



## ALASKA DEPARTMENT OF FISH AND GAME

### DIVISION OF COMMERCIAL FISHERIES

#### MEMORANDUM

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DATE: September 28, 2006

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FROM: Douglas Pengilly  
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SUBJECT: Bering Sea Tanner  
Crab TACs  
for 2006/2007

cc: Distribution

This memo summarizes results of a series of teleconference meetings beginning at 9 AM on 22 September 2006 and concluded on the morning of 25 September 2006 to determine the total allowable catch (TAC) for each of the Bering Sea Tanner crab fisheries east of 166° W longitude and west of 166° W longitude in the 2006/2007 season. ADF&G staff attending were Jim McCullough, Wayne Donaldson, David Barnard, Douglas Pengilly, Leslie Watson, Skip Gish, Doug Woodby, Jie Zheng, Shareef Siddeek, Forrest Bowers, and Barbi Failor. NOAA Fisheries staff attending were Lou Rugolo, Jack Turnock, and Gretchen Harrington. Diana Stram (NPFMC) was not available. In preparation for the teleconference, I distributed via email on 15 September 2006 a review document for the Bering Sea Tanner crab stock. That document reviewed the Federal minimum stock size threshold (MSST), the State harvest strategy, stock assessment methods, fishery and stock history, results of the 2006 NMFS eastern Bering Sea trawl survey, 2006 stock status relative to the federal overfished definition, and computation of the 2006/2007 TACs for each of the areas east and west of 166° W longitude according to the harvest strategy in regulation. That review document (with corrections made to some minor typographical or formatting errors that were brought to my attention after being distributed on 15 September 2006) is attached.

It was concluded during the teleconference, without any objection from meeting participants, that the Bering Sea Tanner crab fishery east of 166° W longitude will open for the 2006/2007 season

with a TAC of 1.875-million pounds (including the portion allocated to the CDQ fishery) and that the Bering Sea Tanner crab fishery west of 166° W longitude will open for the 2006/2007 season with a TAC of 1.094-million pounds (including the portion allocated to the CDQ fishery).

The TACs for the areas east and west of 166° W longitude were not determined by strict application of the harvest strategy to the point estimates of stock abundance/biomass indices; the TAC for the area east of 166° W longitude is one-half the value computed according to the harvest strategy and the TAC for the area west of 166° W longitude is slightly less than one-half the value computed according to the harvest strategy. Section (f) of **5 AAC 35.508** (Bering Sea District *C. bairdi* Tanner Crab Harvest Strategy) directs the department to consider, among other factors, the reliability of stock abundance estimates when implementing the harvest strategy. The reliability of the 2006 survey estimates and other factors considered during the teleconference meetings led to the decision to establish TACs more conservatively than computed according to the harvest strategy.

### Bering Sea Tanner Crab

#### MSST (Federal Minimum Stock Size Threshold for “overfished” status)

- **FMP definition:** 94.8-million pounds of total mature biomass
  - **2006 total mature biomass estimate:** 253.3-million pounds (NOAA Fisheries estimate)
- ⇒ **Stock is above MSST, and MSY biomass (189.6-million pounds),** but will not be considered rebuilt from “overfished” condition until total mature biomass is above MSY biomass for two years in a row

#### State harvest strategy fishery threshold and minimum TAC for fishery opening

- **Fishery threshold definition:** 21-million pounds of mature female biomass in the Eastern Subdistrict
- **State minimum TAC:** None for either area east or west of 166° W longitude
- **2006 estimate for biomass of mature females in the Eastern Subdistrict:** 48.373-million pounds (ADF&G area-swept estimate)
  - ⇒ **Stock is above threshold for a fishery opening**
  - ⇒ 20% exploitation rate on estimated abundance of mature males to both areas east and west of 166° W longitude applies
- **TAC computed according to harvest strategy for area east of 166° W longitude:** 3.040-million pounds (including portion allocated to CDQ fishery)
- **TAC computed according to harvest strategy for area west of 166° W longitude:** 2.521-million pounds (including portion allocated to CDQ fishery)

#### Reduction of TAC from value computed according to harvest strategy

Several concerns were raised during the teleconference meetings that led to a reduction in the TACs from the values computed according to the harvest strategy:

- 1) Poor precision of the abundance estimates for legal males, particularly for the area west of 166° W longitude (the 95% confidence interval provided by NOAA Fisheries was  $\pm 97\%$  of the point estimate of abundance).
- 2) The high proportion (approximately 80%) of old-and-older shell crabs among the legal males, which tend to be less favored by the commercial fishery than new-shell crabs.
- 3) The potential for substantial bycatch of mature-sized, sublegal sized males, particularly in the area west of 166° W longitude, where a large portion of the fishery could be prosecuted with snow crab gear, where mature-sized sublegal males outnumber legal sized males by a ratio of 7:1, and where highest concentrations of legal males were associated with highest concentrations of mature-sized, sublegal males during the 2006 trawl survey.
- 4) The paucity of fishery information from the last 10 seasons, particularly in the area east of 166° W longitude, where the commercial fishery has been closed from 1997 through the 2005/2006 season. Since 1995, the area west of 166° W longitude has only been open for fishing during the 2005/2006 season and during that season only 60% of the 1.62-million pound TAC was harvested, with 80% of the harvest taken from a single statistical area (695631, north of and including St. George Island).

- 5) The mature female biomass estimate (48.373-million pounds) is just above the level (45-million pounds) at which the harvest strategy applies the highest exploitation rate (20%) on estimated abundance of molting males. That results in an increase in the exploitation rate on molting mature males from 0% last season to 20% this season in the area east of 166° W longitude and an increase from 5% last season to 20% this season in the area west of 166° W longitude. Because 2006 is the second year in a row that mature female biomass is estimated to be above 21-million pounds, the cap on the harvest rate on exploitable legal males is at the maximum level (50%). That results in an increase in the cap on the harvest rate of exploitable legal males from 0% last season to 50% this season in the area east of 166° W longitude and an increase from 25% last season to 50% this season in the area west of 166° W longitude.
- 6) The stock is still in the process of recovering from overfished status and there are concerns over jeopardizing that recovery.
- 7) Statistical area 695700 (east of and adjacent to St. Paul Island in the area west of 166° W longitude) has been an important area for the extremely depressed Pribilof blue king crab stock in recent years and should be closed to crab fishing to protect the blue king crab.

The first six concerns interact with and amplify each other. When the abundance of legal males is so poorly estimated, applying the harvest strategy to the point estimates of abundance risks setting the TAC too high. Setting the TAC too high not only has a negative impact on the legal male portion of the stock, but can result in a “long-grind” fishery towards the TAC which increases the potential for bycatch of sublegal crabs. The concerns over the potential for a “long-grind” fishery is heightened by the shell-age distribution among legal males, which may make it difficult for fishers to find the new-shell crabs favored by processors. The paucity of fishery information for the last 9 seasons results in a lack of a “track record” for comparing survey abundance estimates with fishery performance, which can sometimes increase the “comfort level” of using stock abundance estimates with poor precision. If anything, the only fishery data from the last 9 seasons that exists reduce the comfort level; the 2005/2006 fishery west of 166° W longitude was largely prosecuted in a single statistical area. [CONFIDENTIAL DATA – SURVEY CATCH DATA BY LOCATION]. Finally, large-scale bycatch of mature-sized sublegal males during the 2006/2007 season could impact the stock’s status relative to “rebuilt” status in 2007. All these concerns led to the conclusion that, although the point estimates of abundance and biomass trigger application of the harvest strategy’s highest molting mature male exploitation rate and exploitable legal male harvest rate, a more conservative approach to setting the 2006/2007 TACs than strictly applying the harvest strategy to the survey estimates is warranted.

To address those concerns, the approach to determining the TACs for the 2006/2007 season was as follows:

- 1) For both TACs east and west of 166° W longitude, application of a 10% exploitation rate to the estimated abundance of molting mature males.
- 2) For the TAC west of 166° W longitude, cap the harvest rate at 25% of the estimated abundance of exploitable legal males.

Additionally, to minimize risk of bycatch of any blue king crab during the fishery, it was determined that statistical area 695700 should be closed to fishing. Hence, prior to determining

the TAC for the area west of 166° W longitude, the estimated abundance of exploitable legal males within statistical area 695700 was subtracted from estimated abundance of exploitable legal males in the area west of 166° W longitude. That subtraction reduced the estimated abundance of exploitable legal males from 2.467-million crabs to 2.141-million crabs.

An average weight of 2.279 pounds per legal male was used to compute the TAC for the area east of 166° W longitude and an average weight of 2.044 pounds was used to compute the TAC for the area west of 166° W longitude. The TAC for the area east of 166° W longitude is based on a harvest of 0.823-million legal males, which, relative to estimated abundances, represents 4% of the mature-sized males, 10% of the molting mature males, 14% of legal-sized males, and 31% of the exploitable legal males estimated for the area east of 166° W longitude. The TAC for the area west of 166° W longitude is based on a harvest of 0.535-million legal males, which, relative to estimated abundances, represents 1% of the mature-sized males, 3% of the molting mature males, 10% of legal-sized males, and 22% of the exploitable legal males estimated for the area west of 166° W longitude.

#### **Stock status summary**

This stock is estimated to be above the MSY biomass definition (189.6-million pounds of total mature biomass) for the first time since the stock was declared “overfished” in 1998. The total mature biomass estimates have increased sharply over the last three years; from 82-million pounds in 2004, to 162-million pounds in 2005, to 253-million pounds in 2006. If the total mature biomass estimated from the 2007 survey is above the MSY biomass definition, the stock would be considered “rebuilt” and no longer overfished.

Although the State harvest strategy applies to the entire Bering Sea District, only survey data estimates from the Eastern Subdistrict (the area east of 173° W longitude) are applied to the harvest strategy; the Western Subdistrict contributes little to the fishable portion of the Bering Sea Tanner crab stock. ADF&G’s area-swept estimates for mature-sized female abundance in the Eastern Subdistrict increased by approximately 50% between 2005 and 2006; prior to the results for 2005, abundance estimates of mature-sized females had shown only minor fluctuations about depressed levels in the overall Eastern Subdistrict. The area-swept abundance estimates for mature-sized males in the Eastern Subdistrict has shown an increasing trend since 1997, with a marked increase between 2004 and 2005. Since at least 1996 through 2003, most of the mature-sized males in the Eastern Subdistrict occurred in the area east of 166° W longitude. Since 2004, however, a majority of the estimated mature-sized male abundance has occurred west of 166° W longitude; in 2006 two-thirds of the estimated abundance of mature-sized males was from the area west of 166° W longitude. Although the abundance estimates of molting mature males are also greater in the area west of 166° W longitude than in the area east of 166° W longitude in 2006, the abundance estimates of legal males and of exploitable legal males in the areas east and west of 166° W longitude are comparable.

Old-and-older shelled crabs dominated the legal-sized males in the Eastern Subdistrict during the 2006 survey. Approximately 80% of the legal males in either of the areas east or west of 166° W longitude were estimated to be in old-or-older shell condition. Additionally, approximately 75% of the mature-sized sublegal males in the Eastern Subdistrict were estimated to be in old-or-older shell condition. It is likely that the old-and-older shell crabs represent males that terminally molted to maturity a year earlier. Hence, in terms of growth, low future productivity would be

expected from the present population of legal males and mature-sized sublegal males. In the smaller size classes there is a relatively large mode at roughly 75-mm CW in the size frequency distributions for both males and females in 2006. That may provide continued recruitment into the mature size classes in the near-term future. However, unlike the size frequency distributions from the previous four surveys, there is very poor representation of males or females <50-mm CW in 2006 and that is not promising for continued recruitment to mature size classes in the long-term future.

**Distribution:**

ADF&G: Wayne Donaldson, Forrest Bowers, Mary Schwenzfeier, Ryan Burt, Jie Zheng, Shareef Siddeek, Doug Woodby, Earl Krygier, Herman Savikko, Ivan Vining, David Barnard, Robert Gish, Susie Byersdorfer, Leslie Watson, Jan Rumble  
NOAA Fisheries: Lou Rugolo, Gretchen Harrington, Jack Turnock  
NPFMC: Diana Stram

**Attachment:**

Review for 2006/2007 Bering Sea *bairdi* TACs