of incomplete adaptive sampling because the protocol is to sample 5 stations rather than to continue to sample stations until the criteria you are trying to meet in the sample has run out. The team commented that this is a concern that could possibly be addressed by the survey design group in future surveys.

Snow crab assessment review

Jack Turnock presented an overview of his 2005 snow crab assessment (appendix A to the 2005 Crab SAFE report).

Siddeek requested if he had evaluated the comment from the crab overfishing workshop regarding the Bmsy values outside of the data range. Jack noted that he had no answer for that but that given that the stock was declining at the beginning of the model due to previously low recruitment, he constrained the steepness parameter to be close to the red king crab spawner recruit curve and then estimated Bmsy and Fmsy.

The team discussed that use of the model would serve to damp down the observed variation in survey estimates (both high and low). Doug Pengilly requested to what extent 1985 and 1986 survey years are influencing the estimates. Jack noted that he

could look at downweighting these years to evaluate how they are influencing the results. Siddeek commented that adding age-structure to the length-based model would allow for better fits in general. Jack noted that he has added structure to track the age of the animals in the model but that it is not truly age-based due to a lack of sufficient data.

Comments on the model:

- Need to do sensitivity analysis for which parameters are most influencing model results
- Industry concerns with model results and growth increments at later maturity stages. Similar results (accumulation of smaller crab) not observed on the grounds. Industry concerned with yield forecast is model is adopted.
- Concerns voiced form public that model proxies(ie shell condition) may be mis-specified
- Concern that model structure and parameters change radically from one year to the next
- Concern that plan team does not have enough information to evaluate to what extent this is an adequate model, some more technical review body should advise on this. It was noted that while a CIE review did occur, it was several years ago and the model has changed substantially since that time.

The team would like to see a formal documentation of issues of concern with the model and how they are addressed by the authors on an annual basis (e.g. similar to the groundfish assessments treatment of SSC comments). This documentation should include comments by the public, the crab plan team and the SSC as necessary.

The team discussed the need to comment on adoption of the model but felt that their role was advisory in nature and not definitive in the choice of model adoption. This was noted to be for the discretion of the SSC and NMFS. The team notes that it is comfortable with the use of the model for estimating biomass. However the team is concerned that the assessment includes far more information than just biomass estimates and is unclear how this information will be treated (e.g., biological reference points) if the model is adopted. The team solicits the SSC's input on this clarification.

Crab overfishing analysis

Preliminary results from the workgroup

The team received an update from members of the inter-agency workgroup on their progress in the analysis to revise the crab overfishing definitions and discussed recent workshops and reviews that have occurred in conjunction with the analysis. Diana Stram provided an overview of the recent workshop held in February to assist the workgroup in some issues of concerns with respect to the analysis and an overview of the workshop report. Copies of the report were provided to the team. The report was presented to the SSC at the April Council meeting.

Jie Zheng provided an overview of the previous crab tier system and the new proposed tier system (revised at the crab workshop). Siddeek presented some preliminary analysis of reference point results for red king crab. He highlighted where suggestions from the

workshop were incorporated into the analysis. The team discussed the results showing a dramatic decrease in Fmsy when the mating ratio used decreased from 1:3 to 1:2. The team discussed molting and mating ratios and the problems inherent with their specification in modeling.

The team discussed the changes in fishing period due to rationalization and how this was parameterized in the mode. Siddeek noted that it is considered in the model (length of fishing period) but has limited effect on results. The discussion noted that there should be some effect seen of the handling mortality and natural mortality over the longer time period considered but the model does not indicate any effect at present.

Jack Turnock presented preliminary results of simulations for red king crab and snow crab. The team noted that the results are widely varying for the same stocks between Siddeek and Jie's work and Jack and Lou's work and requested clarification on where these two analyses differ in parameterization and what is driving the observed large differences in results.

Jack summarized how spawning biomass estimated in his model, using female spawning biomass for snow crab and a mating ratio of 1.7. Siddeek's mating ratio is higher than this. Jack's analysis includes an estimation for male spawning biomass. Siddeek is using a different assumption for males available for mating. For red king crab, Siddeek splits primiparous and multiparous to estimate how many crabs available for mating. Jack is using mating ratio of 2.1 for red king crab (ratio mature females to non-molting males) as a default value. Siddeek noted that for snow crab the mating ratio is 1.2 in his analysis and he used total effective spawning biomass. The main difference in the two snow crab analyses is in the discount rate for primiparous. Female natural mortality is higher than male natural mortality. The formulation of Fmsy at time of fishing also different between model simulations.

Team members commented that it was not clear from Jack's analysis where and by what means recommendations from the workshop were incorporated. There appear to be too many differences in the approaches by both groups to evaluate the impact of the analysis. Many differences in parameterization remain. Spawning biomass calculation remains a large difference between the two approaches. Noting that the CIE review will shed light on these differences and issues in need of resolution the team deferred further discussion of these issues to that time.

The team noted however that these differences in approaches are all possible under the same tier framework and makes it difficult to evaluate the impact of choosing this framework. Are these sensitivity analyses or competing approaches for how to adopt the framework? The team discussed the necessity of clarifying the review process that is presumed to go along with the annual OFL determination as it will prove critical in determining what approach is used under the adopted tier system. Currently there is no documentation of by what means the tier system will be adopted and the review process that will accompany this. This documentation will be included in the EA analysis and will form part of the description of the alternative, but would also be useful in advance to

team members and the public in order to better understand how a new tier system will be implemented.

The initial tier review process envisioned conceptually included the SSC and the Council process for determining appropriate tier levels and OFLs on an annual basis. However for crab stocks the timing of the fall Council meeting precludes the ability to set OFLs at that meeting as TACs have already been established. The team discussed the problems with timing and the ability to set OFLS in the spring prior to the survey and TAC setting occurring in the fall. Discussion focused upon the inherent problems with this approach in terms of utilizing older data as well as the potential market impacts from establishing an OFL in May/June and a TAC in September/October. The team noted that a frameworking process for crab may not match as well as groundfish does with the Council process.

A suggestion was put forward to modify the timing to evaluate a process whereby the framework and models are evaluated in May/June with review and decisions on parameterization and tier levels made by the SSC at that point, and OFLs subsequently established following the incorporation of new information from the survey by September. OFLs and TACs would then, under this process, be announced to the Council in October.

The team decided to recommend (for the EA) looking at two alternative processes for the implementation and review process. The first alternative would be to establish OFLs in May/June (CPT and SSC recommendations) using data from the previous year and establishing them at the Council meeting in June. The second alternative would be to evaluate the framework and agree upon parameterization and tier levels in May/June with OFLs subsequently established following the survey information in September. The pros and cons of both alternatives would be discussed in the EA. Diana and Gretchen volunteered to write up a documentation of these two options for the process of determining OFLs for the fall CPT meeting for distribution to the team and discussion thereof in conjunction with the review at that time of the overfishing analysis.

Center for Independent Experts (CIE) Review

Mike Bell of the CIE provided an overview to the team of the CIE review of the preliminary analysis. This review was conducted April 24-28 at the AFSC, Seattle. The final report from this review will be available June 1st. He noted that this will include 3 separate reports, one from each reviewer, and that no consensus on issues is required by the CIE for the reviewers in their individual reports. His oral report to the team contained preliminary findings only as the final reports were not yet available. Discussion with the CPT at this time however would also serve to provide additional input to the reviewers on their findings prior to finalizing their report for June.

He noted that the CIE recognizes the excellence of the scientific approach and expertise involved in work product thus far. The criticisms in the review are intended as constructive improvements to the analysis.

Team members questioned Dr. Bell regarding some of the report recommendations. One topic was the calculation of fertilized egg production. It was noted that survey information is not always informative on an annual basis as to fertilized egg production. Some years it would be possible but could not be done reliably every year. The relationship between total egg production and total fertilized egg production was also noted to be complicated and potentially variable between years.

Note that given the preliminary nature of the CIE report a synopsis of the presentation is not included here. The full report will contain all the details.

CPT discussion of results and recommendation for moving forward:
The team remains uncomfortable with the amount of uncertainty inherent in the current approach. Default values are not specified and can be highly variable depending upon the assessment author's choices. Implementation of the framework may be difficult. The CPT requests input from the SSC regarding their comfort level with the ability to implement this framework given the current amount of uncertainty and choices left to the discussion of the stock assessment authors (*Note this also goes back to the discussion of the review process and implementation of tier system previously*). The ability to move forward with an amendment analysis would be difficult given the current uncertainty in the analysis.

The ability of the workgroup to resolve default values for analytical purposes was discussed. Workgroup members commented that they did not believe they would come to agreement within themselves regarding establishing default values. The group has not met together since summer 2005. They have not been able to come to agreement on F and B values for base cases in the analyses.

The team requested clarification from the workgroup on how they planned to incorporate the recommendations from the workshop, CPT, CIE and SSC into the analysis. Members of the workgroup did not feel that they would be able to unilaterally incorporate recommendations from these bodies into their analyses as a group without some outside assistance (i.e. facilitator) to resolve pertinent issues among them. If the group were to meet as a whole with a facilitator to discuss how to incorporate these recommendations, the CPT would like to see a schedule brought forward following that meeting on timing for incorporation of these suggestions and a realistic timeline for completion of the analysis. A suggestion of timing would be to meet as a group (possibly with a facilitator) in July and following this have the analysis completed in time for a review by the CPT at the September plan team meeting. Some suggestions were made regarding potential facilitators who could meet with the workgroup and assist them in resolving these differences. The person should be a modeler preferably with a shellfish biology background.

Should this suggested schedule be followed (meeting in July, completion of analysis by September), the CPT further specifies that there be one single presentation to the team in September as indicative of the demonstrated coordination within the group. The CPT recommends that with additional information in front of them in September, regarding

the analysis as well as further clarification and discussion of the alternative processes for OFL determination, they would be better able to discuss timing for initial review of the analysis and subsequently convey this information to the Council in October.

Economic review of crab fisheries data from crab rationalization program

Ron Felthoven (AFSC/NMFS) provided the team an overview of the types of data collection and reports to come in the future from the review of the crab rationalization program. He noted that an annual report from RAM will be produced in October 2006, an 18 month program report to the Council in February 2007 (and 3 and 5 year reports to follow). The AFSC is planning to work on a social impact analysis for the 3 and 5 year reports. He noted that while some of the pre-rationalization data will be analyzed in the February report it may not be possible to compare this with post-rationalization data by that point.

The team noted that it is their intent to expand upon the economic section in future SAFE reports. Some of the information which could be included, within the restrictions of confidentiality, could be summaries of some of the data to be collection on consolidation.

The team greatly appreciated the report by Dr. Felthoven.

Review of stock assessment models

Jie Zheng presented an overview of the Norton Sound red king crab assessment. Team members questioned the tagging data available and why this was not used to estimate natural mortality. Jie noted that this data is useful for growth but not for mortality. The utility of using CPUE from the winter survey was also questioned. It appeared inconsistent to utilize the length composition data from that survey but not the CPUE data as well.

A summary of stock status overview was provided. It was noted that retained catch in this fishery does not include discards. There are no observers in the fishery and thus limited information available on discards. Recent harvests have been above the harvest rate. A recruitment spike was noted in the length frequency data from the 2003 fishery. Abundance estimates are uncertain due to a lack of survey data. The last survey was completed in 2002. Estimated legal abundance declined in 2006.

Forrest Bowers noted that Norton Sound was excluded from crab rationalization. Recent BOF actions modified the Norton Sound section to include all of the St. Lawrence Island section so the GHL applied to a larger area than previously. Managers are not sure if outside areas will be fished due to the prevalence in the fishery of smaller vessels and the super exclusive zone.

It was suggested to try running the model with and without different data sets (e.g. CPUE and survey data separately) to evaluate the impact on stock status. This could give an indication of how influential the winter length data versus the fishery CPUE are in determining stock status changes.

Jie Zheng gave an overview of his Bristol Bay research model. This model was initially utilized to evaluate survey catchability, bycatch and "red bag" issues. This model has been presented previously to the crab workshop and to the CIE for their review.

Siddeek presented an overview of the Aleutian Islands golden king crab assessment. This analysis was presented at the AFS meeting in 2005. It has not been updated since that time.

Questions were posed regarding the observed increase in the eastern CPUE. It was noted that there have been no changes in fishing practices or locations since 1996, although the general number of pots per vessel has increased. Members of the public noted that the move to a different gear configuration whereby more legal (and less smaller sized) crabs are retained might have impacted the CPUE accordingly.

The fishery has a high discard rate (3 of 4) because the majority of the catch is females and sublegal males. The model uses a constant mortality of 20%. Discards were noted to be size related. The model does not include the pot survey data, but this is planned to be included for presentation to the CPT in September.

Survey distribution for the stock was noted to be deeper than the fishery, with juvenile crabs located at much deeper depths than the fishery. It was noted that if the fishery is only representing a slice of the depth range for the species, than this might be an indicator of interannual changes in actual abundance. This will be a flat indicator however regardless of interannual changes in abundance. It would be preferable to obtain an independent idea of what is going in with abundance outside of that specific area.

CPUE in the survey was noted to be problematic. The survey only occurs every three years.

Projection of status of stocks

Jack Turnock presented a draft document on stock status projections for snow crab including results for mean biomass and the probability of rebuilding by year. The team commended the effort put forward in the document, noting that this was the type of information that the team would be looking for in the future under this type of agenda item, and particularly with respect to stocks under rebuilding plans. This type of document addresses the need for some form of stock status projections as recommended previously. The team feels that some qualitative form of stock status projection, particularly in reference to model performance, would be useful at the spring plan team meeting.

Stock status indications for St. Matthew blue king crab and Pribilof blue king crab remain similar to last year with limited recruitment anticipated. Tanner crab showed a large increase last year which could be a result of survey error thus projections for next year remain uncertain. Expectations, however, are that the stock is on a slow recovery to continued rebuilding. There is no new information available to evaluate Petrel Bank red

king crab, however a survey will be done in November 2006 and more information on the stock status will be available at that time.

Bering Sea crab EFH measures considered by Council

Diana Stram presented an overview of a discussion paper for the June Council meeting regarding the possible need for habitat protection measures for St. Matthew blue king crab and EBS snow crab stocks. This paper was in response to a Council motion requesting a review of existing measures for these stocks and potential fishery interactions. The team's comments were solicited regarding completeness of the measures outlined in the paper, additional information available on habitat requirements for these crab species, display of maps of ovigerous females, and any insight regarding the efficacy of existing measures and the perceived need for additional measures at this time.

Team members offered the following comments regarding the information presented and suggestions for additional information to be analyzed in order to evaluate the need for any additional measures at this time:

- No new information is available since the rebuilding plans were crafted regarding habitat requirements and vulnerability
- Changes in bycatch would be the most pertinent new information to analyze, particularly the composition by sex and life history stage of the bycatch by trawl fisheries
- Areas to the north of the Pribilofs have had increased effort in yellowfin sole trawl fishery in recent years. There is some potential that this might affect the migration and reproduction of snow crab. Again the composition of these fisheries contribution to bycatch would be useful to analyze
- Longline fisheries (particularly halibut fishery) contribution to blue king crab bycatch should be considered
- Timing and catch composition in trawl and fixed gear fisheries should be considered

Summer research issues/schedule

The team was updated on summer 2006 research plans by both the Bering Sea Fisheries Research Foundation (BSFRF) and ADF&G.

Bering Sea Fisheries Research Foundation:
Steve Hughes provided an overview of the BSFRF plans for the next 18 months and their recently awarded funding from NPRB. The new survey will be a full scale survey for Bristol Bay red king crab modeled after the pilot study completed last year. The intent is to match the NMFS survey in time and space. The summer of 2007 plans will allow them to do paired tows for comparison with the NMFS survey. He noted that if there are ideas for studies needing specialized information, the BSFRF survey could be a means of obtaining this information.

NMFS/ADF&G:
Doug Pengilly provided an overview of ADF&G summer research plans. The Aleutian Islands golden king crab triennial survey will begin July 1st. The Norton Sound survey (originally planned for 2005) will be conducted this summer. The Petrel Bank survey will occur in November.

The NMFS summer groundfish/crab survey will be conducted as usual this summer.

State/Federal Action Plan

Doug Woodby (ADF&G) provided the team with a review of the recently drafted revised State/Federal Action plan. He noted that the first three pages of the plan represent a minor re-write of the previous agreement which has been updated to be in accordance with changes due to rationalization, information exchange and the peer review process. The plan will be presented to the Council for their concurrence at the June Council meeting.

The main focus of the revision was in establishing the timeline for information exchange pertinent to the TAC setting process. The appendix details the specifics of the timeline.

Gretchen Harrington noted that one item that is missing from the detailed list in the appendix is the requirement of NMFS to report on the status of stocks under rebuilding plans.

The team notes that the details of the plan are understood to include the requirement of NMFS to report on the status of stocks under rebuilding plans. If there is a future revision anticipated to the State/Federal Action plan, the team recommends that this section be revised to explicitly include this in it for clarity.

Review of recent BOF actions

Wayne Donaldson briefed the team on two proposals that the BOF took action on recently. Both proposals were approved. Both proposals were done on agenda change requests.

1- Elimination of minimum TAC for eastern Bering Sea Tanner crab.
2- Overage on CDQ deliveries will be ticketed on overages over 3%. Proceeds of overage will not go to vessel, same as IFQ.

Discussion of SAFE report

The team notes that suggestions were made previously regarding updating the economic section of the SAFE report with forthcoming data on crab rationalization. The team discussed the necessity as per last year, of meeting data quality act requirements for peer review of some SAFE sections. A suggestion was made to establish subcommittees of reviewers for various sections in order to meet these requirements.

The team discussed the timeline for compiling and updating sections of the SAFE report for 2006, noting that the timeline will be particularly tight following the September plan team meeting.

Other issues/new business

The Fall plan team meeting will be held in Anchorage, September 13-15, location to be determined. It is anticipated that the meeting will be the full three days in length.

The meeting adjourned at 4:30pm on May 18th.

NPFMC Crab Plan Team meeting

May 16-18, 2005

Observer Training Room (Room 1055), AFSC, Seattle, WA

Agenda

May 16

9am-12pm:

Membership issues:

- Election of vice-chair
- Membership needs: Discussion of need for additional CPT members (replacement of vacancies, need for additional expertise)

Review of 2005/06 Fisheries:

- Review of 2005/06 fisheries (incl. Norton Sound) – ADF&G (Bowers)
- Review 2005/06 Bristol Bay red king crab bycatch data – ADF&G (Barnard)

Trawl Survey overview

- Trawl survey overview from 2005

12:00 – 1:00 lunch

1pm-5pm:

Review of snow crab assessment

- CPT discussion of consideration for adoption
- Industry comments/review of snow crab assessment

May 17

9am-12pm:

Crab Overfishing Analysis (time certain)

- Review of preliminary analysis of crab overfishing definitions revision (including report from Crab Workshop)
- CIE review of crab overfishing analysis
- Discussion of analytical needs, timing, SSC presentation in June and Initial Review by Council (Dec 2006)

12:00 – 1:00 lunch

1pm-5pm:

- Continue crab overfishing analysis.

May 18

9am-12pm:

Economic review of crab fisheries data from Crab Rationalization program

Review of stock assessment models (incl. Norton Sound)

Projection of the status of stocks which will be updated and modified for the Fall CPT meeting – ADF&G/NOAA

12:00 – 1:00 lunch

1pm-5pm:

Bering Sea Crab EFH Measures considered by Council – St. Matthew blue king crab and EBS snow crab discussion paper for June Council meeting.

- CPT comments on adequacy of existing measures.

Summer research issues/schedule – NOAA/ADF&G (Pengilly)

State/Federal action plan and timeline for fall TAC setting

Review of recent ABOF actions on Bering Sea Tanner TAC and CDQ fishery management plan – ADF&G (Donaldson)

Discussion of SAFE and other reporting issues

Other issues/new business

Adjourn (5pm)