

Fishery Management Report No. 07-68

**Norton Sound Section Shellfish, 2007; a Report to the
Alaska Board of Fisheries**

by

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and

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December 2007

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mid-eye-to-fork	MEF
gram	g	all commonly accepted		mid-eye-to-tail-fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.		
meter	m	at	@	Mathematics, statistics	
milliliter	mL	compass directions:		<i>all standard mathematical</i>	
millimeter	mm	east	E	<i>signs, symbols and</i>	
		north	N	<i>abbreviations</i>	
		south	S	alternate hypothesis	H _A
		west	W	base of natural logarithm	<i>e</i>
		copyright	©	catch per unit effort	CPUE
		corporate suffixes:		coefficient of variation	CV
		Company	Co.	common test statistics	(F, t, χ^2 , etc.)
		Corporation	Corp.	confidence interval	CI
		Incorporated	Inc.	correlation coefficient	
		Limited	Ltd.	(multiple)	R
		District of Columbia	D.C.	correlation coefficient	
		et alii (and others)	et al.	(simple)	r
		et cetera (and so forth)	etc.	covariance	cov
		exempli gratia	e.g.	degree (angular)	°
		(for example)		degrees of freedom	df
		Federal Information	FIC	expected value	<i>E</i>
		Code		greater than	>
		id est (that is)	i.e.	greater than or equal to	≥
		latitude or longitude	lat. or long.	harvest per unit effort	HPUE
		monetary symbols		less than	<
		(U.S.)	\$, ¢	less than or equal to	≤
		months (tables and		logarithm (natural)	ln
		figures): first three		logarithm (base 10)	log
		letters	Jan, ..., Dec	logarithm (specify base)	log ₂ , etc.
		registered trademark	®	minute (angular)	'
		trademark	™	not significant	NS
		United States		null hypothesis	H ₀
		(adjective)	U.S.	percent	%
		United States of		probability	P
		America (noun)	USA	probability of a type I error	
		U.S.C.	United States	(rejection of the null	
			Code	hypothesis when true)	α
				probability of a type II error	
				(acceptance of the null	
				hypothesis when false)	β
				second (angular)	"
				standard deviation	SD
				standard error	SE
				variance	
				population	Var
				sample	var

Weights and measures (English)

cubic feet per second	ft ³ /s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity	pH
(negative log of)	
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

FISHERY MANAGEMENT REPORT NO. 07-68

**NORTON SOUND SECTION, SHELLFISH, 2007; A REPORT TO THE
ALASKA BOARD OF FISHERIES**

by

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ABSTRACT

Legal male red king crab (crab that have a carapace length ≥ 104 mm) *Paralithodes camtschaticus* abundance for the 2007 Norton Sound summer commercial crab fishery was estimated at 3.1 million pounds. A guideline harvest level (GHL) of 315,000 pounds (10% of the estimated legal male abundance) of crab was set for the 2007 summer fisheries. The Norton Sound Community Development Quota (CDQ) crab allocation is 7.5% of the GHL. Therefore, 23,625 pounds of the quota was reserved for the CDQ red king crab fishery and 291,375 pounds was reserved for the open access red king crab fishery. The 2007 CDQ fishery began at 12:00 noon June 15, and closed at 12:00 noon June 28. Total harvest was 23,611 pounds of crab, nearly 100% of the CDQ allocation. The 2007 summer open access fishery opened by regulation at 12:00 noon, July 1 and closed by emergency order at 12:00 noon, August 8. Total commercial open access harvest was 101,672 crab for 289,264 pounds, 99% of the open access allocation. Thirty vessels and permit holders participated in the 2007 fisheries. Two buyers purchased crab in Norton Sound during the season. Local vessels accounted for 79% of the total crab harvest. Overall, catch per unit effort (CPUE) was 12.1 crabs per pot. The average price paid to fishers for crab was \$2.50 per pound during the CDQ fishery and \$2.49 per pound during the open access fishery. The combined fishery value was estimated at \$750,220. Recruit crab (legal male crab with a new shell carapace length < 116 mm) made up 45% of legal male crab sampled, representing a 20% increase from samples collected during the 2006 season.

Key words: Red king crab, *Paralithodes camtschaticus*, Alaska Board of Fisheries, Norton Sound Section, harvest, recruitment, CDQ harvest, open access harvest.

INTRODUCTION

NORTON SOUND

The Norton Sound Section (Q3) consists of all waters in Statistical Area Q north of the latitude of Cape Romanzof ($61^{\circ} 49'$ N lat), south of latitude 66° N, and east of the International Dateline (Figures 1 and 2). A large vessel summer commercial red king crab *Paralithodes camtschaticus* fishery existed in Norton Sound Section from 1977 through 1992. A summer commercial fishery did not occur in 1991 due to a lack of funding for Alaska Department of Fish and Game (ADF&G) staff to manage the fishery. In 1992 the summer commercial fishery resumed. Regulation changes adopted during the March 1993 Alaska Board of Fisheries (BOF) meeting had the effect of changing participation in the fishery to that of small boats. A super-exclusive designation went into effect for the Norton Sound commercial crab fishery June 27, 1994. This designation stated that a vessel registered for the Norton Sound crab fishery may not be used to take king crab in any other registration area during that registration year. Later a vessel moratorium was put into place before the 1996 season opened with the intention of creating a license limitation program. Community Development Quota (CDQ) groups were allocated a portion of the summer harvest beginning in 1998. Although the CDQ allocation was in place, no harvest occurred until the 2000 season. The North Pacific License Limitation Program (LLP) went into effect for the Norton Sound crab fishery January 1, 2000. The program states that a vessel which exceeds 32 feet in length must hold a valid crab license issued under the LLP by the National Marine Fisheries Service (NMFS).

During the March 1999 BOF meeting, a new management strategy was adopted for the Norton Sound summer red king crab fishery (5AAC 34.915). A threshold level abundance of legal male red king crab (crab that have a carapace width ≥ 121 mm) biomass was set at 1.5 million pounds. The summer commercial season may open if the population of legal crab exceeds 1.5 million pounds. If the legal biomass falls within the range of 1.5 to 2.5 million pounds the harvest rate will not exceed 5%, so that the stock may rebuild. If the legal biomass is 2.5 million pounds or more, the harvest rate will be no more than 10%. Improved abundance estimates and the current

management strategy will greatly reduce risks of over fishing the stock. New regulations adopted by the BOF during the March 2002 meeting affected the CDQ crab fishery and modified closed water boundaries in eastern Norton Sound and waters west of Sledge Island (Figure 2). At a special BOF meeting on May 3, 2006, Norton Sound Section (Q3) was expanded to include all waters north of the latitude of Cape Romanzof ($61^{\circ} 49'$ N lat), south of latitude 66° N, and east of the International Dateline (Figures 1 and 2). The Norton Sound CDQ fishery may begin at 12:00 noon, June 15, or no less than 72 hours after the commercial gillnet or beach seine herring fishery has closed, whichever is later, through 12:00 noon, June 28. After July 1, the commissioner may, by emergency order, open a CDQ fishery for any remaining allocation after closure of the open access fishery.

From 1976–1991, the NMFS conducted triennial trawl surveys as part of a comprehensive study to document the distribution and abundance of demersal fish and invertebrates in Norton Sound. During the 1976–1985 surveys, legal male king crab were defined as having a carapace length (CL) ≥ 100 mm (Fair 1998). For the 1988 and 1991 surveys, legal male crab were redefined as those with a CL ≥ 104 mm (Fair 1998). ADF&G conducted the triennial trawl survey from 1996–2002. The 2005 trawl survey was postponed due to difficulties procuring a vessel. The 2006 trawl survey was conducted jointly with Norton Sound Economic Development Corporation (NSEDC). On these surveys, ADF&G defined legal male king crab as having a carapace width (CW) of 121 mm (4.75 in) or more, which relates to a CL of approximately 104 mm (Fair 1998). Raw CL data collected from the all NMFS trawl surveys, except the survey conducted in 1979, were reanalyzed and legal male king crab were redefined as having a CL of 104 mm or more for each survey conducted by NMFS. Statistical analysis indicates that there is a highly significant relationship between crab CW and CL and legal male king crab can be defined as either having a CW of at least 121 mm, or a CL of at least 104 mm (Fair 1998). Data from the 1979 survey were incomplete and reanalysis of the data was not possible. However, the difference in the 1979 legal crab population estimates based on CL's of 100 mm and 104 mm is assumed to be very small and would not have altered the population estimate significantly.

Table 1 summarizes the abundance estimates of legal and sublegal male red king crab in Norton Sound. These abundance estimates are based on information collected from the 10 trawl surveys conducted by NMFS and ADF&G during the period, 1976–2006. Note however, that abundance estimates of sublegal male king crab or prerecruits, were not available in 1979. Abundance estimates for legal male red king crab for the 9 trawl surveys prior to 2006 varied from a low of 771,569 legal male crab in 2002 to a high of 1,742,755 crab in 1976, the year of the first trawl survey, and averaged 1,072,279 legal crab for years when the surveys were conducted (Table 1). The 2006 legal male king crab estimate of 726,251 was over 30% below the long-term average abundance estimate, but very similar to the 2002 estimate of 771,569 crab. Abundance estimates for prerecruit-1 (pre-1) male king crab (crab that are 90–103 mm in CL) for the 8 trawl surveys prior to 2006 varied from a low of 303,682 in 1991 to 940,198 in 1999 and averaged 616,132 crab (Table 1). The 2006 pre-1 abundance estimate of 569,833 was slightly below this long-term average abundance estimate (Table 1). Abundance estimates for prerecruit-2 (pre-2) male red king crab (crab that are 76–89 mm in CL) during this same time period varied from 103,832 in 1999 to 466,858 in 1985 and averaged 374,914 crab (Table 1). The estimated abundance of pre-2 male king crab abundance in 2006 is the highest abundance estimate of pre-2 crab in the history of the trawl survey, representing a 66% increase over the previous record abundance estimate and a more than two-fold increase over the long-term average of 374,914 pre-2 crabs (Table 1) (Soong and Banducci 2006). Pre-2 crabs require 2 years in order to molt and grow large enough

to contribute to the legal proportion of the red king crab population. A large abundance of pre-2 crab observed in 2006 suggests that there should be a substantial increase in the legal male crab portion of the population in 2008 and 2009.

Size composition data from the 2007 winter pot study indicated that the portion of the crab population that was considered legal size, 21.9%, was one of the lowest legal crab proportions on record. Near equal percentages of legal sized crab were classified as recruits (legal male crab with a carapace length < 116 mm), 11.3%, and post recruits (legal male crab with a carapace length \geq 116 mm), 10.6% (Table 2). Results from these winter pot surveys indicated a continued decline in the percentage of legal crab over the previous 2 years, with decreased percentages occurring in both categories. Sublegal prerecruit crab accounted for 61.5% of the total population in 2006 and 69.2% of the total population in 2007. Percentage of pre-1 crabs observed during the 2007 winter pot survey was the highest on record. The pre-2 crab percentage, 16.4%, was slightly below the long-term (1983–1993 and 1995–2006) average of 18.8%. The prerecruit-3 (pre-3) crab (crab with a carapace length < 76 mm) percentage, 8.8%, was more than double the long-term average of 3.5% (Table 2).

The projected estimated legal male red king crab abundance for the 2007 summer commercial crab fishery was 3.1 million pounds. This was more than 30% below the 2005 and 2006 abundance estimates of 4.8 million and 4.5 million pounds, respectively. At a maximum exploitation rate of 10%, the guideline harvest level (GHL) was set at 315,000 pounds of crab in 2007. By regulation, the CDQ fishery is allocated 7.5% of the GHL, which resulted in 23,625 pounds being set aside for the CDQ fishery. This follows the harvest strategy set by the Alaska Board of Fisheries that is stipulated in 5AAC 34.915 (b).

HARVEST SUMMARY

SUMMER OPEN ACCESS FISHERY

The 2007 summer open access commercial crab fishery was opened by regulation at 12:00 noon, July 1 in the Norton Sound Section. The guideline harvest level for this portion of the fishery (92.5% of the total GHL) was set at 291,375 pounds of crab. Two companies were registered to buy crab in Norton Sound during the season. One of these buyers operated a seafood processing plant in Nome and purchased crabs from local Norton Sound fishers, while some fishers based in Unalakleet and non-resident fishers delivered to the second buyer in Anchorage. Some fishers also sold their catch dockside as catcher/sellers. The open access portion of the fishery was closed by emergency order 12:00 noon, August 7, 2007 when the harvest approached the goal of 291,375 pounds.

The open-access harvest from fish ticket reports was 101,672 red king crabs or 289,264 pounds (Table 3), more than 99% of the open access allocation. Of this total, 119 pounds were seized by the Department of Public Safety, 965 pounds were reported as deadloss, and 3,932 pounds were kept for personal use. A total 234 landings were made by 30 permit holders operating 30 vessels (Table 3). The average weight for commercially caught crab was 2.85 pounds (Table 3) and the average price paid was \$2.49 per pound (Table 4). Total exvessel value of the open access fishery was \$693,412. Historic information regarding the commercial open access and CDQ red king crab fisheries from 1977–2007, including economic performance and season length can be

found in Table 4. Overall CPUE was 12.1 crabs per pot compared to the 2006 CPUE of 17.3 crabs per pot (Table 5; Appendix A1).

Fish ticket reports document that 14 statistical areas were legally fished in the open access and CDQ fisheries (Table 5; Figure 2). Statistical area 636401 had the highest catch with 123,092 pounds of crab. The other large catches came from stat areas 656401 (70,065 pounds) and 626401 (61,704 pounds). The catch from stat areas east of 164°W longitude made up 71.1% of the harvest (Table 5; Figure 3). A historical comparison of the combined harvest from the open-access and CDQ fisheries by statistical area is provided in Table 6.

Commercial crab fishers either delivered to a small tender vessel in northeastern Norton Sound, which then delivered the crabs to Nome for processing, or crab were sold directly to a seafood processing plant. The majority of fishers delivered to the plant in Nome, while two Unalakleet fishers and two non-resident fishers flew live crabs to a buyer in Anchorage.

CDQ FISHERY

The Norton Sound and Yukon Delta CDQ groups divide the CDQ allocation. Only fishers designated by these two CDQ groups are allowed to participate in this portion of the king crab fishery. Fishers are required to have a CDQ fishing permit from the Commercial Fisheries Entry Commission (CFEC) and register their vessel with ADF&G before they make their first delivery. Fishers operate under authority of the CDQ group and each CDQ group decides how their crab quota is harvested. In 2007, as in the previous 2 years, Yukon Delta transferred their quota to Norton Sound; therefore, all fishers operated under authority of the Norton Sound CDQ group.

The CDQ fishery opened at 12:00 noon June 15, 2007, but fishers did not start fishing until June 18. The harvest was 23,611 pounds of crab (Table 7), nearly 100% of the CDQ allocation. This was the sixth year a CDQ harvest occurred since the CDQ fishery was implemented in 1998, and the fourth year in which fishers harvested or nearly harvested the entire allocation. With only 14 pounds remaining of the quota, the fishery was not reopened after the close of the open access fishery. Eight vessels participated and 17 landings were made (Table 7). The average price paid to fishers for their harvest was \$2.50 per pound. The exvessel value was \$56,808 for the CDQ fishery, the fourth highest on record (Table 4). The fishery was closed 12:00 noon June 28, 2007.

HARVEST SAMPLING

Carapace length measurements and shell age were collected from 6,125 commercially-caught crabs during the open access and CDQ fisheries. Carapace age was classified as new (2–12 months old) or old (over 13 months old). Male new-shell crabs made up 88% of the total legal crabs sampled, and old-shell crabs made up 12% (Table 8; Figure 4). Recruit crabs are new-shell legal crabs < 116-mm carapace length (CL). Postrecruit crabs are legal new-shell male crabs \geq 116-mm CL and all legal old-shell males. Recruit crabs made up 45% of the legal crabs sampled and postrecruit crabs made up 55% (Table 8; Figure 5). This was a 26% decrease in the number of postrecruit crabs compared to samples from the 2006 fishery. Overall mean carapace length of legal male crabs was 117.0 mm. This was slightly less than the 119.4 mm average length observed from samples collected from the 2006 fishery.

WINTER COMMERCIAL FISHERY

A winter commercial fishery in Norton Sound Section occurs from November 15 through May 15 and typically takes place near Nome. Most fishers consider winter commercial crabbing an

extra source of income and work other jobs. Usually, two or three of the winter crab fishers sell the majority of the crab harvest. The use of vessels is prohibited and the winter commercial fishery takes place through the ice. Stability of sea ice greatly affects the success of the winter fishery. During the winter of 2006–2007, sea ice conditions were good until early March, at which point unstable sea ice contributed to the loss of several commercial pots. Table 9 summarizes the winter commercial and subsistence harvest of crab from 1978 to 2007.

The winter commercial season opened November 15, 2006, and 8 fishers registered to fish. Based on fish tickets submitted, the first landing was made January 17 and the final delivery occurred on May 5. A total of 3,313 crabs were caught by 8 fishers for an average harvest of 92 crab per permit holder (Table 9). Average weight was 2.4 pounds and average price per pound was \$3.06 (Soong 2007b). Percentages of crabs sold (and CPUE) by month are as follows: January 2% (1.5), February 37% (3.4), March 36% (3.7), April 24% (4.2), and May 2% (5.0) (Soong 2007b).

WINTER SUBSISTENCE FISHERY

Residents of Norton Sound subsistence fish for red king crab mainly during the winter. Fishing occurs through cracks or holes cut in the ice with the use of handlines and pots. In order to document trends in subsistence harvests, the BOF enacted a regulation in 1977 requiring subsistence fishers in Norton Sound to obtain a subsistence permit prior to fishing. Fishers record their daily effort and catch on these permits. During the 2006–2007 season, 129 subsistence permits were issued for all of Norton Sound, and of the 127 permits returned, 116 reported that they actually fished (Table 9). A total of 10,690 crabs were recorded as kept, or harvested for subsistence use in the Norton Sound (Table 9), with 80% of the catch being harvested in the Nome area. Unstable sea ice in the Nome area led to few subsistence fishers participating in the fishery and resulted in a small harvest.

The first year subsistence permits were required, 1977, had the highest number of permits issued and a relatively high harvest rate. The fishery declined sharply the following year and remained at low levels throughout the 1981–1982 season. Lack of success in past winter crab fisheries has been attributed to a declining crab population caused by the removal of crab in the summer commercial fishery, low recruitment, low effort due to poor ice conditions, and changes in nearshore winter distribution of crab. During the 1978–1979 winter fishery, the king crab population was relatively large. Despite this large population, harvests were the lowest recorded, indicating that major factors limiting winter harvests were probably poor ice conditions and crab distribution. During the winter of 1981–1982, poor winter catches could more reasonably be attributed to a declining crab population since crab abundance was at a much lower level. Subsistence fishing success during the winters of 1982–1983 through 1986–1987 improved due to a rebuilding population and increased use of more efficient gear (pots instead of handlines). Unstable ice conditions and/or record snowfalls adversely affected 1987–1988, 1988–1989, 1992–1993, 2000–2001, and 2003–2006 harvests (Soong 2007a; Soong and Kohler 2005). During years of stable ice conditions, approximately 100 fishers averaged 100 crabs each.

DISCUSSION

The number of vessels and permit holders participating in the Norton Sound summer crab fishery has been stable since 2001. From 1997 through 1999, the GHL for the summer commercial crab fisheries was set at 80,000 pounds. Participation dropped significantly during these 3 years because fishing became economically impractical for fishers and buyers. Starting in 2000, the GHL was set in association with the estimated legal crab biomass. A GHL set at more than 300,000 pounds of crab caused an increase in effort in the 2000 fishery and a GHL of 240,000 pounds in 2002 was still viewed by participants as a viable fishery. Since then, the GHL has ranged from 250,000 pounds in 2003 to the highest GHL since 1985, 450,000 pounds, set in 2006 (Table 4).

There has been a shift in the commercial fishery effort and harvest eastward and closer in shore since 1993 (Tables 5 and 6; Figures 2 and 3). This is caused in part by the change in participation from large vessels to small vessels. Before 1993, most vessels participating in the Norton Sound summer king crab fishery were 100 feet or greater in length and had circulating seawater holding tanks. These vessels could deploy hundreds of pots and the fishery usually lasted a few days. Large vessels had to avoid freshwater influences that would kill crab in seawater holding tanks. Since 1993, most vessels participating in the summer crab fisheries are 32-foot modified herring and salmon boats that do not have circulating seawater tanks. These boats are ill equipped to handle heavy seas, and, therefore, fish closer to shore to avoid bad weather. Near shore fishing has focused the commercial crab fleet toward statistical areas offshore of Nome and Golovnin Bay. Crabs are abundant at the beginning of the season, the closed water boundary line is close to land, and boats have a short distance to travel if the weather deteriorates.

Average CPUE decreased from 17.3 crab per pot in 2006 to 12.0 crab per pot in 2007 (Appendix A1). Overall mean CL also decreased from the 119.4 mm observed in 2006 to 117.0 mm during the 2007 commercial fishery. Reductions in both catch rates and body size can most likely be attributed to the decrease in the percentage and number of postrecruits in the crab population in 2007. The 2007 Norton Sound summer commercial crab harvest showed a 20% decrease in the percentage of post recruits from the 2006 summer commercial season (Table 8). However, this was expected as low numbers of recruit male crabs were observed during the 2006 trawl survey (10%) (Table 1) and 2006 summer commercial fishery (25%) (Table 8). Additionally, this trend was further supported by results of the 2006–2007 winter pot survey in which postrecruits comprised a mere 10.6% of the samples (Table 2). An increase in average legal mean length is expected for the 2008 season because of increased recruitment observed in 2007. Recruits from 2007 will molt and contribute to the postrecruit portion of the population in 2008. There are also indications that the legal red king crab portion of the population is expected to increase in 2008. Specifically, the record abundance of pre-2 male crab from the 2006 trawl survey (Table 1), as well as the record percentage, 52.8%, of pre-1 crab that comprised the 2006–2007 winter pot survey samples (Table 2) are anticipated to contribute to the 2008 legal size male crab population. Pre-2 males will molt over a 2-year period and become legal recruit male crab in 2008 and post-recruit males in 2009. Legal red king crab biomass is therefore expected to increase in 2008, followed by a possible decline in 2009, depending on the results of the 2008 winter pot survey.

The Norton Sound red king crab fishery has not had a floating processor on the fishing grounds since the Norton Sound Economic Development Corporation began operating its Nome seafood processing plant in the summer of 2002. In years when there is not a floating processor with an

observer on board to sample crab, a smaller percentage of the commercial harvest is sampled because fishers deliver at all times of the day and night. During the 2007 season ADF&G personnel were able to coordinate catch sampling with fishers and buyers to ensure optimal harvest data collection.

Until 2002, the Norton Sound CDQ fishery occurred directly after the open access fishery that generally ends in late August or early September. By late August, male red king crab in Norton Sound begin to molt, which in turn led to an increase in handling mortality and a marketing problem associated with double shell crab. This problem was solved through a BOF action in 2002 that opened the CDQ fishery in mid June, prior to the July 1 open access fishery. In 2007, the CDQ fishery was able to harvest nearly 100% of the quota prior to the June 28 closure, thereby avoiding handling mortality and marketing problems.

2008 ALASKA BOARD OF FISHERIES PROPOSALS

There are five proposals the BOF will consider in March 2008 affecting Norton Sound Section red and blue king crab. They are as follows:

Proposal 387: This proposal would move the start of open access summer king crab fishery from July 1 to June 15 and move the CDQ fishery from June 15 until after the open access fishery is closed.

Proposal 388: This proposal would remove the restriction that the herring fishery must be complete before the start of the CDQ king crab fishery on June 15.

Proposal 389: This proposal involves reducing the size limit for blue king crab in Norton Sound from a carapace width of 5 ½ inches to 5 inches.

Proposal 390: This proposal would require commercial king crab pots to have escape mechanisms modified in one of two ways. Option one would be for crab pots to have at least four escape rings with an inside diameter of 4 ½ inches. The alternative would be for a four-sided pot to have the lower half of one of its side panels comprised of a mesh size no less than 6 ½ inches.

Proposal 391: This proposal would require king crab pots in the Nome winter commercial and subsistence king crab fisheries to have a galvanic release or other thread that would break down quicker than the current 30 thread cotton or smaller requirement.

RECOMMENDATIONS FOR FURTHER INVESTIGATIONS

A winter pot survey is planned during February, March, and April of 2008. Results of the winter project will be incorporated into a model to project the summer 2008 legal biomass and appropriate GHL. The triennial Norton Sound Trawl Survey will also begin in July of 2008. Results from the trawl survey will not be available until January 2009 and will be used to set the GHL in 2009.

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TABLES AND FIGURES

Table 1.—Results of population assessment surveys conducted for red king crab in Norton Sound since 1976.

Year	Dates	Research		Number of Red King Crabs Captured ^a				Population Abundance Estimates ^b			Standard Error		
		Agency	Gear	Pre-2 Males	Pre-1 Males	Legal Males ^c	Females	Pre-2 Males	Pre-1 Males	Legal Males	Pre-2 Males	Pre-1 Males	Legal Males
1976	9/2 - 9/5, 9/16 - 10/7	NMFS	Trawl	58(38)	110(213)	180(614)	101(35)	331,555	808,091	1,742,755	44,653	70,094	104,941
1979	7/26 - 8/5	NMFS	Trawl	N/A	N/A	90(86)	N/A	^d	^d	809,799			61,176
1982	9/5 - 9/11	NMFS	Trawl	42	107	97	256	356,724	832,581	877,722	50,116	76,454	79,907
1985	9/16 - 10/1	NMFS	Trawl	63	94	139	139	466,858	707,140	1,051,857	58,598	71,999	87,931
1988	8/16 - 8/30	NMFS	Trawl	82(0)	69(1)	135(3)	212(2)	565,255	493,030	978,748	62,339	58,224	82,083
1991	8/22 - 8/30	NMFS	Trawl	39	42	166	105	294,801	303,682	1,287,486	46,648	46,960	98,101
1996	8/7 - 8/18	ADF&G	Trawl	39(36)	32(17)	53(14)	98(70)	452,580	325,699	536,235	52,324	47,338	69,647
1999	7/28 - 8/7	ADF&G	Trawl	9(3)	64(38)	103(63)	64(18)	103,832	940,198	1,594,341	40,841	120,449	129,864
2002	7/27 - 8/6	ADF&G	Trawl	34(18)	42(23)	61(29)	116(35)	427,703	518,638	771,569	73,494	80,741	85,303
2006	7/25 - 8/8	ADF&G	Trawl	77(3)	37(16)	51(18)	66(1)	775,076	569,833	726,251	91,812	82,883	92,590
Historical Average ^e								374,914	616,132	1,072,279			

^a The 1976, 1979, 1988, and all ADF&G trawl catches include re-sampled stations (in parentheses). The 1979, 1996, and 2006 population estimates incorporated re-sampled stations by combining catches and tow distances for each station re-sampled.

^b Population estimates are in numbers of crab and are valid for the date of the survey (i.e., either before or after the summer commercial fishery).

^c Legal male red king crabs were defined as 121 mm (4.75 in) in carapace width (CW) for the pot surveys and all ADF&G trawl surveys, and 104-mm CL for all the NMFS trawl surveys except the 1979 survey which defined legal males as 100-mm CL.

^d Pre-1 and pre-2 male, and female data is not available for the 1979 NMFS trawl survey and the legal male abundance estimate is fully standardized.

^e Historical average is from 1976–1991, and from 1996–2002.

Table 2.—Percent prerecruits, recruits, and postrecruits in the catch of red king crab during the winter pot surveys, 1983–2007, Norton Sound.

Year ^{b,c}	Sublegal Prerecruits ^a				Legal		Subtotal	
	Threes ^{d,e}	Twos ^{d,f}	Ones ^g	Subtotal	Recruits ^h	Postrecruits ⁱ		
1983		26.2%	38.0%	64.2%	26.1%	9.6%	35.7%	
1984			34.7%	31.0%	65.6%	18.6%	15.8%	34.4%
1985			24.7%	45.1%	69.8%	20.4%	9.8%	30.2%
1986			25.7%	35.0%	60.7%	21.7%	17.7%	39.3%
1987			12.5%	31.3%	43.8%	10.4%	45.8%	56.3%
1989			26.8%	15.4%	42.2%	27.3%	30.5%	57.8%
1990			15.9%	33.5%	49.4%	24.7%	26.0%	50.6%
1991	0.2%	4.8%	30.6%	35.4%	33.5%	30.9%	64.4%	
1993	0.0%	3.3%	8.8%	12.2%	17.1%	70.7%	87.9%	
1995 ^j	2.1%	9.8%	11.4%	21.2%	32.3%	44.4%	76.7%	
1996	9.2%	22.1%	33.1%	55.2%	10.1%	25.5%	35.6%	
1997	11.0%	32.3%	20.8%	53.1%	14.3%	21.6%	35.8%	
1998	0.8%	36.6%	44.3%	81.0%	8.7%	9.5%	18.3%	
1999	0.7%	6.5%	42.4%	48.9%	39.0%	11.3%	50.3%	
2000	3.1%	13.2%	20.3%	33.5%	38.6%	24.9%	63.5%	
2001	4.5%	18.2%	15.9%	34.1%	13.6%	47.7%	61.3%	
2002	10.7%	43.1%	25.5%	68.6%	9.0%	11.8%	20.8%	
2003	4.2%	19.7%	41.6%	61.3%	20.2%	14.2%	34.4%	
2004	0.0%	9.4%	40.2%	49.6%	37.1%	13.3%	50.4%	
2005	1.5%	15.8%	23.9%	39.7%	25.4%	33.5%	58.9%	
2006	1.0%	28.5%	33.0%	61.5%	15.6%	21.9%	37.5%	
2007	8.8%	16.4%	52.8%	69.2%	11.3%	10.6%	21.9%	
Historical Average ^k	3.5% ^k	18.8% ^k	29.6% ^k	50.0%	22.1%	25.5%	47.6%	

^a Prerecruit threes are all sublegal males with carapace length < 76 mm.

^b Unstable ice conditions in 1988 and 2001.

^c Project was not funded in 1992 and 1994.

^d Prior to 1991 carapace lengths were consolidated in pairs so that prerecruit threes and twos cannot be accurately separated.

^e Prerecruit three crabs have CL < 76mm.

^f Prerecruit twos are all sublegal males with carapace length from 76 through 89 mm.

^g Prerecruit ones are all sublegal males with carapace length ≥ 90 mm.

^h Recruits are new-shell, legal crabs with CL ≤ 115 mm.

ⁱ Postrecruits are new-shell, legal crabs with CL > 115 mm and all old-shell legal crabs.

^j Includes catch from 12 test fishing stations and from one commercial fisherman's catch on 5 April.

^k Historical average is from 1983–1993 and 1995–2006.

Table 3.—Daily catch based on fish ticket data for the open-access summer commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, July 1–August 8, 2007.

Date^{a,b}	Number of Vessels	Number of Permits	Landings	Number of Crabs	Daily Harvest (lbs)	Cumulative Harvest (lbs)^c	No. Pots Pulled	Average Weight (lbs)	CPUE
6/30	2	2	2	42	119	119	2	2.83	21.0
7/3	3	3	3	663	1,840	1,959	140	2.78	4.7
7/4	5	5	5	2,742	7,843	9,802	180	2.86	15.2
7/6	9	9	9	3,277	9,153	18,955	331	2.79	9.9
7/7	3	3	3	1,632	4,389	23,344	97	2.69	16.8
7/8	3	3	3	1,513	4,274	27,618	77	2.82	19.6
7/9	10	10	10	5,044	14,148	41,766	460	2.80	11.0
7/10	2	2	2	862	2,512	44,278	55	2.91	15.7
7/12	14	14	16	6,770	18,659	62,937	564	2.76	12.0
7/13	3	3	3	1,450	4,342	67,279	116	2.99	12.5
7/14	5	5	6	2,007	5,812	73,091	170	2.95	11.8
7/15	10	10	10	4,096	11,372	84,463	390	2.78	10.5
7/16	3	3	3	1,005	2,944	87,407	102	2.93	9.9
7/17	10	10	10	4,466	12,916	100,323	363	2.88	12.3
7/18	11	11	11	4,227	11,815	112,138	406	2.80	10.4
7/19	2	2	2	352	1,076	113,214	60	3.06	5.9
7/20	11	11	11	5,053	14,372	127,586	429	2.84	11.8
7/21	1	1	1	477	1,340	128,926	40	2.81	11.9
7/22	6	6	6	4,191	12,356	141,282	227	2.95	18.5
7/23	6	7	7	3,485	9,923	151,205	261	2.85	13.4
7/24	10	10	11	5,086	14,552	165,757	403	2.86	12.6
7/25	6	6	6	2,274	6,678	172,435	229	2.94	9.9
7/26	10	10	10	4,111	12,207	184,642	377	2.97	10.9
7/27	6	6	7	3,222	8,805	193,447	230	2.73	14.0
7/28	5	5	5	1,984	5,906	199,353	198	2.98	10.0
7/29	14	14	14	6,324	17,825	217,178	525	2.82	12.0
7/30	3	3	3	1,038	3,040	220,218	120	2.93	8.7
7/31	9	9	10	4,783	13,802	234,020	343	2.89	13.9
8/1	7	7	7	3,006	8,661	242,681	269	2.88	11.2
8/2	5	4	5	1,347	3,712	246,393	136	2.76	9.9
8/3	1	1	1	414	1,030	247,423	40	2.49	10.4
8/4	12	12	12	6,816	19,569	266,992	485	2.87	14.1
8/5	5	5	5	1,408	3,773	270,765	147	2.68	9.6
8/6	1	1	1	540	1,205	271,970	40	2.23	13.5
8/7	11	12	13	5,719	16,643	288,613	446	2.91	12.8
8/8	1	1	1	246	651	289,264	38	2.65	6.5
Totals	30	30	234	101,672	289,264		8,496	2.85	12.0

^a The fishery closed by EO on 8/07/07 at noon.

^b The Department of Public Safety seized 119 pounds of crab on June 30, 2007.

^c Total harvest includes 965 pounds of deadloss and 3,932 pounds that were retained for personal use.

Table 4.—Historical summer commercial red king crab fishery economic performance, Norton Sound Section, Eastern Bering Sea, 1977–2007.

Year	Guideline	Legal Male Pop. Est.(lbs) ^b	Commercial Harvest (lbs) ^{a,b}		Number of Pots		Exvessel Price/lb	Fishery Value (Thousands \$)		Season Length	
	Harvest Level (lbs) ^b		Open Access	CDQ	Registered	Pulls		Open Access	CDQ	Days	Dates
1977	c	1.7	0.52		c	5,457	0.75	229,000		60	c
1978	3.00	1.7	2.09		c	10,817	0.95	1,897,000		60	6/7-8/15
1979	3.00	0.8	2.93		c	34,773	0.75	1,878,000		16	7/15-7/31
1980	1.00	1.9	1.19		c	11,199	0.75	890,000		16	7/15-7/31
1981	2.50	1.3	1.38		c	33,745	0.85	1,172,000		38	7/15-8/22
1982	0.50	0.9	0.23		c	11,230	2.00	405,000		23	8/9-9/1
1983	0.30	0.9	0.37		3,583	11,195	1.50	537,000		3.8	8/1-8/5
1984	0.40	0.9	0.39		1,245	9,706	1.02	395,000		13.6	8/1-8/15
1985	0.45	1.1	0.43		1,116	13,209	1.00	427,000		21.7	8/1-8/23
1986	0.42	1.1	0.48		578	4,284	1.25	600,000		13	8/1-8/25 ^d
1987	0.40	1.1	0.33		1,430	10,258	1.50	491,000		11	8/1-8/12
1988	0.20	1.0	0.24		360	2,350	c			9.9	8/1-8/11
1989	0.20	1.0	0.25		2,555	5,149	3.00	739,000		3	8/1-8/4
1990	0.20	1.0	0.19		1,388	3,172	c			4	8/1-8/5
1991	0.34	1.3	No summer fishery					0			
1992	0.34	1.3	0.07		2,635	5,746	1.75	130,000		2	8/1-8/3
1993	0.34	1.3	0.33		560	7,063	1.28	430,000		52	7/1-8/28 ^c
1994	0.34	1.3	0.32		1,360	11,729	2.02	646,000		31	7/1-7/31
1995	0.34	1.3	0.32		1,900	18,782	2.87	926,000		67	7/1-9/5
1996	0.34	0.5	0.22		1,640	10,453	2.29	519,000		57	7/1-9/3 ^f
1997	0.08	0.5	0.09		520	2,982	1.98	184,000		44	7/1-8/13 ^g
1998	0.08	0.5	0.03		360	1,639	1.47	41,000		65	7/1-9/3 ^h
1999	0.08	1.6	0.02		360	1,630	3.08	73,000		66	7/1-9/4 ⁱ
2000	0.33	4.2	0.29	0.00	560	6,345	2.29	715,000		91	7/1- 9/29 ^j
2001	0.30	3.8	0.28	0.00	1,200	11,928	2.31	674,000		71	7/1 - 9/9 ^k
2002	0.24	3.1	0.24	0.01	1,120	6,491	2.81	688,347	40,653	77	6/15-9/3 ^l
2003	0.25	3.1	0.25	0.01	960	8,494	3.09	762,546	40,854	68	6/15-8/24 ^m
2004	0.35	4.4	0.34	0.03	1,120	8,066	3.13	1,079,278	78,822	53	6/15-8/8 ⁿ
2005	0.37	4.8	0.37	0.03	1,320	8,867	3.18	1,178,035	85,965	72	6/15-8/27 ^o
2006	0.45	4.5	0.42	0.03	1,120	8,695	2.26	950,367	70,633	67	6/15-8/22 ⁿ
2007	0.32	3.1	0.29	0.02	1,200	9,118	2.49	693,412	56,808	52	6/15-8/7 ⁿ

^a Deadloss included in total.

^b Millions of pounds.

^c Information not available.

^d Fishing actually began 8/12.

^e Fishing actually began 7/8.

^f Fishing began 7/9 due to fishermen's strike.

^g First delivery was made 7/10.

^h First delivery was made 7/16.

^j The season was extended 24 hours due to bad weather.

^k Open access fishery closed 8/29/00. CDQ fishery was open 9/1/00–9/29/00.

^l Open access fishery closed 9/1/01. CDQ fishery was open 9/1/01–9/9/01.

^m Open access fishery was open 7/1/02–8/6/02. CDQ fishery was open 6/15/02–6/28/02 and 8/9/02–9/3/02.

ⁿ CDQ opened 6/15–6/28. OA opened 7/1 to the end date.

^o OA opened 7/1–8/15. CDQ opened 6/15–6/28 and 8/17–8/27.

Table 5.—Red king crab CDQ and open-access summer commercial harvest based on fish ticket reports by statistical area for Norton Sound Section, Eastern Bering Sea, June 15–August 8, 2007.

Statistical Area ^a	Number	Pounds	Pots		Average Weight (Lbs.)	Percent of Pots	Percent
			Pulled	CPUE		Pulled in Stat. Area	Harvest in Stat. Area
616401	78	231	20	3.9	3.0	0.2	0.1
626331	9,819	27,018	758	13.0	2.8	8.3	8.6
626401	21,984	61,704	2,168	10.1	2.8	23.8	19.7
636330	3,546	10,253	269	13.2	2.9	3.0	3.3
636401	43,610	123,092	2,703	16.1	2.8	29.6	39.3
646330	2,061	5,290	200	10.3	2.6	2.2	1.7
656300	658	1,909	120	5.5	2.9	1.3	0.6
656330	1,775	4,911	177	10.0	2.8	1.9	1.6
656401	23,966	70,065	2,069	11.6	2.9	22.7	22.4
656402	719	2,254	40	18.0	3.1	0.4	0.7
666330	188	511	120	1.6	2.7	1.3	0.2
666401	809	2,498	127	6.4	3.1	1.4	0.8
666402	1,062	2,959	297	3.6	2.8	3.3	0.9
676400	69	180	50	1.4	2.6	0.5	0.1
Total	110,344	312,875	9,118	12.1	2.8		

Note: Information based on fish ticket data.

^a Total harvest includes 715 pounds of crab that were harvested in closed area 626403.

Table 6.—Historical commercial harvest by statistical areas of red king crabs from Norton Sound Section, Eastern Bering Sea, 1977–2007 (catch in pounds).

Statistical Area	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
616331	7,893												
616401													
626331	40,020					22							
626401	31,572			4,830	399								
626402	38,995												
636330													
636401				12,398	61,823	32,246	5,880	41	891				22,030
636402													
646301													
646330					4,716								5,212
646401			155,972		1,319	17,532							
646402	80,969					748							
656300			161,699		15,174								
656330			323,518	72,735	395,662	3,983	24,246	83,479	7,632		79,006	36,129	1,757
656401			138,011	121,147	253,387	60,480	11,422	183,119	246,200		194,408	165,644	100,956
656402	306,302	90,187	288,869	918	3,098	2,832			132,363				
666230		55,490			77								
666300		162,795	60,816	84,874	9,167	95		4,534					
666330		353,016	505,050	367,446	141,513	8,990	1,192		389	70,615	2,963	13,020	1,275
666401		179,212	486,947	205,400	381,510	79,580	325,045	116,254	5,341	408,848	50,744	21,895	115,257
666402	12,036	515,778	534,938	183,581		17,585			32,992				
666431			146,029										
676300		13,238		126,231									
676330		51,304	81,798	6,762	18,734								
676400		667,130	33,856	274	92,026	1,315	247		32				
676430		3,811	12,309		373	3,513			1,171				
676501					36								
686330			1,860										
686431													
Totals	517,787	2,091,961	2,931,672	1,186,596	1,379,014	228,921	368,032	387,427	427,011	479,463	327,121	236,688	246,487

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Table 6.--Page 2 of 3.

Statistical Area	1990	1992	1993	1994	1995	1996 ^a	1997	1998	1999	2000	2001	2002
616331				48					633	4,557		3,506
616401					35							
626331						61						2,455
626401					18,971	45,045	18,066	8,065	508	4,689	61,620	53,722
626402												
636330						4,560	3,838	2,449			2,253	
636401		1,159	1,373	8,087	24,329	70,677	59,206	10,771	14,201	126,994	91,343	50,906
636402				1,754	3,466							
646301					4,628	13,888						
646330					1,493	2,894	314		3,021		1,868	1,955
646401			1,963	37,222	105,045	22,834	1,052	3,194	221		4,287	
646402			730	143,511	66,821							
656300												
656330		4,814	265		19,745	15,446	4,661	4,078	1,300		20,869	12,374
656401	171	53,119	105,341	29,566	32,289	9,985	4,035	1,127	2,739	94,813	55,158	63,038
656402			193,079	106,053	44,000							
666230												
666300						25,519						
666330	27,185	4,305	31,758		730					5,839	7,030	1,332
666401	162,263	10,632	746	396		3,001	1,816		930	60,762	43,771	35,970
666402			535	1,221								30,070
666431					1,124							4,274
676300						546						
676330												
676400	3,212					9,775						
676430												
676501												
686330												
686431												
Totals	192,831	74,029	335,790	327,858	322,676	224,231	92,988	29,684	23,553	297,654	288,199	259,602

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Table 6.—Page 3 of 3.

Statistical Area	2003	2004	2005	2006	2007^b	Totals
616331	646			2,357		19,640
616401					231	266
626331				1,415	27,018	70,991
626401	15,899	23,113	94,130	118,202	61,704	560,535
626402	1,352					40,347
636330			126	26,680	10,253	50,159
636401	83,949	166,489	227,204	224,531	123,092	1,419,620
636402						5,220
646301						18,516
646330		2,226	4,097	2,629	5,290	35,715
646401	3,952	1,964	149	1,660		358,366
646402						292,779
656300	14	932		284	1,909	180,012
656330	21,176	46,288	47,411	17,752	4,911	1,249,237
656401	40,566	21,579	9,405	28,434	70,065	2,096,204
656402	1,441		380	807	2,254	1,172,583
666230				1,721		57,288
666300				18,245		366,045
666330	1,296	12,359	142	5,041	511	1,562,997
666401	83,998	42,452	727	600	2,498	2,826,595
666402	12,873	23,344	16,025	1,050	2,959	1,384,987
666431	45					151,472
676300						140,015
676330						158,598
676400					180	808,047
676430						21,177
676501			1,008			1,044
686330						1,860
686431				340		340
Totals	267,207	340,746	400,804	451,748	312,875	15,050,655

Note: No commercial fishery occurred in 1991.

^a Does not include approximately 2,490 lbs that was not reported on fish tickets.

^b Includes 715 pounds caught in closed area 626403.

Table 7.—Daily CDQ summer commercial red king crab harvest, Norton Sound Section, Eastern Bering Sea, 2007.

Date	Landings	Number of Crab	Harvest (lbs)	Cumulative Harvest (lbs)	Number of Pots Pulled	Average Weight (lbs)	CPUE
6/21	1	69	180	180	50	2.6	1.4
6/22	1	77	210	390	18	2.7	4.3
6/23	2	2,177	5,660	6,050	60	2.6	36.3
6/24	2	539	1,517	7,567	80	2.8	6.7
6/25	1	625	1,701	9,268	40	2.7	15.6
6/26	4	2,542	6,804	16,072	138	2.7	18.4
6/27	4	1,913	5,480	21,552	156	2.9	12.3
6/28 ^a	2	730	2,059	23,611	80	2.8	9.1
Totals	17	8,672	23,611	23,611	622	2.7	13.9

Note: Information based on fish ticket data.

^a The CDQ fishery closed by regulation on 6/28, and the last delivery was made 6/28.

Table 8.—A historical comparison of the percentage of recruit, postrecruit, and oldshell red king crab sampled from the summer commercial harvest, Norton Sound Section, Eastern Bering Sea, 1977–2007.

Year	Percent Recruits^a	Percent Postrecruits^b	Percent Old Shell^c	Average Weight (lbs)	Legal mean Length (mm)
1977	53	47	^d	3	113.4
1978	29	71	^d	3	118.9
1979	33	67	^d	3	119.8
1980	15	85	^d	4	125.8
1981	10	90	^d	4	128.5
1982	27	73	^d	4	125.4
1983	55	45	^d	3	115.2
1984	59	41	^d	3	112.5
1985	45	55	^d	3	115.8
1986	48	52	^d	3	115.9
1987	22	78	13	3	121.7
1988	25	75	26	3	119.0
1989	23	77	29	3	119.8
1990	21	79	17	3	121.1
1991 ^e					
1992	28	72	29	3	119.7
1993	31	69	10	3	119.1
1994	14	86	71	3	118.8
1995	36	64	21	3	118.2
1996	30	70	36	3	117.1
1997	49	51	14	3	115.7
1998	32	68	39	3	116.9
1999	42	58	12	3	118.1
2000	41	60	16	3	116.0
2001	33	67	11	3	119.1
2002	33	67	12	3	119.5
2003	48	52	14	3	116.8
2004	49	51	8	3	116.5
2005	36	64	9	3	118.2
2006	25	75	27	3	119.4
2007	45	55	12	3	117.0

^a Recruit crab are legal male crab with a carapace length < 116 mm.

^b Postrecruit crab are legal male crab with a carapace length ≥ 116 mm.

^c Oldshell crab are classified by a carapace age ≥ 13 months.

^d No information available for years 1977–1986.

^e Fishery closed in 1991.

Table 9.—Winter commercial and subsistence red king crab harvests, Norton Sound, Eastern Bering Sea, 1978–2007.

Year ^a	Commercial Fishery		Subsistence Fishery						
	No. Fishers	No. Crabs Harvested	Winter ^a	Permits		No. Fished	Total Crabs		
				No. Issued	No. Returned		Total Catch ^b	Total Harvest ^c	Average Harvest
1978	37	9,625	1977-78	290	206	149	^d	12,506	84
1979	^e	^e	1978-79	48	43	38	^d	224	6
1980	^e	^e	1979-80	22	14	9	^d	213	24
1981	0	0	1980-81	51	39	23	^d	360	16
1982	^e	^e	1981-82	101	76	54	^d	1,288	24
1983	5	549	1982-83	172	106	85	^d	10,432	123
1984	8	856	1983-84	222	183	143	15,923	11,220	78
1985	9	1,168	1984-85	203	166	132	10,757	8,377	63
1985-86	5	2,168	1985-86	136	133	107	10,751	7,052	66
1986-87	7	1,040	1986-87	138	134	98	7,406	5,772	59
1987-88	10	425	1987-88	71	58	40	3,573	2,724	68
1988-89	5	403	1988-89	139	115	94	7,945	6,126	65
1989-90	13	3,626	1989-90	136	118	107	16,635	12,152	114
1990-91	11	3,800	1990-91	119	104	79	9,295	7,366	93
1991-92	13	7,478	1991-92	158	105	105	15,051	11,736	112
1992-93	8	1,788	1992-93	88	79	37	1,193	1,097	30
1993-94	25	5,753	1993-94	118	95	71	4,894	4,113	58
1994-95	42	7,538	1994-95	166	131	97	7,777	5,426	56
1995-96	9	1,778	1995-96	84	44	35	2,936	1,679	48
1996-97	^e	^e	1996-97	38	22	13	1,617	745	57
1997-98	5	984	1997-98	94	73	64	20,327	8,622	135
1998-99	5	2,714	1998-99	95	80	71	10,651	7,533	106
1999-00	10	3,045	1999-00	98	64	52	9,816	5,723	107
2000-01	3	1,098	2000-01	50	27	12	366	256	21
2001-02	11	2,591	2001-02	114	61	45	5,119	2,177	48
2002-03	13	6,853	2002-03	107	70	61	9,052	4,140	68
2003-04 ^f	2	522	2003-04	96	77	41	1,775	1,181	29
2004-05	4	2,091	2004-05 ^g	170	102	60	6,496	3,973	66
2005-06	^e	^e	2005-06	98	97	67	2,083	1,239	18
2006-07	8	3,313	2006-07	129	127	116	21,444	10,690	92
Average 1978-2006	9	2,357	Average 1983-2006	119	95	72	8,049	5,301	68

^a Prior to 1985 the winter commercial fishery occurred from January 1–April 30. As of March 1985, fishing may occur from November 15–May 15. The winter subsistence fishery occurs during months of 2 calendar years (as early as December, through May).

^b The number of crab actually caught; some may have been released.

^c The number of crab harvested is the number of crab caught and kept.

^d Information not available for years 1978–1983.

^e Confidential under AS 16.05.815.

^f Confidentiality was waived by the fishers.

^g During the 2004–2005 season, permits were given out in Elim, Golovin, Shaktoolik, and White Mountain. In other years, permits were only given out of the Nome ADF&G office.

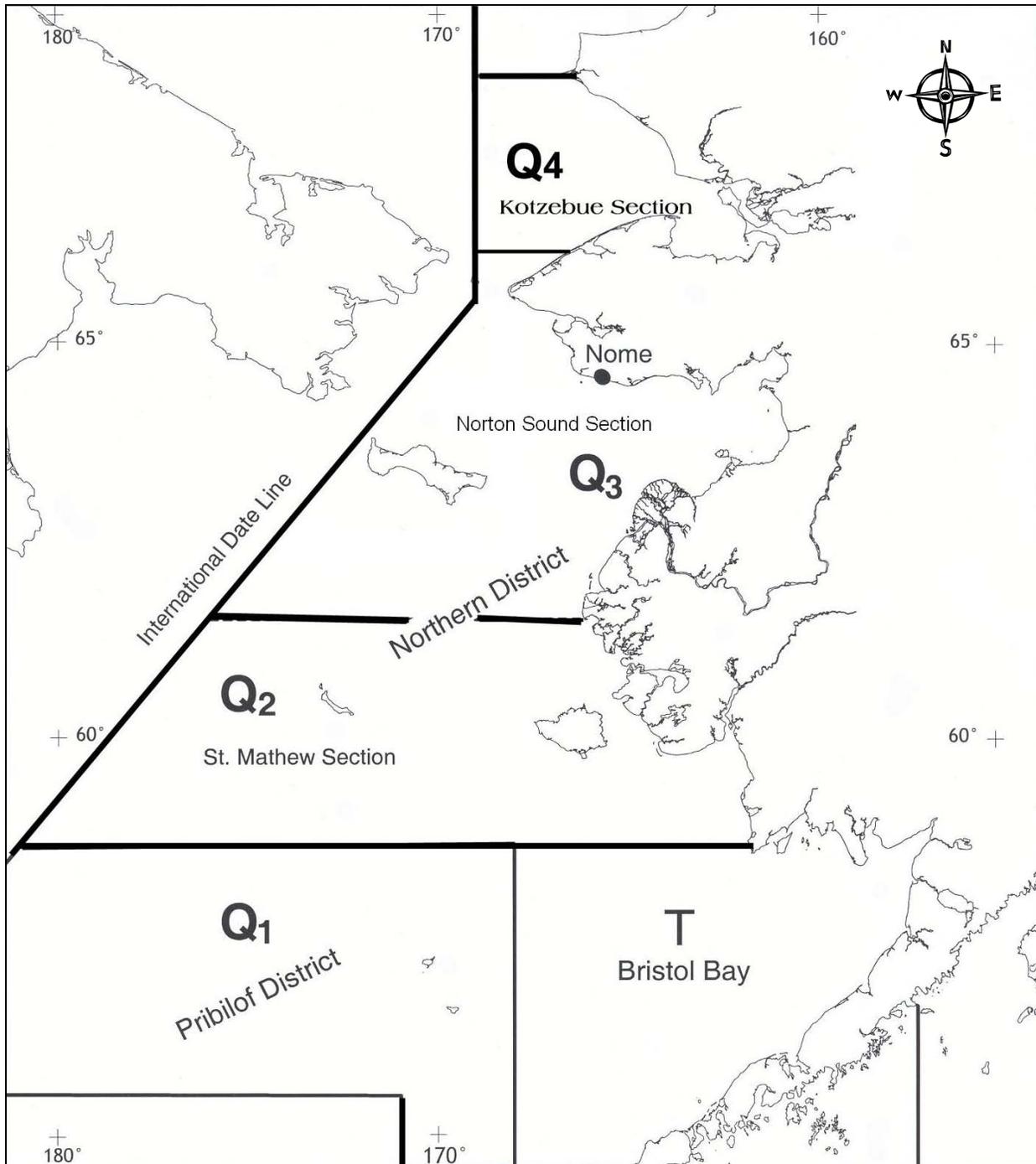


Figure 1.—King crab fishing districts and sections of Area Q.

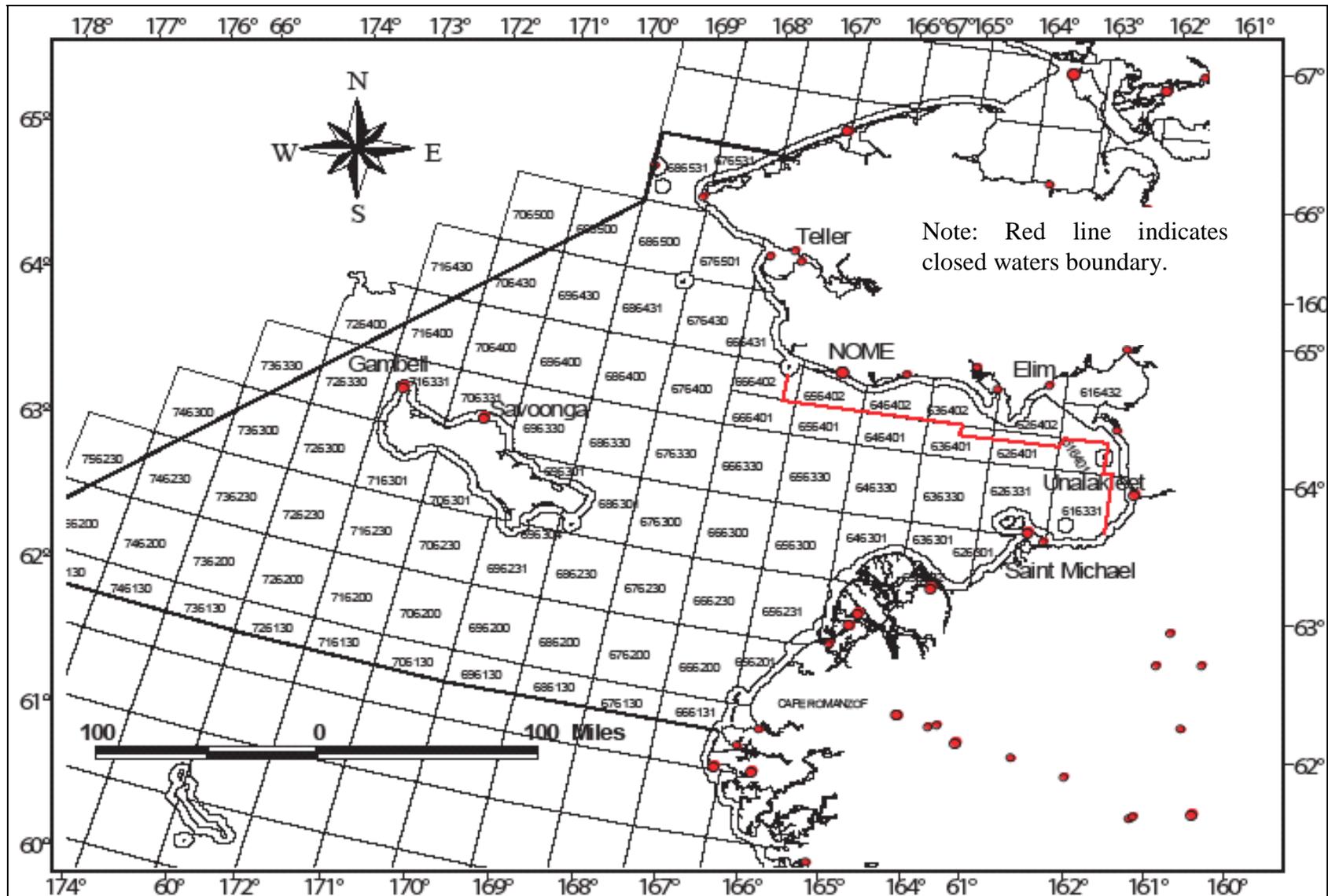


Figure 2.—Norton Sound section of Area Q and associated statistical areas.

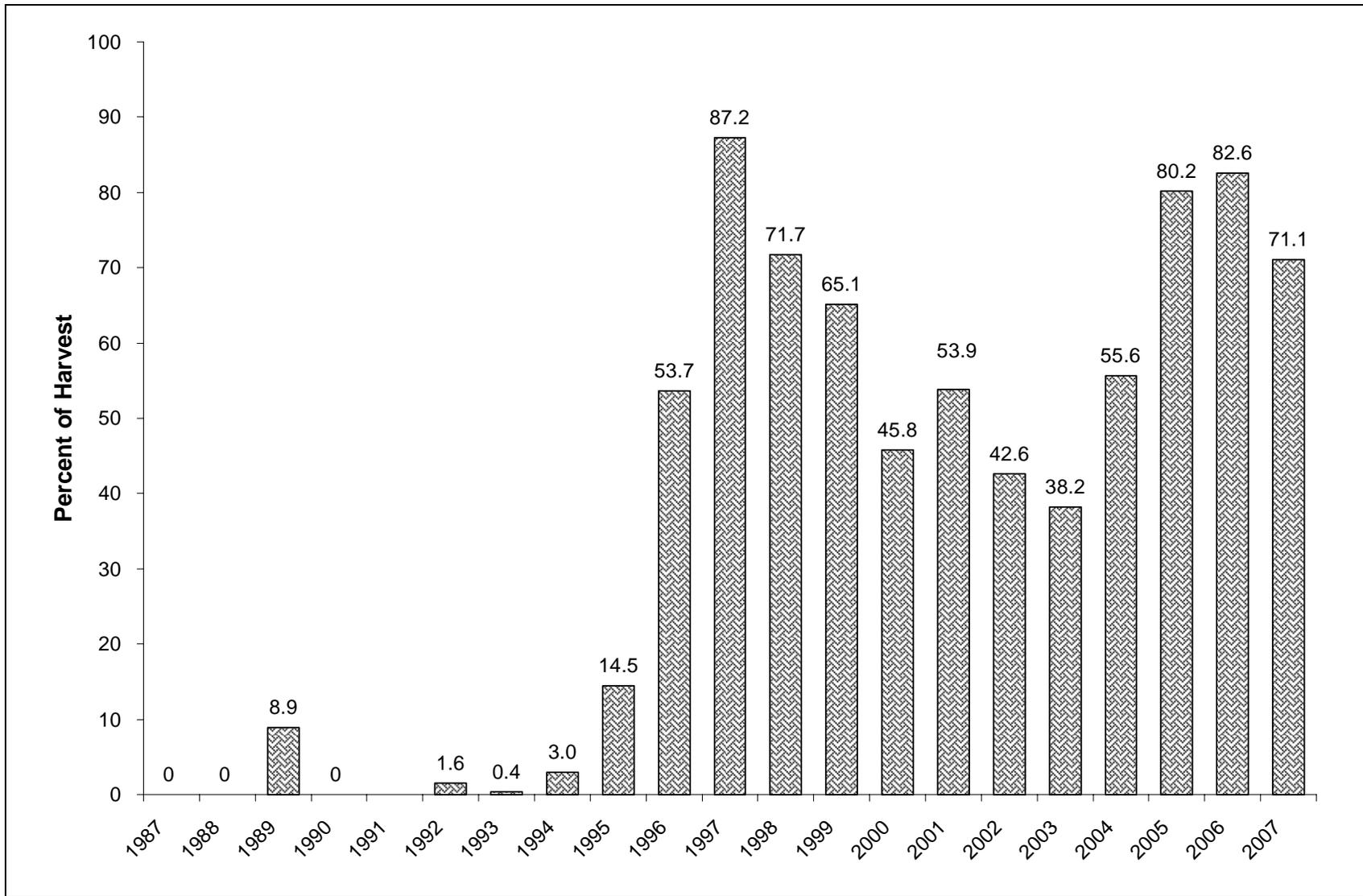


Figure 3.—Percent of red king crab harvested during the Norton Sound summer commercial fishery east of 164° W longitude, 1987–2007.

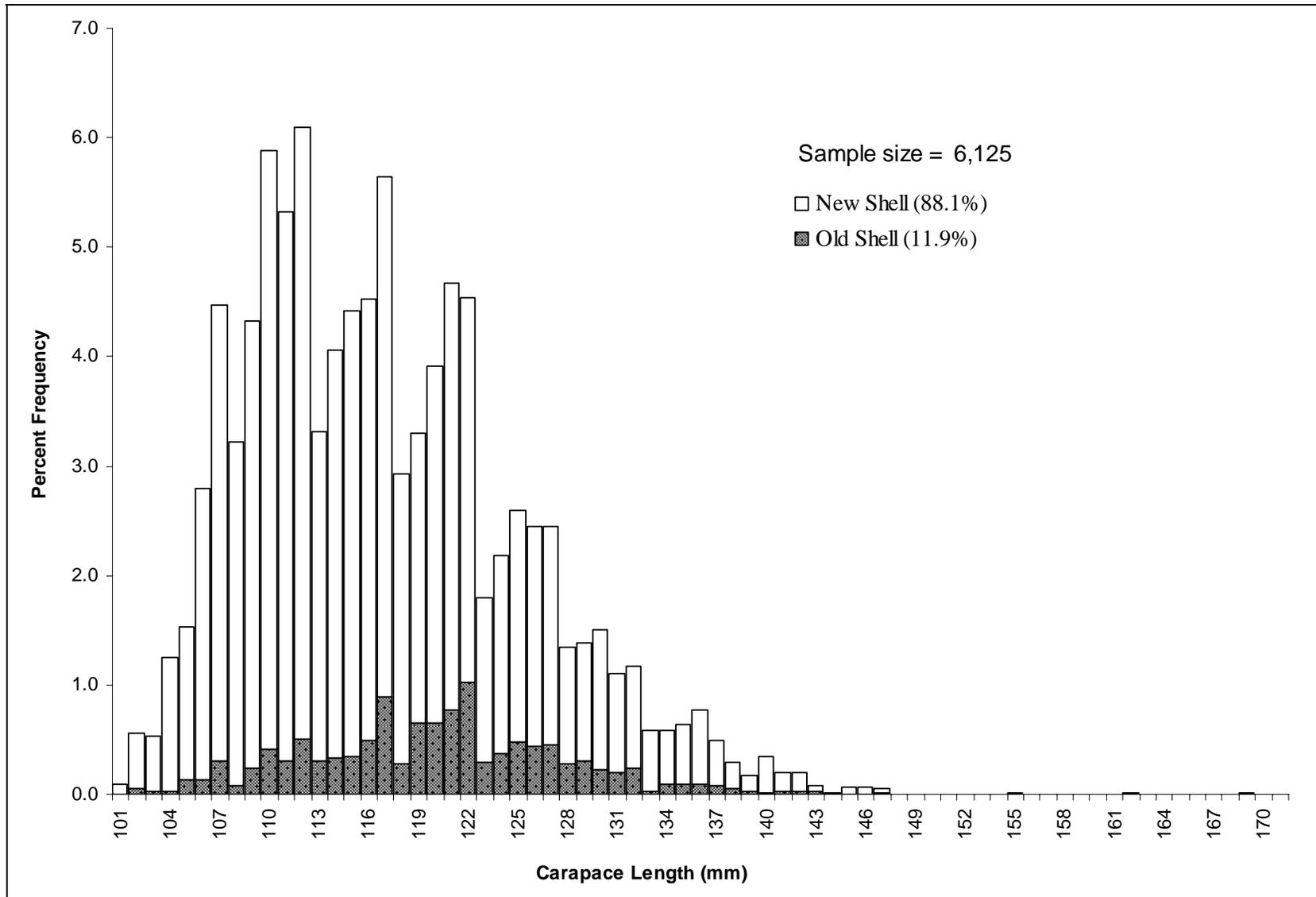


Figure 4.—Length frequency distribution for new and old shell legal male red king crab, sampled from the Norton Sound summer commercial fishery, 6/15–8/07, 2007.

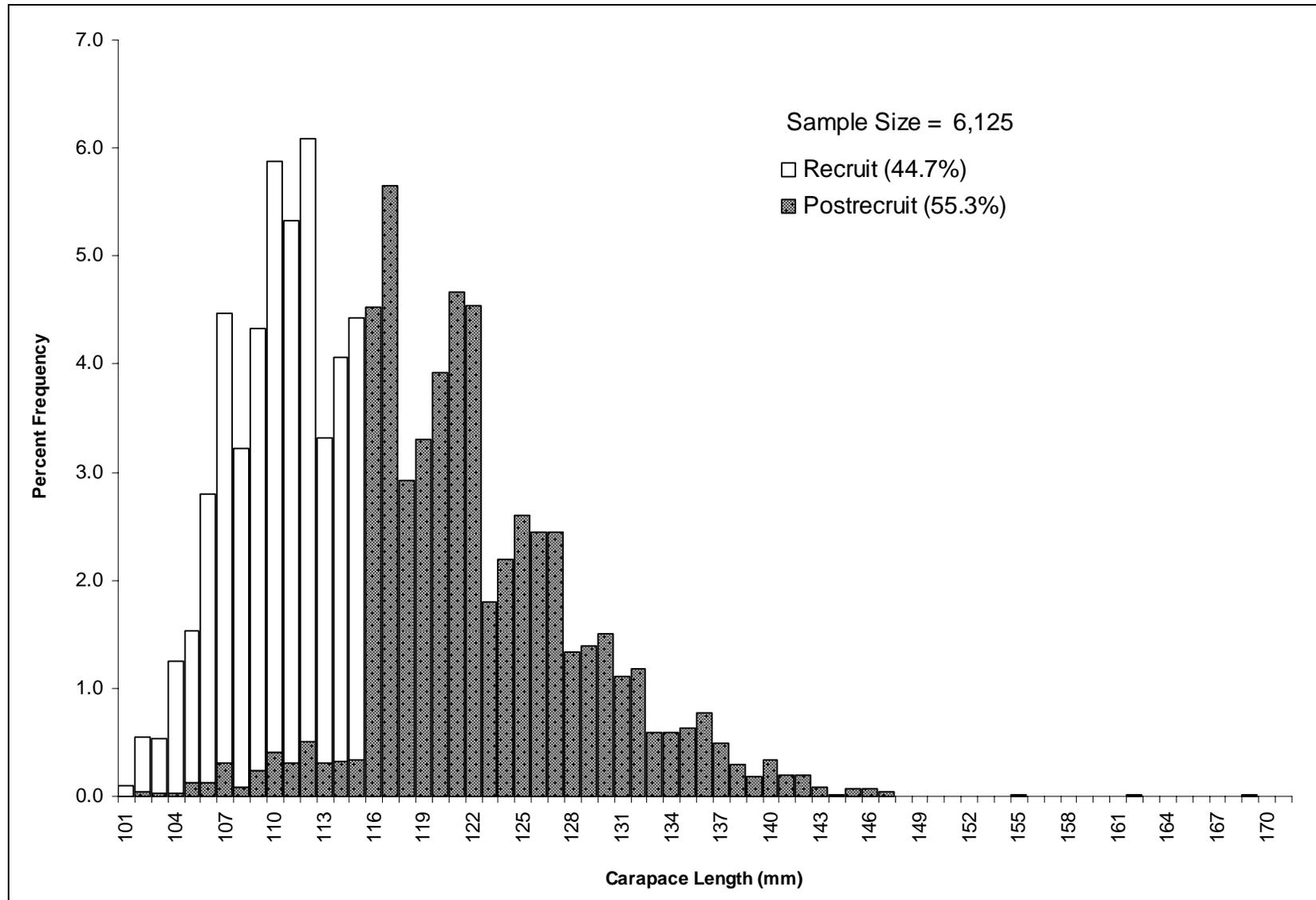


Figure 5.—Carapace length measurement summary of legal male red king crab captured and sampled during the summer commercial harvest, 6/15–8/07, 2007.

APPENDIX A

Appendix A1.—Historical summer commercial red king crab annual harvest, Norton Sound Section, Eastern Bering Sea, 1977–2007.

Year	Number of	Number of	Number of	Number of		Number of	CPUE	Percent	Average	Avg. Legal Mean	
	Vessels	Permits	Landings	Crabs	Harvest (lbs) ^a						Crabs
	(open access only)			Open Access	CDQ ^b	Pot Lifts		Old Shell	Weight (lbs)	Length (mm)	
1977	7	7	13	195,877	517,787	5,457	36	c	2.7	113.4	
1978	8	8	54	660,829	2,091,961	10,817	64	c	3.0	118.9	
1979	34	34	76	970,962	2,931,672	34,773	28	c	3.0	119.8	
1980	9	9	50	329,778	1,186,596	11,199	29	c	3.6	125.8	
1981	36	36	108	376,313	1,379,014	33,745	11	c	3.7	128.5	
1982	11	11	33	63,949	228,921	11,230	6	c	3.6	125.4	
1983	23	23	26	132,205	368,032	11,195	12	c	2.8	115.2	
1984	8	8	21	139,759	387,427	9,706	14	c	2.8	112.5	
1985	6	6	72	146,669	427,011	13,209	11	c	2.9	115.8	
1986	3	3	c	162,438	479,463	4,284	38	c	2.9	115.9	
1987	9	9	c	103,338	327,121	10,258	10	13	3.2	121.7	
1988	2	2	c	76,148	236,688	2,350	32	26	3.1	119.0	
1989	10	10	c	79,116	246,487	5,149	15	29	3.1	119.8	
1990	4	4	c	59,132	192,831	3,172	19	17	3.1	121.1	
1991	d										
1992	27	27	c	24,902	74,029	5,746	4	29	3.0	119.7	
1993	14	20	208	115,913	335,790	7,063	16	10	2.9	119.1	
1994	34	52	407	108,824	327,858	11,729	9	71	3.0	118.8	
1995	48	81	665	105,967	322,676	18,782	5.6	21	3.0	118.2	
1996	41	50	264	74,752	224,231	10,453	7.1	36	3.0	117.1	
1997	13	15	100	32,606	92,988	2,982	10.9	14	2.8	115.7	
1998	8	11	50	10,661	29,684	1,639	6.5	39	2.8	116.9	
1999	10	9	53	8,734	23,553	1,630	5.4	12	2.7	118.1	
2000	14	17	202	108,249	297,654	14,870	6,345	17.7	16	2.7	116.0
2001	30	37	320	98,321	288,199	0	11,928	7.6	11	2.9	119.1
2002	28	32	164	86,666	244,376	15,225	6,491	13.7	11	3.0	119.5
2003	24	30	219	88,518	253,284	13,923	8,494	11.0	14	2.8	116.8
2004	26	29	208	120,289	314,472	26,274	8,066	14.9	8	2.8	116.5
2005	30	32	227	128,405	370,744	30,060	8,867	15.9	9	2.9	118.2
2006	28	29	224	139,131	419,191	32,557	8,695	17.3	27	3.0	119.4
2007	30	30	234	101,672	289,264	23,611	9,118	12.0	12	2.8	117.0

^a Deadloss included in total.

^b No CDQ fishery harvest prior to the 2000 season.

^c Data not available.

^d No summer commercial fishery.