Stock Assessment and Fishery Evaluation Report
for the
KING AND TANNER CRAB FISHERIES
of the
Bering Sea and Aleutian Islands Regions

2004 Crab SAFE

Compiled by

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of the Bering Sea and Aleutian Islands

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Bering Sea and Aleutian Islands

Executive Summary

The annual stock assessment and fishery evaluation (SAFE) report is a requirement of the North Pacific Fishery Management Council's *Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs (FMP)*, and a federal requirement [50 CFR Section 602.12(e)]. The SAFE summarizes the current biological and economic status of fisheries, guideline harvest levels (GHL), and analytical information used for management decisions or changes in harvest strategies. The report is assembled by the Crab Plan Team with contributions from the State of Alaska, Department of Fish and Game (ADF&G) and the National Marine Fisheries Service (NMFS), and is available to the public and presented to the North Pacific Fishery Management Council (NPFMC) on an annual basis. Additional information on Bering Sea/Aleutian Islands (BSAI) king and Tanner crab is available on the NMFS web page at www.fakr.noaa.gov and the Alaska Department of Fish and Game (ADF&G) Westward Region web page at www.cf.adfg.state.ak.us/region4/rgn4home.htm.

Status of Annually Surveyed Crab Stocks

The FMP defines the minimum stock size threshold (MSST) and the maximum fishing mortality threshold (MFMT). These requirements are contained in the FMP and outlined in the following section, overfishing parameters. MSST is 50% of the mean total spawning biomass (SB = total biomass of mature males and females, also known as TMB = total mature biomass) for the period 1983-1997, upon which the maximum sustainable yield (MSY) was based. A stock is overfished if the SB is below MSST. MFMT is represented by the sustainable yield (SY) in a given year, which is the MSY rule applied to the current SB (the MSY control rule is F = 0.2 for king crabs, and F = 0.3 for Tanner and snow crabs). Overfishing occurs if the GHL exceeds the SY in one year. GHLs are developed from joint NMFS and ADF&G assessment of stock conditions based on harvest strategies developed by ADF&G. Figures 1-6 depict each crab stock's spawning biomass and catch history relative to overfishing.

Table 1. MSST, 2004 spawning biomass (SB), sustained yield (SY), and 2004/2005 guideline harvest levels (GHL) for BSAI king and Tanner crab stocks. Values are in millions of pounds.

Stock	MSST	2004 SB	2004 SY	2004/2005 GHL
Bristol Bay red king	44.8	176.4	35.3	15.4
Pribilof Islands red king	3.3	9.9	2.0	0.0
Pribilof Islands blue king	6.6	0.5	0.1	0.0
Saint Matthew blue king	11.0	7.3	1.5	0.0
EBS Tanner	94.8	86.8	26.0	0.0
EBS snow	460.8	343.7	103.1	20.9

In addition to the Federal requirements, survey results for five stocks (Pribilof District blue king crab, Saint Matthew Island Section blue king crab, Bristol Bay red king crab, eastern Bering Sea Tanner crab, and eastern Bering Sea snow crab) are compared to thresholds established in State of Alaska harvest strategies and

regulations. ADF&G uses these thresholds to determine if a fishery should be opened and to calculate the GHL. Please refer to the attached report "Executive Summary: Status of King Crab Stocks in the Eastern Bering Sea in 2004" (Vining, et al 2004) for more detail on the population estimation methods for Bristol Bay red king crab, Pribilof District red and blue king crab, and Saint Matthew Island Section blue king crab.

Bering Sea Tanner crab (*Chionoecetes bairdi*):

The 2004 survey estimate of mature biomass decreased to 86.9 million pounds from the 2003 estimate of 100.8 million pounds. The 2002 estimate of 69.4 million pounds was essentially unchanged from the 2001 estimate of 67.7 million pounds. In 2003, this stock increased above the MSST (94.8 million pounds spawning biomass) for the first time in six years.

The fishery was closed in 1997 due to near-record low stock abundance in the 1997 NMFS survey and extremely poor performance in the 1996 fishery. The Council adopted a rebuilding plan for this stock in October 1999. NMFS approved the rebuilding plan in June 2000 (65 FR 38216). The fishery has been closed since 1999.

Based on the 2004 estimate of total mature biomass, the stock remains in "overfished" status for the seventh year since the 1998 overfished declaration. The total mature biomass estimate for 2004 is below MSST (86.8 million pounds) and down from the estimate for 2003 (100.8 million pounds), but it is the second highest estimate since 1997. Overall, estimates of total mature biomass have shown an increasing trend since the 1998 overfished declaration and the 2004 estimate is more than twice the estimate for 1998 (37.6 million pounds). However, the rate of increase in estimated total mature biomass since 1998 has been extremely slow relative to that seen when total mature biomass increased from 48.0 million pounds in 1985 to 249 million pounds in 1988. Given the 2004 survey data, this stock is not expected to be above the "rebuilt" level (MSY biomass, defined in the FMP as 189.6 million pounds of total mature biomass) in 2005.

The ADF&G estimate for Eastern Subdistrict mature female biomass declined from being just below the 21.0 million pound threshold in 2003 (20.8 million pounds) to 13.2 million pounds in 2004. Size frequency modes for females at 77.5 mm CW and 57.5 mm CW in 2003, which tracked well from 2001, disappeared or have greatly diminished in 2004. Abundance estimates of mature-sized females have shown only minor fluctuations in the Eastern Subdistrict since 1997 and remain depressed. The prolonged depressed level of mature-sized female abundance during the last eight years is in contrast with the rapid recovery from similarly depressed levels that was seen from the mid-1980s through the late-1980s. Abundance of juvenile-sized females (i.e., <80 mm CW) in 2004 was lower than the previous three surveys, except for in the <40 mm CW size class. There is no expectation for any appreciable increase in mature female EBS Tanner crab abundance or biomass in the next two years.

The area swept abundance estimates for mature-sized males in the Eastern Subdistrict have displayed a slight increasing trend from 1997 through 2004. The size frequency distribution for the Eastern Subdistrict in 2004 suggests the possibility for some increase in mature-sized male abundance next year. However, the estimated abundance of legal males has remained low since 1997, perhaps indicating that sublegal males are not molting into legal size. ADF&G estimated abundance of legal-sized males in Bristol Bay (Bering Sea waters east of 168° W longitude, south of 58° 39' N latitude and north of 54° 36' N latitude) in 2004 at 5.2 million crabs by the area swept method and at 3.2 million by the LBA method (the NMFS area swept estimate is 5.0 million crabs). Due to a preponderance of old-shell legal male crabs, ADF&G estimates the abundance of "exploitable legal males" (100% of new-shell legal males plus 32% of old-shell legal males) in Bristol Bay to be only 2.1 million crabs by the area-swept method and 1.7 million crabs by the LBA method. Both ADF&G and NMFS estimate the abundance of legal males in the Eastern Subdistrict west of 168° W longitude to be 0.3 million crabs.

Bering Sea snow crab (*Chionoecetes opilio*):

Snow crab spawning biomass in 2004 is estimated to be 343.7 million pounds using the area-swept method. This stock is below the MSST of 406.8 million pounds, with an estimated SB that is among the lowest on record. The SB estimated for 2004 increased 12% from the 2003 estimate of 306.2 million pounds. Estimated mature male biomass was 174.6 million pounds. Despite an increase in spawning biomass in 2004, this stock remains in a depressed condition and is unlikely to be above B_{MSY} in 2005; it is uncertain if thresholds will be met to allow a commercial fishery in 2006.

Size frequency distribution from the 2004 survey indicates a mode representing new-shell males centered at 40 mm CW indicating continued recruitment to this portion of the stock. However, similar signs of recruitment to the stock in the 2000 and 2001 proved ephemeral, disappearing in the 2002 survey. While this apparent recruitment is encouraging, modes of crabs in this size range have proven difficult to track through subsequent surveys. Although the area-swept estimate of total mature biomass in 2004 is higher than those for the mid-1980s, a size-based assessment model estimates the 2004 total mature biomass to be lower than in the mid-1980s and at the lowest level since 1978 (Turnock 2004; Appendix A, Table 2).

A size-based assessment model for EBS snow crab estimates that snow crab biomass was lower in the mid-1980s than is currently estimated, however the 2004 estimated biomass is near historic lows.

The estimated abundance of males greater than four inches in CW in 2004 (68 million crabs) has increased from the 2003 abundance level of 65 million crabs. The percentage of new-shell males greater than four inches in CW from the 2004 survey (approximately 67%) is comparable to the 2003 estimate of 70%.

The GHL of 20.9 million pounds for the 2005 season represents 6.1% of the estimated SB and 12.0% of the estimated mature male biomass in 2004. The 20.9 million pound harvest would corresponds to 23% of the estimated abundance of males greater than or equal to four inches CW, and 34% of the abundance of new-shell males greater than or equal to four inches CW. Under the state harvest strategy, the 2005 GHL was not constrained by the 58% cap on the harvest of exploitable legal males.

Bristol Bay red king crab (*Paralithodes camtschaticus*):

This stock was estimated to be above the stock threshold for a fishery opening. With ESB estimated as greater than 55.0 million pounds, a 15% exploitation rate on mature-sized males is used to determine the GHL. ADF&G estimated the average weight for legal crabs to be 6.44 pounds using the size distribution from this year's survey. That average weight was applied to 15% of the estimated abundance of mature-sized males (15.97 million; ADF&G LBA base model estimate) to compute the GHL. The 15% harvest rate on mature-sized males provides a harvest of 2.395 million legal males. A harvest of 2.395 million legal males would represent 23% of the estimated abundance of legal males (10.358 million animals; ADF&G LBA base model estimate).

Estimated total mature biomass in 2004 (176.4 million pounds) is essentially unchanged from the estimate from 2003 (178.1 million pounds); the 2004 estimate is nearly twice the MSY biomass currently defined in the FMP. The 2004 LBA base model estimates effective spawning biomass and legal male abundance to be at the highest since 1981 and abundance of mature-sized males and females to be at the highest since 1982. Mature-sized males and legal males in 2004 are estimated to be only slightly higher than the estimate for 2003, whereas abundance of mature-sized females is estimated to have increased to 35.35 million from 28.11 million in 2003.

Additional recruitment in 2005 to the mature-sized males can be expected from the size frequency distribution seen in the 2004 survey data. However, the mode that has contributed to recruitment to the mature-sized females in the 2003 and 2004 surveys appears close to fully recruited in 2004. Hence no significant increase in mature-sized females should be expected in 2005. The estimate for effective spawning biomass (ESB) in 2004 is only 12% above the threshold for applying the maximum 15% exploitation rate to mature-sized male abundance. So, it should be noted that only a slight decrease in estimated abundance and biomass of mature-sized females in 2005 could result in a reduction of the exploitation rate to 12.5% for computation of the 2005 GHL.

The male and female size-frequency distributions for 2004 show a mode of juvenile-sized crabs centered at approximately 67.5 mm CL. Size modes for crabs of that size do not always track into future surveys. However, if those juveniles do continue to track into future surveys, they would begin providing recruitment to the mature-sized females by 2006.

Pribilof District red king crab (*Paralithodes camtschaticus*):

No formal harvest strategy has been developed for this stock. The stock has been closed to fishing since 1999 due to imprecision of abundance estimates and concerns about bycatch of blue king crab. Concerns about possible effects to the Pribilof District blue king crab stock stem from the depressed condition of that stock; the Pribilof District blue king crab stock was declared overfished in 2002 and stock abundance estimates from this year's trawl survey data are the lowest on record. Past fishery and trawl survey data have indicated the potential for significant bycatch of blue king crab during a directed fishery on the Pribilof red king crab stock. Precision in the estimates for mature-sized and legal male red king crab males remains poor in 2004: plus-or-minus approximately 50% for the ADF&G CSA estimates and plus-or-minus 116% for the NMFS area-swept estimates. Results from a Pribilof red and blue king crab pot survey and a Pribilof red king crab test fishery conducted by ADF&G in September 2003 validate concerns about potential of bycatch on blue king crab and the poor precision of red king crab abundance estimates.

Although year-to-year comparisons are problematic due to poor precision of estimates, the time series of estimates indicates that the mature portion of this stock has been in decline since 2001. The 2004 survey provides no expectations for recruitment to the mature-sized or legal-sized males next year; hence mature abundance should be expected to decline through next year due to natural mortality. However, some males 40 mm to 75 mm CL were captured during the 2004 survey, providing an indicator of possible future recruitment.

Pribilof District blue king crab (*Paralithodes platypus*):

This stock is closed due to being below the threshold for a fishery opening. The stock remains in "overfished" condition for the third year in a row. Estimated total mature biomass decreased from 4.1 million pounds in 2003 to 0.5 million pounds in 2004 an abrupt drop to the lowest estimate on record. The 2004 total mature biomass estimate is $1/13^{th}$ of MSST and $1/26^{th}$ of the level that needs to be attained for two consecutive years for consideration of a fishery opening. Mature biomass has been in decline for the last 10 years and there is no evidence from this year's survey results that recruitment to the mature stock will occur in the near future.

In October 2004, the BOF adopted a new harvest strategy for blue king crabs in the Pribilof District. The harvest strategy requires that the spawning biomass estimate must exceed 13.2 million pounds for two consecutive years and that a minimum GHL threshold of 0.5 million pounds must be met prior to a fishery opening. The spawning biomass estimate for 2004 is 4.1 million pounds, thus the threshold was not met. The fishery has been closed since 1999 because the stock did not exceed the threshold level of abundance. Therefore, this population is declining in the absence of directed fishing pressure and in the absence of any bycatch during the Pribilof red king crab fishery; the Pribilof red king crab fishery has also remained closed

since 1999. It is also worth noting that bycatch in trawl fisheries has not occurred due to the Pribilof trawl closure area. There is no evidence from this year's survey results that recruitment to the mature or legal male stock will occur in the near future.

Saint Matthew Island Section blue king crab (*Paralithodes platypus*):

The fishery has been closed since 1999 and will remain closed in 2004. This stock remains in "overfished" condition for the sixth year in a row since the "overfished declaration" of 1999. Estimated total mature biomass decreased from 12.8 million pounds in 2003 to 7.3 million pounds in 2004, but the reality of year-to-year fluctuations in estimated total mature biomass cannot be judged due to the low precision of the estimates. Total mature biomass would need to increase threefold to 22.0 million pounds from the 2004 estimate for the stock to be considered "rebuilt." Data from the 2004 survey do not provide any expectations for such an increase in the near-term future; the estimates from 1999 through 2004 indicate at best only a weakly increasing trend in total mature biomass. As in previous years, the stock is estimated to be above the threshold for a fishery opening, but with the GHL computed according to the fishery harvest strategy far below the minimum GHL of 2.5 million pounds.

Crab Stocks With No Annual Survey

Stock status for the following stocks are unknown due to a lack of survey data: Pribilof District golden king crab (*Lithodes aequispinus*); Saint Lawrence Island blue king crab; Northern District golden king crab; Aleutian Islands golden king crab; Western Aleutian Tanner crab (*C. bairdi*); Aleutian Islands (AI) scarlet king crab (*Lithodes couesi*); Bering Sea triangle Tanner crab (*Chionoecetes angulatus*); Eastern AI triangle Tanner crab; Eastern AI grooved Tanner crabs (*Chionoecetes tanneri*); Western AI grooved Tanner crabs and Bering Sea grooved Tanner crabs. The fisheries for the species identified in Table 3 occur under authority of an ADF&G commissioner's permit. Estimation of MSST for these stocks is not possible at this time because of insufficient data on the basic stock abundance.

Table 2. 2004/2005 Guideline harvest levels, fishery status, and MSY estimates for BSAI king and Tanner crab stocks that are surveyed on a limited basis.

Stock	GHL (millions of pounds)	Fishery/Season	MSY (millions of pounds)
WAI red king	Closed	10/25	1.5
EAI red king	Closed	Closed	NA
Norton Sound red king			0.5
Saint Lawrence blue king	None established	Permit	0.1
AI golden king	5.7	8/15	15.0
Pribilof golden king	0.15	Permit	0.3
Northern District golden king	0.01-0.02	Permit	0.3
AI scarlet king	Incidental harvest	Permit	NA
EBS scarlet king	Incidental harvest	Permit	NA
EAI Tanner	Stock status determ. pending	1/15	0.7
WAI Tanner	Closed	Closed	0.4
EAI triangle Tanner	Incidental harvest	Permit	1.0
EBS triangle Tanner	Incidental harvest	Permit	0.1
EAI grooved Tanner	0.05-0.2	Permit	1.8
EBS grooved Tanner	0.05-0.2	Permit	1.5
WAI grooved Tanner	Incidental harvest	Closed	0.2

NA: Indicates that insufficient data exists to generate an estimate.

Aleutian Islands red king crab: WAI (Adak or Petrel Bank) and EAI (Dutch Harbor). The GHL for the eastern portion is based on the results of surveys performed by ADF&G on a triennial basis; the most recent survey was performed in 2004. Few red king crabs have been caught in surveys of the eastern Aleutians since 1995. The eastern portion has been closed since 1983. Historically, the GHL for the western portion has been based on the most recent fishery performance. The western portion was closed for the 1996/97 and 1997/98 seasons due to poor performance and poor signs of recruitment during the 1995/96 season. The western portion was reopened for limited exploratory fishing in some areas in 1998/99. Based on the results of the 1998/99 season, the fishery in the western portion was closed in 1999/2000.

In 1999 the Crab Plan Team identified the need for standardized surveys in areas of historical production prior to reopening the fishery in the western portion; prior to that meeting, the western portion had not been surveyed since 1977. A cooperative ADF&G-Industry pot survey was performed in the Petrel Bank area under the provisions of a permit fishery in January-February and November of 2001. Results of those surveys showed high densities of legal crabs within limited portions of the surveyed area. Survey catches of females and prerecruit sized males were low. Based on results of the 2001 surveys and recommendations from ADF&G and the public, the Alaska Board of Fisheries adopted pot limits, and modified the season opening date.

A GHL of 0.5 million pounds was set for the 2002 season in the Petrel Bank area. Because only relative abundance information is available, ADF&G monitored the fishery utilizing inseason catch data. The management goal is to maintain a fishery CPUE of at least 10 legal crabs per pot lift. The 2002 fishery in the Petrel Bank area harvested 505,000 pounds. The fishery CPUE was 18 legal crabs per pot lift. Based on fishery performance, ADF&G announced a 0.5 million pound GHL for the 2003 fishery and the fleet harvested 479,000 pounds. The 2003 catch rate dropped to 10 legal crabs per pot lift. The 2004 Petrel Bank red king crab fishery will not open due to declining stock size. An additional pot survey is planned for 2006.

In order to assess red king crab in other portions of the western AI, during November 2002, a survey was conducted between 172° W longitude, and 179° W longitude (waters in the vicinity of Adak, Atka, and Amlia Islands). The survey of these waters yielded very few red king crabs and the area will remain closed until further notice.

Norton Sound red king crab: The Norton Sound red king crab legal male abundance is estimated from the triennial trawl survey and winter pot surveys. The 2004 estimated legal male biomass is 4.4 million pounds, an increase from the 2003 estimate of 3.1 million pounds of legal male crabs. This increase in abundance is the result of 16.9% increase in the abundance of recruit-sized crabs. The abundance of post-recruits remains low relative to historic levels. Recruitment is anticipated to remain strong in 2005, but may decrease in subsequent years. The Norton Sound crab fishery operates in the summer and in the winter. The legal male abundance remained in a range that allowed a harvest rate of 8% to be applied to the 2004 legal biomass estimate. The 2004 GHL was 353,000 pounds of which 26,500 pounds were allocated to the CDQ fishery.

Aleutian Islands golden king crab (Eastern Aleutian Islands and Western Aleutian Islands golden king crab stocks): A standardized triennial pot survey for golden king crab in a portion of the eastern Aleutian Islands (in the vicinity of Amukta, Chagulak, and Yunaska Islands) was initiated in 1997. Survey results and tag recovery data indicate that catch per unit effort (CPUE) of legal male crabs in the area surveyed has declined since 1997. Analysis of 1996-2003 golden king crab fishery performance and observer data from the entire area east of 174° W longitude indicate that the golden king crab stock has remained stable in that larger area, however ADF&G observer data indicates a continued decline since 2000, in the catch of sublegal male golden king crabs. The 2003-04 GHL for the Aleutian Islands has again been set at 5.7 million pounds, with 2.7 million pounds for the area west of 174° W longitude, and 3.0 million pounds for the area east of 174° W longitude.

Eastern Aleutian Islands Tanner crab: ADF&G surveys a portion of the eastern Aleutian Islands Tanner crab stock triennially. Improved trawl survey catches prompted ADF&G to conduct a pot survey of the Unalaska Bay, Makushin Bay, and Akutan Bay areas in 2003. Based on trawl survey data, ADF&G developed threshold levels of abundance to be met prior to a fishery opening and set 2004 GHLs of 47,219 pounds for Unalaska Bay and 87,891 pounds for Makushin Bay. ADF&G currently intends to survey the Unalaska Bay, Makushin Bay and Akutan Bay Tanner crab populations annually and a survey was conducted in August 2004, however a stock status determination has not yet been made for the 2005 fishery.

Overfishing Parameters

The FMP identifies the following overfishing definitions to provide objective and measurable criteria for identifying when the BSAI crab fisheries are overfished or overfishing is occurring, as required by the Magnuson-Stevens Fishery Conservation and Management Act. Table 3 provides the MSST, MSY, OY and maximum fishery mortality threshold (MFMT) control rule estimates for the BSAI king and Tanner crab stocks. The Crab Plan Team is currently studying revisions to the Overfishing Definitions.

Table 3. MSST, MSY, OY, and the MFMT values for BSAI king and Tanner crabs. Values in millions of pounds.

Stock	MSST	MSY	OY range	MFMT
WAI red king	NA	1.5	0-1.5	0.2
Bristol Bay red king	44.8	17.9	0-17.9	0.2
EAI red king	NA	NA	NA	0.2
Pribilof Islands red king	3.3	1.3	0-1.3	0.2
Norton Sound red king	NA	0.5	0-0.5	0.2
Pribilof Islands blue king	6.6	2.6	0-2.6	0.2
Saint Matthew blue king	11.0	4.4	0-4.4	0.2
Saint Lawrence blue king	NA	0.1	0-0.1	0.2
Aleutian Islands golden king	NA	15.0	0-15.0	0.2
Pribilof Islands golden king	NA	0.3	0-0.3	0.2
Northern District golden king	NA	0.3	0-0.3	0.2
Aleutian Islands scarlet king	NA	NA	NA	0.2
EBS scarlet king	NA	NA	NA	0.2
Total king crab		**43.9**	**0-43.9**	
Eastern Aleutian Tanner	NA	0.7	0-0.7	0.3
EBS Tanner	94.8	56.9	0-56.9	0.3
Western Aleutian Tanner	NA	0.4	0-0.4	0.3
Total Tanner		**58.0**	**0-58.0**	
EBS snow	460.8	276.5	0-276.5	0.3
Total snow		**276.5**	**0-276.5**	
Eastern Aleutian triangle Tanner	NA	1.0	0-1.0	0.3
EBS triangle Tanner	NA	0.3	0-0.3	0.3
Eastern Aleutian grooved Tanner	NA	1.8	0-1.8	0.3
EBS grooved Tanner	NA	1.5	0-1.5	0.3
Western Aleutian grooved Tanner	NA	0.2	0-0.2	0.3
Total other Tanner		**4.8**	**0-4.8**	

NA: Indicates that insufficient data exists to calculate value.

Maximum sustainable yield (MSY) is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions. MSY is estimated from the best information available. Proxy stocks are used for BSAI crab stocks where insufficient scientific data exists to estimate biological reference points and stock dynamics are inadequately understood. MSY for crab species is computed on the basis of the estimated biomass of the mature portion of the male and female population or total spawning biomass (SB) of a stock. A fraction of the *SB* is considered sustained yield (*SY*) for a given year and the average of the *SY*s over a suitable period of time is considered the MSY.

Overfishing and Overfished: The term "overfishing" and "overfished" mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce MSY on a continuing basis. Overfishing is defined for king and Tanner crab stocks in the BSAI management area as any rate of fishing mortality in excess of the maximum fishing mortality threshold, F_{msy}, for a period of 1 year or more. Should the actual size of the stock in a given year fall below the minimum stock size threshold, the stock is considered overfished. If a stock or stock complex is considered overfished or if overfishing is occurring, the Secretary will notify the Council to take action to rebuild the stock or stock complex.

MSY control rule means a harvest strategy which, if implemented, would be expected to result in a long-term average catch approximating MSY. The MSY control rule for king and Tanner crabs is the mature biomass of a stock under prevailing environmental conditions, or proxy thereof, exploited at a fishing mortality rate equal to a conservative estimate of natural mortality. Sustainable yield (SY) in a given year is the MSY rule applied to the current spawning biomass. Overfishing occurs if the SY is exceeded for one year or more.

MSY stock size is the average size of the stock, measured in terms of mature biomass of a stock under prevailing environmental conditions, or a proxy thereof. It is the stock size that would be achieved under the MSY control rule. It is also the minimum standard for a rebuilding target when remedial management action is required. For king and Tanner crab, the MSY stock size is the average mature biomass observed over the 15 year period from 1983 to 1997.

Maximum fishing mortality threshold (MFMT) is defined by the MSY control rule, and is expressed as the fishing mortality rate. The MSY fishing mortality rate $F_{msy} = M$, is a conservative natural mortality value set equal to 0.20 for all species of king crab, and 0.30 for all *Chionoecetes* species.

Minimum stock size threshold (MSST) is whichever is greater: one half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years if the stock or stock complex were exploited at the maximum fishing mortality threshold. The minimum stock size threshold is expressed in terms of mature biomass of a stock under prevailing environmental conditions, or a proxy thereof

Management Programs

Crab Rationalization Program

In January 2004, Congress amended section 313 of the Magnuson-Stevens Act through the Consolidated Appropriations Act of 2004 (Pub. L. No. 108-199, section 801), by adding paragraph (j). As amended, section 313(j)(1) requires the Secretary to approve by January 1, 2005, and implement thereafter, the Crab Rationalization Program as approved by the Council. The program is a limited access system that balances the interests of several groups with interests in these fisheries. The program addresses conservation and management issues associated with the current derby fishery and may reduce bycatch and associated discard mortality. The program also may increase the safety of crab fishermen by ending the race for fish. Share allocations to harvesters and processors, together with incentives to participate in fishery cooperatives, are designed to increase efficiencies, provide economic stability, and facilitate compensated reduction of excess

capacities in the harvesting and processing sectors. The program was designed to protect community interests through Community Development Quota (CDQ) allocations and regional landing and processing requirements, as well as by several community protection measures.

NMFS is developing regulations to implement this program. Fishing under the program will begin August 2005.

Community Development Quota Crab Fisheries

The Magnuson-Stevens Act mandates that the Council and NMFS establish a Community Development Quota (CDQ) program under which a percentage of the total allowable catch for Bering Sea and Aleutian Island crab fisheries is allocated to the CDQ program (16 U.S.C. 1855 (i)(1)(A)). The Council and NMFS deferred management authority of the BSAI king and Tanner crab fisheries, including the CDQ fisheries, to the State, within the FMP framework. The FMP specifies three categories of management measures, which provide the framework for Federal/State management of the crab fisheries, including the determination of the GHLs and fishery seasons. Additionally, the FMP authorizes the State to allocate the crab CDQ reserve among CDQ groups and to manage crab harvesting activity of the BSAI CDQ groups (§8.1.4.2 of the FMP).

Sixty-five communities located along the Bering Sea are eligible for the CDQ program. These communities are aligned into six CDQ groups: Aleutian Pribilof Island Community Development Association (APICDA), Bristol Bay Economic Development Corporation (BBEDC), Central Bering Sea Fishermen's Association (CBSFA), Coastal Villages Regional Fund (CVRF), Norton Sound Economic Development Corporation (NSEDC), and Yukon Delta Fisheries Development Association (YDFDA). The CDQ reserve is 7.5% of the GHL for the following Bering Sea fisheries: Bristol Bay red king crab, Pribilof District red and blue king crab, Norton Sound red king crab, Saint Matthew Island Section blue king crab, Bering Sea snow crab, and Bering Sea Tanner crab. ADF&G divides the 7.5% reserve among the six CDQ groups.

Table 4. 2003-2005 CDQ percent allocation by group.

Fishery	APICDA	BBEDC	CBSFA	CVRF	NSEDC	YDFDA
Bristol Bay red king	17	19	10	18	18	18
Pribilof Islands king	0	0	100	0	0	0
Saint Matthew blue king	50	12	0	12	14	12
Norton Sound red king	0	0	0	0	50	50
EBS Tanner	10	19	19	17	18	17
EBS snow	8	20	20	17	18	17

Table 5. 2004/2005 CDQ reserve by fishery.

Fishery	CDQ reserve
Bristol Bay red king	1.2 million pounds
Pribilof Islands king	Closed
Saint Matthew blue king	Closed
Norton Sound red king	0.026 million pounds
EBS Tanner	Closed
EBS snow	1.6 million pounds

License Limitation Program

Fishing under the crab license limitation program (LLP) began in January 2000. The goal of the LLP is to limit access to the crab fisheries to the historic participants or to persons who purchase licenses from historic participants. Owners of vessels must posses a valid LLP license in order to participate in the BSAI crab

fisheries. NMFS issued licenses based on fishing history during a general qualifying period, with area/species endorsements based on additional qualifying periods for each species by area, and a recent qualifying period. Licenses also limit the size of the vessel deployed under the license. Interim licenses were also issued to any applicant that had a valid moratorium qualification for crab in 1999. Interim licenses are temporary and the total numbers of licenses will change as the interim licenses are either approved or denied. Interim licenses are issued if any part of a person's claim is contested. Also, the number of licenses may change as a result of a small number of new licenses issued from late-filed claims.

Table 6. BSAI crab License Limitation Program number of licenses issued as of May 2003.

Fishery	Licenses	Interim	Total
Bristol Bay red king	250	52	302
Saint Matthew blue king	165	34	199
Pribilof Islands king	110	26	136
Aleutian Islands golden king	27	11	38
Aleutian Islands red king	26	11	37
EBS Tanner	254	54	308
Norton Sound king	60	3	63

American Fisheries Act Crab Sideboards

In 1998, Congress passed the American Fisheries Act (AFA) to establish a new allocation program for the BSAI pollock fishery. The AFA placed harvest restrictions (commonly known as "sideboards") on the pollock fishers who received exclusive harvesting privileges under the AFA to protect the interests of fishers not directly benefited by the AFA.

Under regulations implementing the AFA, an AFA qualified vessel is ineligible to participate in any BSAI crab fishery unless that specific vessel participated in a specific crab fishery during certain qualifying years. AFA vessel permits may be endorsed for the Bristol Bay red king crab, EBS snow crab, EBS Tanner crab, Saint Matthew Island Section blue king crab, Pribilof District king crab, Aleutian Islands red king crab, and Aleutian Islands golden king crab fisheries. To participate in a BSAI crab fishery, the operator of an AFA vessel must posses a valid LLP endorsement for that crab fishery as well as an AFA vessel permit containing an endorsement for that crab fishery. The qualifying years and participation requirements for AFA vessels to participate in the crab fisheries are as follows:

Table 7. Participation requirements for AFA catcher vessels to determine eligibility to harvest crab species. An AFA vessel must have participated in the directed crab fishery during the participating years listed in order to be eligible to participate in that fishery in the future.

Fishery	Qualifying years
Bristol Bay red king	Made landings of BSAI king or Tanner crab species in 1996, 1997, or on or before February 7, 1998
Saint Matthew blue king	1995, 1996, or 1997
Pribilof Islands king	1995, 1996, or 1997
Aleutian Islands golden king	1997/1998 and 1998/1999
Aleutian Islands red king	1995/1996 and 1998/1999
EBS snow	Made a landing in each of four or more years from 1988 to 1997
EBS Tanner	1995 or 1996

In addition to the historic participation requirements, there is a cap on the amount of Bristol Bay red king crab and EBS Tanner crab that the AFA vessels may harvest. The Bristol Bay red king crab harvest cap is based on the aggregate five year (1991-1997, excluding 1994-1995) weighted average share. Under this cap, AFA

vessels may harvest up to 10.96% of the general fishery GHL, which equals 1.564 million pounds for the 2004 fishery. The amount of the harvest cap may change if the number of AFA vessels with Bristol Bay red king crab endorsements changes. An aggregate harvest cap will be established for EBS Tanner crabs once the stock rebuilds. This harvest cap will be based on the aggregate historic catch of the endorsed EBS Tanner crab vessels for 1995-1996. Management and implementation of these crab harvest cap sideboards is deferred to the State of Alaska.

Table 8. Number of AFA qualified vessels eligible to harvest BSAI crabs and 2004 AFA harvest caps by fishery.

Fishery	Number of AFA qualified vessels	2004 Harvest cap
Bristol Bay red king	41	1.56 million pounds
Saint Matthew blue king	1	0.0 million pounds
Pribilof Islands king	2	0.0 million pounds
Aleutian Islands golden king	0	0.0 million pounds
Aleutian Islands red king	0	0.0 million pounds
EBS snow crab	6	0.0 million pounds
EBS Tanner crab	28	0.0 million pounds

Capacity Reduction Program

Pursuant to Section 144(d) of Public Law 106-554 (section 144), as amended by Public Law 107-20, NMFS is in the process of implementing a capacity reduction program for the BSAI crab fisheries, excluding Norton Sound. NMFS published the proposed rule on December 12, 2002 (67 FR 76329) and the final rule on December 12, 2003 (68 FR 69331). Section 144 mandates a specific capacity reduction program. The objective of the program is to permanently remove harvesting capacity from the BSAI crab fisheries by permanently reducing the number of crab LLP licenses issued vessel owners. The action is necessary because the BSAI crab fisheries are over capitalized. The program will: 1) prevent certain crab vessels from fishing again anywhere in the world; 2) revoke the crab LLP licenses based on the vessels' fishing history; 3) revoke any NMFS issued non-crab licenses that the vessels' owners hold; and, 4) revoke the vessels' fishing histories upon which NMFS based the licenses to be revoked.