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**Prince William Sound Area King and Tanner Crab
Review, 2007; a Report to the Alaska Board of
Fisheries**

by

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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		degree (angular)	°
		(for example)	e.g.	degrees of freedom	df
		Federal Information		expected value	<i>E</i>
		Code	FIC	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
		U.S. state	use two-letter	probability of a type II error	
			abbreviations	(acceptance of the null	
			(e.g., AK, WA)	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

SPECIAL PUBLICATION NO. 08-02

**PRINCE WILLIAM SOUND AREA KING AND TANNER CRAB REVIEW,
2007; A REPORT TO THE ALASKA BOARD OF FISHERIES**

by

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ABSTRACT

The Prince William Sound (PWS) Registration Area E includes the territorial waters of Alaska from 144°00' W. longitude to the longitude of Cape Fairfield and extending 3 nautical miles offshore. The Alaska Department of Fish and Game (ADF&G) is responsible for the management of commercial, personal use, and subsistence shellfish fisheries within the registration area. In addition, ADF&G assumes management authority of king crab (red *Paralithodes camtschaticus*, blue *Paralithodes platypus* and golden *Lithodes aequispina*) and Tanner *Chionoectes bairdi* crab fisheries within federal waters of the exclusive economic zone (EEZ), extending from 3-200 nautical miles offshore.

Waters of the PWS Management Area once supported commercial and non-commercial Tanner crab fisheries. The commercial Tanner crab fishery began in the late 1960's, peaked at nearly 14 million pounds during the 1972–1973 season and then decreased until 1988. Due to low abundance, ADF&G closed the commercial Tanner crab fishery by emergency order authority from 1989 until 1999. ADF&G also issued emergency orders for partial area closures of the non-commercial Tanner crab fisheries beginning in 1982. In 1999, the Alaska Board of Fisheries (BOF) adopted a regulatory closure of all Tanner crab fisheries to facilitate rebuilding. The collapse of the PWS Tanner crab may be attributed to factors of fishing mortality and environmental conditions. ADF&G assessment surveys using pot gear from 1977–1991 and trawl gear since 1991, documented the decline of Tanner crab within PWS. The abundance estimate of legal male Tanner crab (crab with a carapace width ≥ 5.3 inches (135 mm)) from the 2007 survey was 33,518.

Red, blue, and golden king crab species occur in PWS and commercial harvests date to 1957. Commercial harvests occurred in the early 1960's, peaked at 296,200 pounds in 1972 and decreased until 1988. Commercial fisheries for red and blue king crab were closed by emergency order from the 1984–1985 season to the present except for an “exploratory season” in 1991–1992. Similarly, golden king crab fisheries were closed by emergency order for the 1989–1990 season, from 1992–1994, and from 1995 to 1999. In 1999, the BOF adopted a regulatory closure of all king crab fisheries. ADF&G did not have the means to assess king crab. However, in March 2004 ADF&G attained funding and initiated a 3 year survey to index the relative abundance and monitor the status of golden king crab in Western PWS. Data obtained over the course of a 3 year survey indicates that golden king crab abundance in the Knight Island Passage area of western PWS may be steady, but is low. The combination of low (and many zero) catches to the north and south of the Passage, and that data only show relative growth in adult cohorts with extremely low numbers of small (young) crabs and very low recruitment, are of concern for the resource, area managers and potential resource users.

Key words: assessment, Alaska Board of Fisheries, Prince William Sound, Tanner crab, *Chionoectes bairdi*, king crab, *Paralithodes camtschaticus*, *Paralithodes platypus*, *Lithodes aequispina*, harvest, management.

INTRODUCTION

The Alaska Department of Fish and Game (ADF&G) Prince William Sound (PWS) Management Area (Area E) includes waters of PWS and the Gulf of Alaska bounded by 144°00'W. longitude near Cape Suckling on the east and Cape Fairfield (146°50'W) on the west (Figure 1). The Alaska Department of Fish and Game manages all commercial shellfish fisheries within the territorial waters of Prince William Sound or those waters from the shoreline to 3 nautical miles offshore. The department also manages all commercial shellfish fisheries in the adjacent waters of the federal exclusive economic zone (EEZ), those waters beyond 3 nautical miles offshore. Commercial shellfish harvests are monitored inseason through ADF&G fish tickets (regulation 5 AAC 39.130) with additional information derived, in some instances, from logbooks, onboard observers, catch samples and interviews with fishermen.

Statewide regulations establish a vessel registration requirement for each crab fishery and PWS is a superexclusive registration area for king and Tanner crab. This means that a vessel registered for a king or a Tanner crab fishery in PWS may not participate in any other king or Tanner crab fishery in Alaska during that year. Conversely, a vessel registered to fish in another registration area may not

fish in PWS during that registration year. Regulations define pot gear overall and tunnel size dimensions and require a biodegradable escape mechanism on each pot (5.AAC 39.145).

Commercial harvest data for PWS were compiled from historical annual management reports, previous reports to the Alaska Board of Fisheries (BOF), and data summaries from the ADF&G fish ticket harvest database. Survey data were compiled from historical management and survey reports as well as recent ongoing research efforts.

Because of low abundance, the BOF adopted regulations in March of 1999 to close commercial, sport, personal use, and subsistence harvests of king and Tanner crabs in all waters of PWS and the adjacent Gulf of Alaska. This report summarizes past commercial fisheries for Tanner *Chionoectes bairdi*, red king *Paralithodes camtschaticus*, blue king *Paralithodes platypus*, and golden or brown king *Lithodes aequispina* crabs within Area E. This report also reviews non-commercial fisheries as well as current assessment information and past management actions taken to conserve these crab resources (Berceci et al. 2002).

TANNER CRAB

Proposal 362–365. Establish a personal use Tanner crab fishery.

HISTORICAL BACKGROUND

Commercial Fishery

The PWS commercial Tanner crab fishery began in 1968 when 1.2 million pounds were landed (Table 1). The harvest peaked in 1972–1973 at 13.9 million pounds, prior to the 1976 adoption of a minimum legal carapace width. Harvests decreased during the late 1970s and early 1980s, followed by district closures during 1984 and 1985. Small postrecruit fisheries during 1986 to 1988 yielded relatively stable harvests of approximately 0.5 million pounds (Table 1; Figure 2). However, skip molting in the prerecruit-1 size class resulted in fewer legal males and no harvest in the Eastern District.

Plausible explanations for the collapse of Tanner crab within PWS include factors related to fishing mortality and environmental conditions. Overharvesting may have occurred prior to the 1976 adoption of the male-only restriction and minimum carapace size limit of 5.3 inches. For example, the 3.8 million pound harvest in 1974–1975 included 2.7 million pounds of crab smaller than the current minimum size limit (Donaldson 1991). The legal male portion of PWS Tanner crab may have been overharvested because early fisheries were limited by regulatory season length rather than an abundance based guideline harvest level. Handling mortality of undersized and female crab may have contributed to the decline, particularly during fishing seasons of 7 months duration. Finally, and perhaps more importantly, changes in environmental conditions, documented on a Gulf of Alaska-wide basis, may have caused greater mortality of Tanner crab larvae, impaired growth and reproduction, and coincided with increased production of crab predators such as gadoid fishes.

PWS is divided into 4 Tanner crab management districts (Figure 3). The Northern and Hinchinbrook Districts include most of the waters inside PWS proper, while the Eastern and Western Districts encompass waters of the Gulf of Alaska and southwestern PWS. Historically, the commercial Tanner crab harvest was equally divided between the Gulf of Alaska and PWS portions of the management area.

Other regulations distinctive to the PWS commercial Tanner crab fishery include: a gear limit not to exceed 75 king and Tanner pots per vessel; a buoy tag requirement and a minimum legal carapace width of 5.3 inches (135 mm) for all retained crab. Past regulatory fishing seasons opened January 15 and closed March 31.

Non-commercial Fisheries

Historically, sport, personal use, and subsistence Tanner crab fisheries remained open on a year around basis throughout most of PWS. Despite low and declining abundance estimates, daily bag and possession limits remained at 20 male crabs. Minimum legal size differed by fishery; 5.3 inches (135 mm) for personal use and subsistence fisheries and 5.5 inches (140 mm) for sport fisheries. Legal gear types for sport and personal use fishing included pots, ring nets, dive gear, dip nets, and hooked or hookless hand lines. Pot gear was limited to 5 pots per person and 10 pots per vessel for all non-commercial crab fisheries and all pots were required to have a biodegradable escape mechanism. However, legal gear for the subsistence harvest of Tanner crab was broadly defined and included any gear type defined in regulation 5 AAC 39.105.

There was no mechanism to directly monitor effort or harvest of Tanner crab in historical non-commercial fisheries. Data from the Division of Sport Fish Statewide Harvest Survey (SWHS; Howe et al. 2001) indicated a harvest range of 137 to 537 crabs, with an average annual harvest of 300 Tanner crabs during the years 1994 to 1998 (ADF&G *Unpublished*). Limited data developed through household interviews by ADF&G Subsistence Division staff suggested that subsistence harvests totaled less than 4,900 Tanner crab among all PWS communities in 1997 (ADF&G 1999).

STOCK STATUS AND MANAGEMENT MEASURES

ADF&G has conducted assessment programs for Tanner crab within the PWS Management Area since 1977 (Berceli et al. 2002). Surveys were conducted with pot gear through 1991 (Donaldson 1991). Pot survey objectives were to provide indices of legal and sublegal male Tanner crab and to monitor reproductive success of female Tanner crab. This information was used to determine relative stock condition, as well as to set preseason harvest guidelines for the commercial fishery. Pot survey data indicated steady declines in the numbers of male and female Tanner crab (Table 2). During the pot survey time series, the mean catch rate of Tanner crab decreased 86%.

Recognizing the inherent weaknesses of pot surveys, such as the inability to expand catches to estimate population abundance, ADF&G implemented trawl surveys in 1991 (Bechtol 1999; Kimker and Trowbridge 1992). An advantage of trawl surveys is that population abundance estimates can be generated by using an area swept method. Trawl surveys to assess crab stocks are also used by ADF&G in other management areas and by the National Marine Fisheries Service for the Bering Sea.

Population estimates generated from ADF&G trawl surveys demonstrate that PWS Tanner crab remain at low levels (Table 3; Figure 4). Estimated abundance of legal male crab in the Northern and Hinchinbrook Districts decreased 97% from 108,689 in 1993 to 3,697 in 1999 (Table 3). The collapse of Tanner crab within PWS may be due to factors related to fishing mortality and, more recently, environmental conditions. Poor recruitment to the legal portion of PWS Tanner crab, due to successive weak pre-recruit classes and skip molting, may have been the result of such factors. Abundance estimates generated since 2001 show numbers are slowly increasing

from the low observed in 1999 (Table 3; Figure 4). The estimate of legal males from the 2007 survey indicated another modest increase from the 2005 survey, but Tanner crab abundance remains low overall and far below historical levels (Figure 4). In addition to the traditional ‘core’ trawl survey stations north of Montague Island and within Orca Bay and adjacent waters, ancillary tows are conducted in other areas of PWS (Figure 5) that suggest the male (and legal male) Tanner crab numbers remain low throughout PWS. Similarly, female Tanner crab numbers also hit their lowest abundance level in 1999 and appear to be slowly increasing over the past 8 years (Table 4; Figure 4), however, the numbers indicate that there is a reasonable reproductive group of females present in PWS.

Separate population estimates have also been generated from trawl survey data for the Valdez Arm biennially since 1999. Estimated abundance of legal male Tanner crab in this area increased between 1999 and 2005 from 22,083 to 44,250, however, numbers decreased to 30,670 in 2007 (Table 5). The total abundance of female Tanner crab in Valdez Arm was highest in 2001 with 121,776 and has since decreased to 42,170 in 2007 (Table 6). Juvenile female Tanner crab showed a large decrease between 2001 and 2005, but increased slightly in 2007, while mature females show little change between the 2005 and 2007 surveys (Table 6).

Waters of Orca Bay and adjacent fjords were identified as key production areas that historically provided newly mature male and female Tanner crabs. In order to protect crab in these areas, ADF&G annually issued emergency orders closing commercial and subsistence Tanner crab fisheries within the Hinchinbrook Entrance and Orca Bay portions of PWS beginning in 1982 and the personal use fishery in these areas beginning in 1987. Waters off of the northwest end of Montague Island were similarly recognized as an important production area and were first closed to subsistence and personal use fishing in 1988 and again from 1994–1998. In March of 1999, the BOF adopted regulations to close commercial, sport, personal use, and subsistence fisheries for Tanner crab in all waters of the PWS area. Currently, ADF&G trawl surveys indicate that the majority of the Port Valdez area and all of Port Fidalgo and Port Gravina fjords remain as key areas for the potential recovery of PWS Tanner crab to commercial fishing levels. Despite continued closures of Orca Bay and adjacent waters since 1982, Tanner crab in PWS continued to decline leaving the adjacent fjords as the only locations with any reasonable numbers. Tanner crab abundance appears to be slowly increasing in the Orca Bay and North Montague areas in recent years.

The legal male portion of the Tanner crab stock remains depressed far below historical levels from the early 1990’s. Studies have indicated the importance of large male crab to mating large females, the most fecund component of the population (Paul and Paul 1996). Because of the lack of understanding of larval sources and the role that local aggregations play in rebuilding the crab population, it is critical to protect key production areas in PWS in order to maximize Tanner crab reproductive potential.

KING CRAB

Proposal 361, 364, 365. Establish a personal use king crab fishery.

HISTORICAL BACKGROUND

Red, blue and golden king crabs are found in PWS. Red king crab are sparsely distributed throughout PWS, with historic concentrations occurring in waters east of Valdez Arm and Hinchinbrook Entrance (Figure 1). Blue king crab are found in the Port Wells and Harriman

Fjord areas; small aggregations may also occur in other glacial fjords of western PWS. Golden king crab were fished in central and western PWS typically at depths of 150–400 fathoms (274-732 m). Waters in the Gulf of Alaska portion of the management area have no documented concentrations of king crab except for a sparse distribution of golden king crab.

Commercial Fishery

Commercial harvests of king crab from PWS date to 1957 when 300 lb were landed (Kaydas and Kopppen 1957). However, the fishery rapidly developed and the area's second highest harvest of 246,965 pounds was landed 1960 (Table 7). Catch reporting by king crab species did not begin until the 1979–1980 season. The 1972 harvest of 296,200 pounds is believed to have been primarily blue king crab. During 1979 to 1984, both blue and red king crab numbers declined and commercial fisheries for both species were closed by emergency order from the 1984–1985 season through the 1990–1991 season and from 1991 through 1998. The closures coincided with development of the golden king crab fishery from 1982–1989 (Figure 6).

The golden king crab numbers proved to be relatively small, as indicated by fishery catch per unit of effort data coupled with rapid declines in average weight, size, and geographic distribution. In 1988, the BOF adopted a guideline harvest range (GHR) of 40,000 to 60,000 pounds for golden king crab in an attempt to help stabilize these declines. The GHR was apparently established too late because the 1990–1991 and 1991–1992 fisheries failed to attain the low end of the range. The commercial golden king crab fishery was closed in 1992, but reopened for a month during the 1994–1995 season. Harvests during this opening, although confidential due to the small number of participants, were low.

Harvest is restricted to males only with minimum legal carapace widths of 7.0 inches (178 mm) for red and golden king crabs, and 5.9 inches (150 mm) for blue king crab. Past regulatory seasons provided two open periods: October 1 to December 20 and January 15 to March 15.

Noncommercial Fisheries

The historical non-commercial king and Tanner crab fisheries shared many similarities. The fisheries remained open year around despite declines in abundance, legal gear, and gear limits were identical with legal subsistence gear types more liberal than for other non-commercial fisheries. The daily bag and possession limit for all non-commercial fisheries was 6 king crab and minimum legal sizes were identical to those set for commercial fisheries.

There was no mechanism in place to directly monitor the effort or harvest in the non-commercial king crab fisheries of PWS. Prior to the fishery closure in 1999, data from the Division of Sport Fish SWHS indicated a harvest of 40 king crabs in 1997 and 72 king crabs in 1998 (ADF&G *Unpublished*). Limited data developed through household interviews by ADF&G Subsistence Division staff suggested that subsistence harvests totaled less than 150 king crabs among all PWS communities in 1997 (ADF&G 1999).

STOCK STATUS AND MANAGEMENT MEASURES

ADF&G does not assess blue king crab in PWS. Permit holders targeting blue king crab during the 1991–1992 season reported few sublegal (crab with a carapace width < 5.9 inches (150 mm)) male and female crabs. Increased recruitment from immigration is unlikely because even historic aggregations were small and widely dispersed.

The ADF&G has assessed the relative abundance of red king crab within the eastern portion of PWS in conjunction with Tanner crab surveys since 1977. The frequency captures in the historical pot and more recent trawl surveys is believed to be an index of red king crab abundance. During the pot survey time series, 1977–1991, red king crab catches ranged from a high of 193 crabs in 1978 to 1 crab in 1987 (Table 2). Trawl surveys in traditional index stations since 1991 have likewise demonstrated that red king crab in PWS remain depressed and are unlikely to recover in the near future.

In 2004, ADF&G initiated a 3 year study to establish baseline data on golden king crab relative abundance and distribution in the Knight Island Passage area of PWS where the fishery used to occur (Figure 7). Over the course of the study period, a total of 436 pots were set at depths ranging from 27–437 fathoms (50–800 m) yielding 580 golden king crabs; 158 pots in 2004 yielded 297 golden king crabs (127 males and 170 females), 178 pots in 2005 yielded 132 golden king crabs (90 males and 42 females), and 80 pots in 2006 yielded 126 golden king crabs (68 males and 58 females). Pot soak times averaged 22.0 hrs in 2004 (range of 15–28 hrs), 22.8 hrs in 2005 (range of 19–29 hrs) and 22.8 hrs in 2006 (range of 21.8–23.9 hrs). The CPUE for legal males in this study was: 0.7 in 2004, 0.5 in 2005 and 0.8 in 2006. The vast majority of golden king crab caught during the survey were large. Legal males (≥ 7 " or 177.8 mm spine-to-spine carapace width) composed 93%, 98% and 96% of the total male catch in 2004, 2005 and 2006, respectively. ADF&G data provide an indication that the golden king crab numbers in Knight Island Passage may be stable at this time, but are at low levels. Additional concerns are that the lower (and many zero) catches to the north and south of the Passage indicate that relative abundance may be even lower in other areas that were part of the historical fishing grounds in PWS. Legal male CPUE values from the 3 year study are similar to those immediately following the oil spill in 1989. Additionally, there are indications that recruitment to this area is poor. Out of the 580 golden king crabs caught over the 3 year period, only 4 individuals were smaller than 125 mm carapace length, and the data indicate that our study was witness to the growth of a group of adult cohorts of mainly adult crab growing over a 3 year period with virtually no recruitment to the area. The lack of small golden king in our survey data may be due to the fact that those age-classes are not present or that they occur in another area of PWS. However, there appears to be a reasonable proportion of egg-bearing females within the Knight Island Passage area of PWS. In our survey 42% of mature females were egg-bearing in 2004, 60% were egg-bearing during the 2005 survey and 69% were egg-bearing during our 2006 survey.

The blue and red king crab fisheries remained closed by emergency order following the 1991-1992 season which provided no indication of recovery. Trawl survey data suggest continued low numbers for red king crab. Fishery performance data from the 1994–1995 golden king crab season demonstrated a continued low level of abundance, provided no indication of impending recruitment to the legal segment, and reported low harvests of sublegal (crab with a carapace width < 7.0 inches (178 mm)) male and female crab. The commercial fishery for golden king crab has remained closed since the 1994–1995 season.

In March 1999, the BOF adopted a regulation to close all commercial and non-commercial fisheries for king crab in PWS due to demonstrated low abundance levels and lack of non-commercial fishery harvest information.

CONCLUSIONS

Waters of the PWS Management Area once supported commercial and noncommercial Tanner and king crab fisheries. Commercial fisheries for both Tanner and king crab species demonstrated strong harvests during the early years of fisheries development followed by precipitous harvest declines. Past regulatory measures were inadequate, or were enacted too late to curb the decline of PWS crab as evidenced by fishery performance. Explanations for the collapse of PWS crab include factors related to fishing mortality and unfavorable environmental conditions.

ADF&G closed the commercial Tanner crab fisheries by emergency order authority for more than 10 years prior to the BOF regulatory closures adopted in 1999. Similarly, with the exception of a few limited area openings, ADF&G acted to protect juvenile and newly matured crab by closing non-commercial fisheries in key Tanner crab production areas of Orca Bay since 1982 and waters north of Montague Island since 1991.

Tanner crab numbers in PWS remain far below historical levels. ADF&G assessment surveys conducted with pot gear from 1977 to 1991 and trawl gear from 1991 to present, document the decline of Tanner crab. Abundance estimates of legal male Tanner crab in the Northern and Hinchinbrook Districts decreased 97% from 1993 to 1999, but recent data indicate that abundance is slowly increasing. It is critical to protect key production areas in PWS in order to maximize Tanner crab reproductive potential.

Despite partial and full area fishery closures, persistent low numbers of red and blue king crabs suggests a continuing need to protect them in PWS to allow recovery and capitalize on the available reproductive potential.

Survey data suggest that golden king crab are at low, but steady levels. Using historical data from the PWS golden king crab fishery and a 1989 oil spill damage assessment study (O'Clair et al. 1990) enabled ADF&G to place study results in relative perspective to catches during the fishery and near its close. The results suggest that there is no surplus production to be commercially harvested at this point in time.

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TABLES AND FIGURES

Table 2.—Tanner and king crab catch by pot (1977–1991) and in trawl surveys of core stations (1991-2007) in the Northern and Hinchinbrook Districts (except Valdez Arm), Prince William Sound.

Pot Survey Catch Abundance						
Year	Number of Pots	Female Tanner Crab	Male Tanner Crab	Total Tanner Crab (both sexes)	Mean Tanner Crab Per Pot	King Crab (both sexes)
1977	51	1,972	2,773	4,745	93.0	30
1978	146	1,099	6,376	7,475	51.2	193
1979	237	3,210	16,831	20,041	84.6	161
1980	240	2,092	11,012	13,104	54.6	103
1981	216	1,064	8,114	9,178	42.5	36
1982	224	849	4,734	5,583	24.9	30
1983	180	573	3,225	3,798	21.1	3
1984	178	610	3,440	4,050	22.8	18
1985	163	212	2,191	2,403	14.7	15
1986	168	570	2,473	3,043	18.1	18
1987	138	1,010	2,336	3,346	24.2	1
1988	119	750	1,195	1,945	16.3	2
1989	114	459	1,640	2,099	18.4	5
1990	109	255	1,336	1,591	14.6	5
1991	81	331	724	1,055	13.0	23

Trawl Survey Catch Abundance						
Year	Number of Tows	Female Tanner Crab	Male Tanner Crab	Mean Legal Male Tanner Crab Per Tow	Red King Crab	Golden King Crab
1991	29	1,632	1,722	3.6	0	0
1992	37	1,512	1,776	1.9	2	0
1993	38	790	1,245	3.3	2	0
1994	38	904	1,088	1.4	2	0
1995	32	276	417	0.6	0	1
1996	Biennial survey schedule initiated, no survey					
1997	39	341	380	0.3	0	1
1998	No Survey					
1999	40	135	181	0.1	0	0
2000	No Survey					
2001	40	2,397	2,177	0.2	0	0
2002	No Survey					
2003	40	993	955	0.4	0	0
2005	40	642	687	0.8	1	0
2007	35	1,395	1,367	0.9	0	0

Table 3.—Male Tanner crab abundance estimates from trawl surveys of core stations in the Northern (except Valdez Arm) and Hinchinbrook Districts of Prince William Sound, 1991–2007.

Year	Shell Age	Pre-4		Pre-3		Pre-2		Pre-1		Recruit		Post-recruit	
		Size (mm)	< 73	73–92	93–112	113–134	135–157	> 157	Legal Males	Total Males			
1991	Abundance	819,732	597,697	237,445	39,924	83,001	154,327	24,632	90,238	1,167	3,502	119,539	1,963,879
	95% CI	499,942	556,415	229,947	21,591	90,923	90,380	30,003	84,593	2,391	5,269	94,869	1,283,310
1992	Abundance	601,197	280,805	347,506	84,635	136,697	146,578	8,875	49,042	915	1,738	60,571	1,593,606
	95% CI	180,032	236,540	214,806	38,809	57,025	60,848	6,872	32,335	1,793	2,379	34,186	522,912
1993	Abundance	470,835	106,194	105,838	96,573	108,154	129,447	57,284	48,821	-	2,584	108,689	1,075,308
	95% CI	243,483	77,781	54,226	38,869	53,846	43,466	26,762	20,830	-	3,707	34,360	374,233
1994	Abundance	669,186	79,919	34,622	88,999	21,152	161,834	4,989	49,388	-	998	55,375	1,111,087
	95% CI	420,605	48,840	23,013	33,035	12,633	59,551	6,962	22,580	-	1,956	22,686	467,940
1995	Abundance	251,182	38,033	17,061	51,421	6,753	90,757	-	22,275	-	-	22,275	477,482
	95% CI	142,439	24,749	16,285	21,616	5,882	44,583	-	14,959	-	-	14,959	176,965
1997	Abundance	209,014	55,608	34,123	16,235	10,208	22,651	1,750	8,944	-	-	10,694	358,533
	95% CI	116,889	33,038	15,339	9,338	6,309	17,720	2,393	7,733	-	-	9,929	151,268
1999	Abundance	17,294	7,678	2,938	24,549	948	15,924	-	2,749	-	948	3,697	173,027
	95% CI	51,522	6,174	3,242	11,828	1,858	10,769	-	3,034	-	1,858	3,484	6,231
2001	Abundance	1,362,743	405,778	180,832	42,360	30,237	28,815	3,791	2,844	-	-	6,635	2,057,399
	95% CI	459,552	232,409	144,850	23,247	23,272	16,469	5,830	3,134	-	-	6,456	758,905
2003	Abundance	495,318	113,584	99,695	96,492	38,388	56,682	5,592	10,332	-	-	15,924	883,591
	95% CI	269,14	58,999	58,805	55,808	28,451	56,317	6,108	16,642	-	-	17,404	324,777
2005	Abundance	279,90	80,568	82,179	60,473	50,142	67,298	17,914	10,142	948	-	29,004	649,566
	95% CI	170,91	55,821	63,290	48,666	37,377	49,250	15,478	13,039	1,858	-	24,999	282,982
2007	Abundance	779,049	192,538	120,234	104,031	109,677	92,933	9,749	23,769	-	-	33,518	1,431,980
	95% CI	301,229	66,449	59,018	35,311	60,192	50,630	8,817	26,858	-	-	28,958	379,932

Note: Biennial survey schedule adopted in 1995. No surveys conducted in 1996, 1998, 2000, 2002, 2004 and 2006.

Note: Confidence interval (CI) displayed as 95% is a plus or minus value to be added or subtracted from the estimate.

Table 4.—Female Tanner crab abundance estimates from trawl surveys of core stations in the Northern and Hinchinbrook Districts (except Valdez Arm) of Prince William Sound, 1991–2007.

Year	Females		Total
	Juvenile	Mature	Females
1991 Abundance	1,465,189	630,292	2,095,481
95% CI	1,075,250	258,088	1,210,931
1992 Abundance	591,438	765,282	1,356,720
95% CI	168,586	335,920	393,560
1993 Abundance	460,259	304,711	764,970
95% CI	216,090	125,971	248,302
1994 Abundance	700,715	223,794	924,509
95% CI	465,339	104,022	489,320
1995 Abundance	210,306	106,160	316,465
95% CI	118,462	46,514	132,183
1997 Abundance	223,208	99,258	322,465
95% CI	106,249	67,970	154,179
1999 Abundance	108,515	22,749	131,263
95% CI	45,881	13,127	48,815
2001 Abundance	1,629,594	631,235	2,260,830
95% CI	534,210	319,648	743,204
2003 Abundance	423,692	518,288	941,979
95% CI	216,079	324,044	380,492
2005 Abundance	349,664	258,670	608,334
95% CI	207,198	137,247	276,176
2007 Abundance	686,352	747,589	1,433,941
95% CI	233,423	343,740	458,723

Note: Biennial survey schedule adopted in 1995. No surveys conducted in 1996, 1998, 2000, 2002, and 2004.

Note: Confidence interval (CI) displayed as 95% is a plus or minus value to be added or subtracted from the estimate.

Table 5.—Male Tanner crab abundance estimates from trawl surveys of core stations in the Valdez Arm Prince William Sound, 1999–2007.

Year	Size (mm) Shell Age	Pre-4		Pre-3		Pre-2		Pre-1		Recruit		Post-recruit		Legal Males	Total Males
		< 73	73–92	93–112	113–134	135–157	> 157	All	All	New	Old	New	Old		
1999	Abundance	1,463	-	4,648	-	4,503	6,820	5,951	14,394	-	1,738	22,083	39,517		
(n=4)	95% CI	4,654	-	5,003	-	9,234	16,106	7,904	21,697	-	5,529	20,731	37,046		
2001	Abundance	109,613	20,272	2,896	4,344	-	13,032	-	24,471	-	1,448	25,919	176,075		
(n=4)	95% CI	75,632	52,399	5,320	13,822	-	35,590	-	40,184	-	4,607	42,211	185,893		
2005	Abundance	10,426	11,584	31,508	19,113	26,875	39,964	5,908	37,184	-	1,158	44,250	183,721		
(n=5)	95% CI	13,831	16,863	22,833	24,857	26,187	40,885	8,812	50,095	-	3,216	57,368	122,762		
2007	Abundance	18,113	17,374	40,494	844	30,594	12,407	6,638	24,033	-	-	30,670	150,497		
(n=7)	95% CI	16,111	19,792	41,842	2,066	16,864	9,941	6,512	21,955	-	-	23,528	103,239		

Note: Biennial survey schedule adopted in 1995. No surveys conducted in 2000, 2002, 2004 and 2006.

Note: For 2003 survey: n = 1 in Valdez Arm caught zero legal males and 6 sublegal males.

Note: Confidence interval (CI) displayed as 95% is a plus or minus value to be added or subtracted from the estimate.

Table 6.—Female Tanner crab abundance estimates from trawl surveys of core stations in the Valdez Arm Prince William Sound, 1999–2007.

Year		Females		Total
		Juveniles	Mature	Females
1999	Abundance	1,463	45,062	46,524
(n=4)	95% CI	4,654	119,010	117,710
2001	Abundance	104,400	17,376	121,776
(n=4)	95% CI	91,340	30,940	117,561
2005	Abundance	3,475	34,752	38,227
(n=5)	95% CI	9,647	26,129	23,305
2007	Abundance	11,535	30,634	42,170
(n=7)	95% CI	13,052	19,226	29,897

Note: Biennial survey schedule adopted in 1995. No surveys conducted in 2000, 2002, 2004 and 2006.

Note: For 2003 survey: n = 1 in Valdez Arm caught 41 total females.

Note: Confidence interval (CI) displayed as 95% is a plus or minus value to be added or subtracted from the estimate.

Table 7.—Commercial king crab harvests from the Prince William Sound Management Area, 1960–1995.

Season ^{a,b,c}	Vessels	Landings	King Crab Harvest Biomass (lbs.)				Total	Average wt.
			Red	Blue	Golden	Golden King		
1960						246,965		
1961						236,081		
1962						31,478		
1963						43,569		
1964						14,028		
1965						5,500		
1966						11,000		
1967						41,800		
1968						200,000		
1969						48,100		
1970						94,300		
1971						144,200		
1972						296,200		
1973						207,916		
1974						85,379		
1975						53,423		
1976–77						17,087		
1977–78						86,595		
1978–79						114,000		
1979–80	18	109	52,026	13,662	0	65,688		
1980–81	14	65	32,433	7,282	20	39,735	No Data	
1981–82	11	43	25,358	5,634	0	30,992		
1982–83	31	187	30,809	10,433	147,016	188,258	9.7	
1983–84	18	69	16,467	5,324	50,535	73,226	8.8	
1984–85	4	14	235	closed	40,232	40,467	No Data	
1985–86	4	11	closed	closed	51,800	51,800	5.8	
1986–87	4	11	closed	closed	65,674	65,837	6.1	
1987–88	4	15	closed	closed	68,270	68,270	6.6	
1988–89	5	14	closed	closed	48,442	48,442	6.6	
1989–90	0	0	closed	closed	closed	0		
1990–91	^d	^d	closed	closed	^d	^d	No Data	
1991–92	^d	^d	^d	^d	^d	^d	No Data	
1992–93	0	0	closed	closed	closed	0		
1993–94	0	0	closed	closed	closed	0		
1994–95	^d	^d	closed	closed	^d	^d		

Note: Data confidential under AS 16.05.815.

- ^a 1995–96 to 1999 Seasons closed by emergency order.
- ^b Seasons closed by regulation effective August 1999.
- ^c Catch not reported by species prior to 1979–80 season.

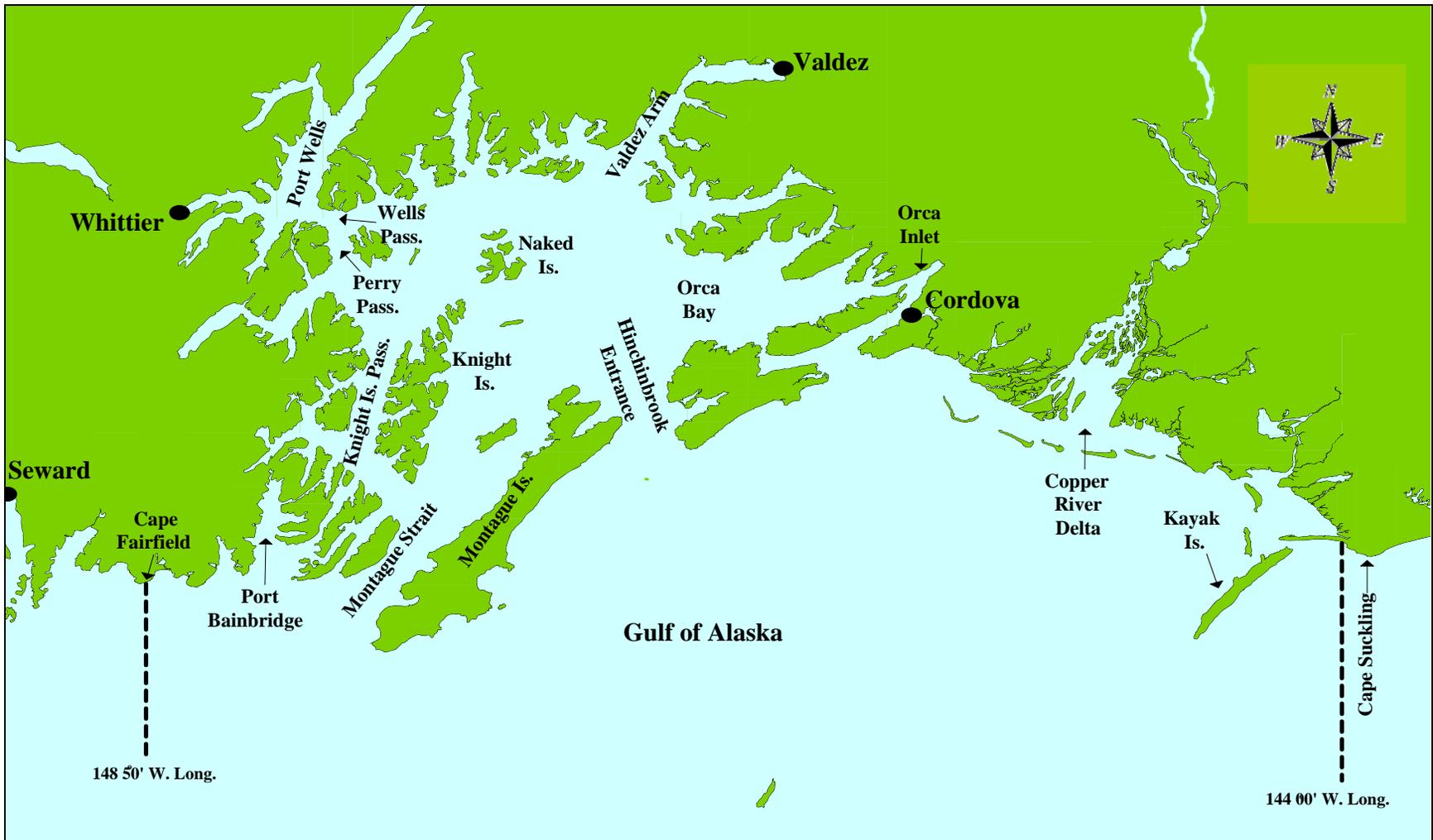


Figure 1.—Prince William Sound shellfish registration area.

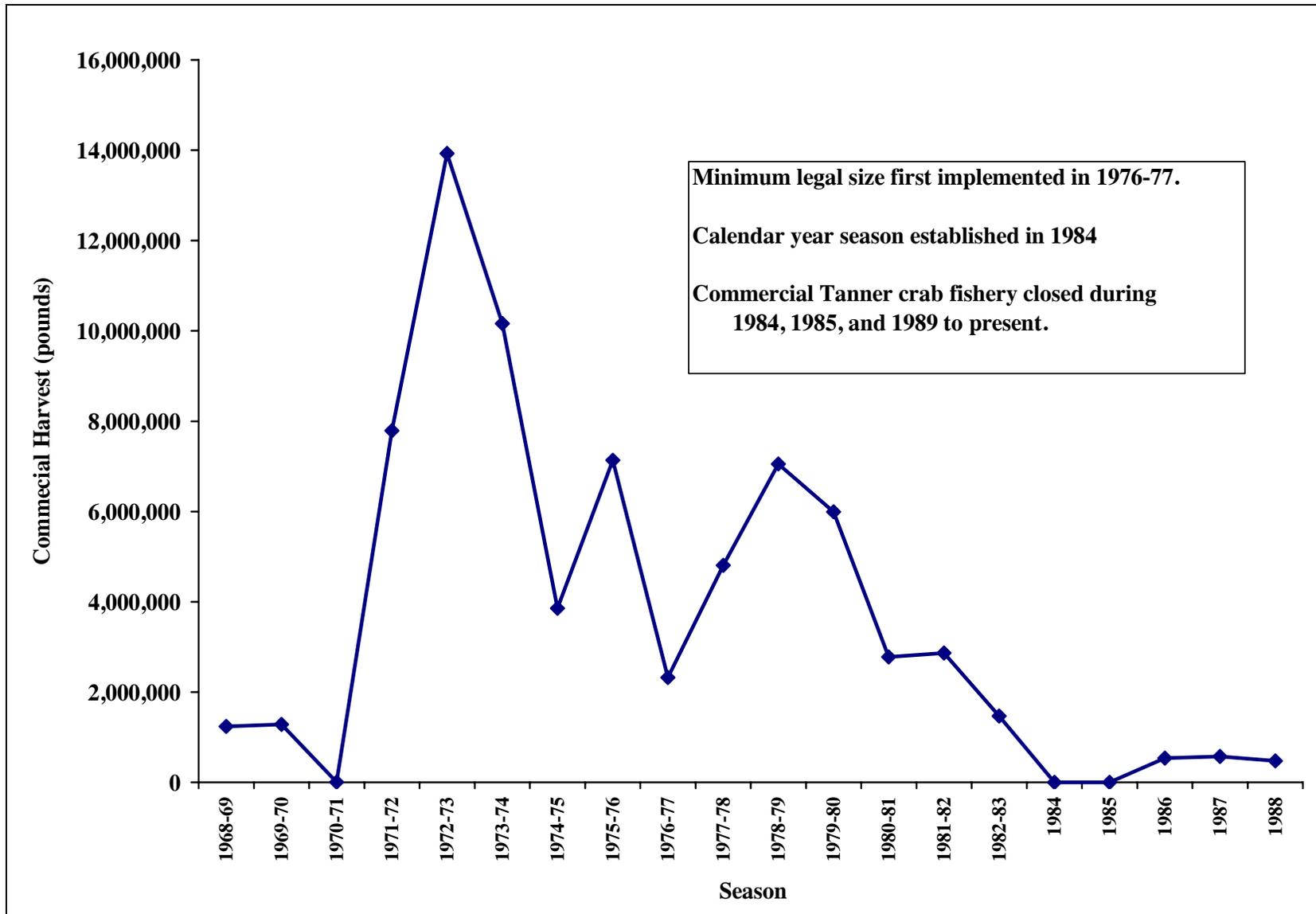


Figure 2.—Commercial Tanner crab harvests from the Prince William Sound Area, 1968–1988.

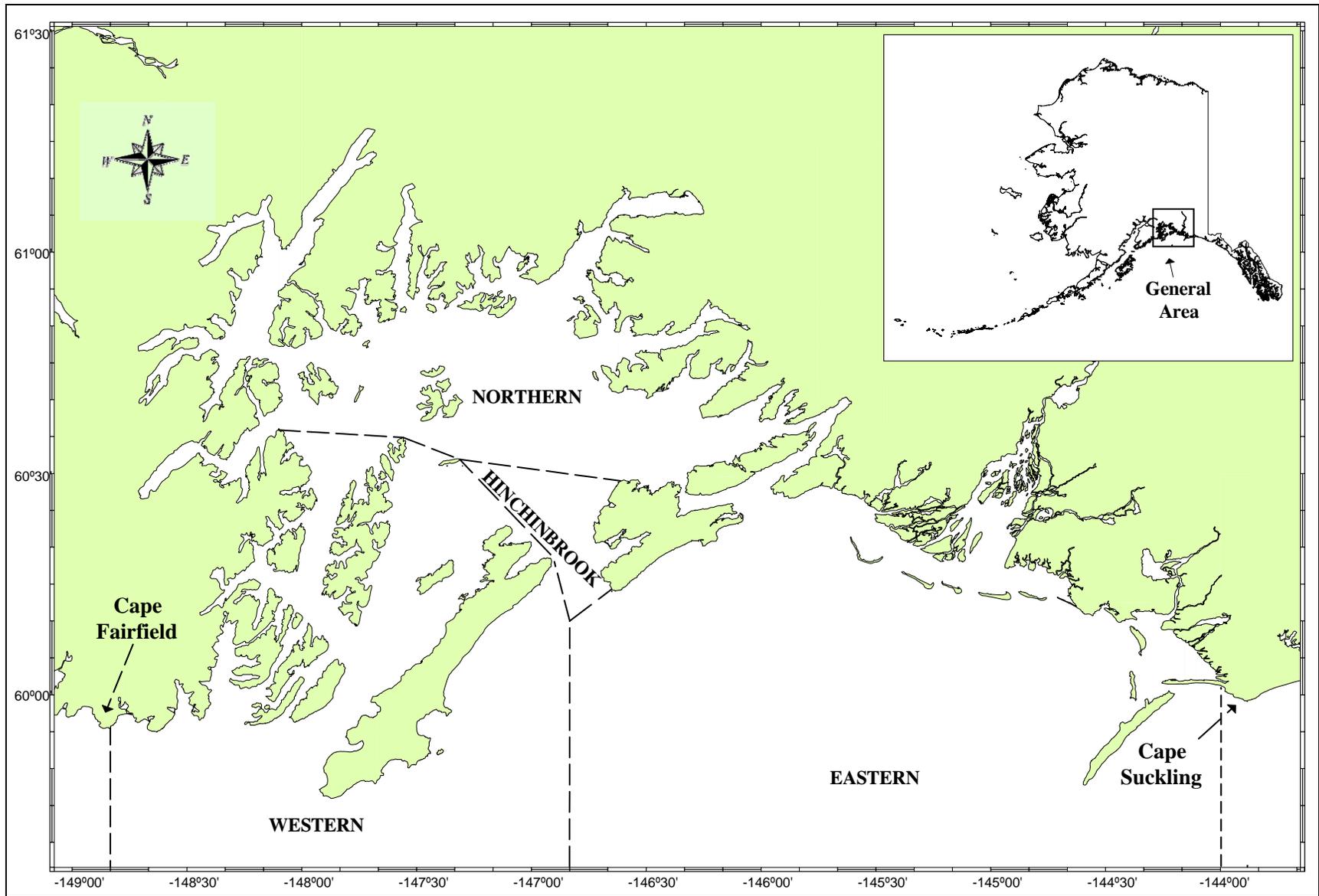


Figure 3.—Prince William Sound Tanner crab fishing districts.

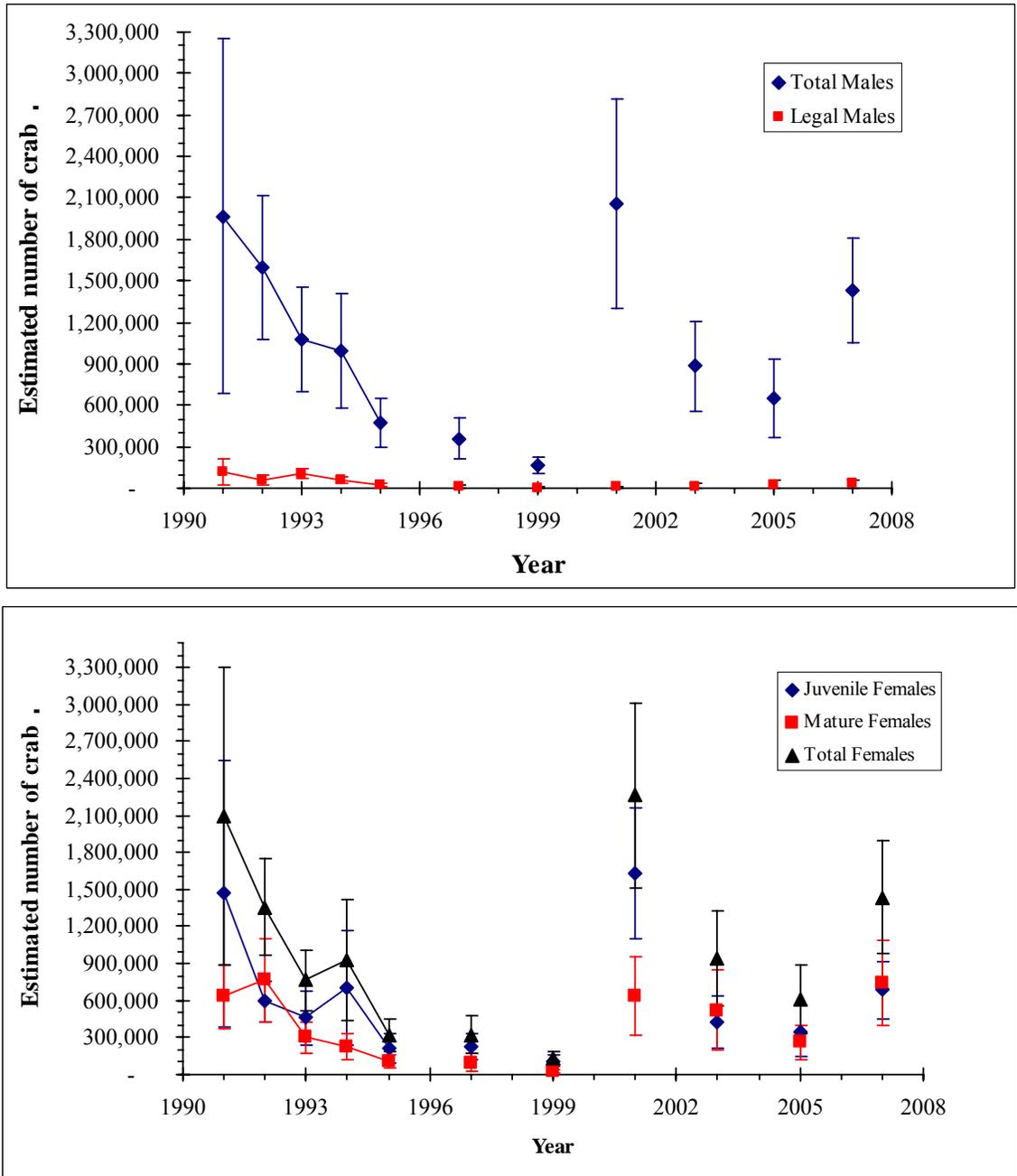


Figure 4.—Tanner crab population estimates (males top; females bottom) from Prince William Sound trawl surveys, 1991-2007.

Note: Surveys not conducted in 1996, 1998, 2000, 2002, 2004 and 2006.

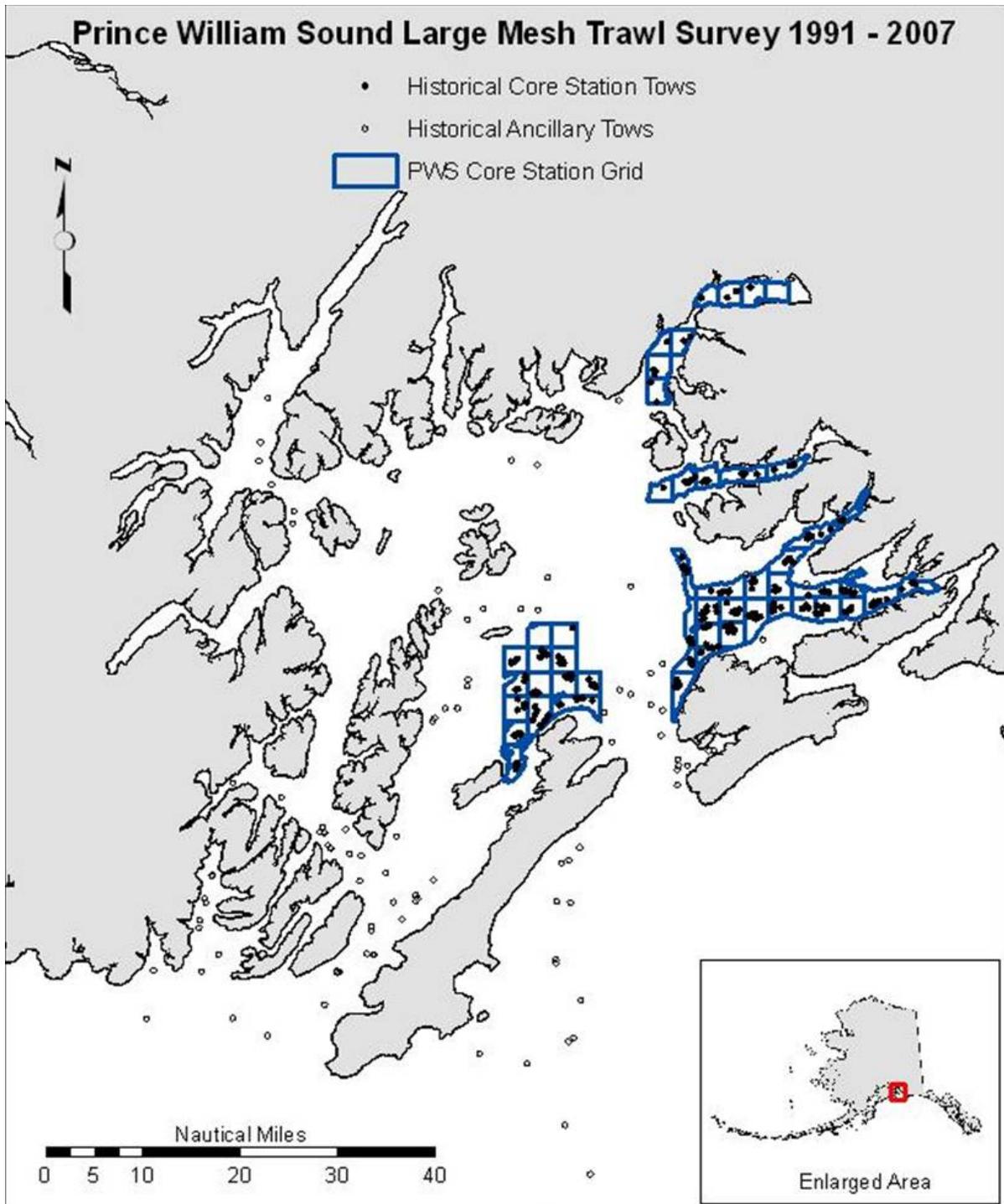


Figure 5.—Prince William Sound bottom trawl survey locations from 1991–2007.

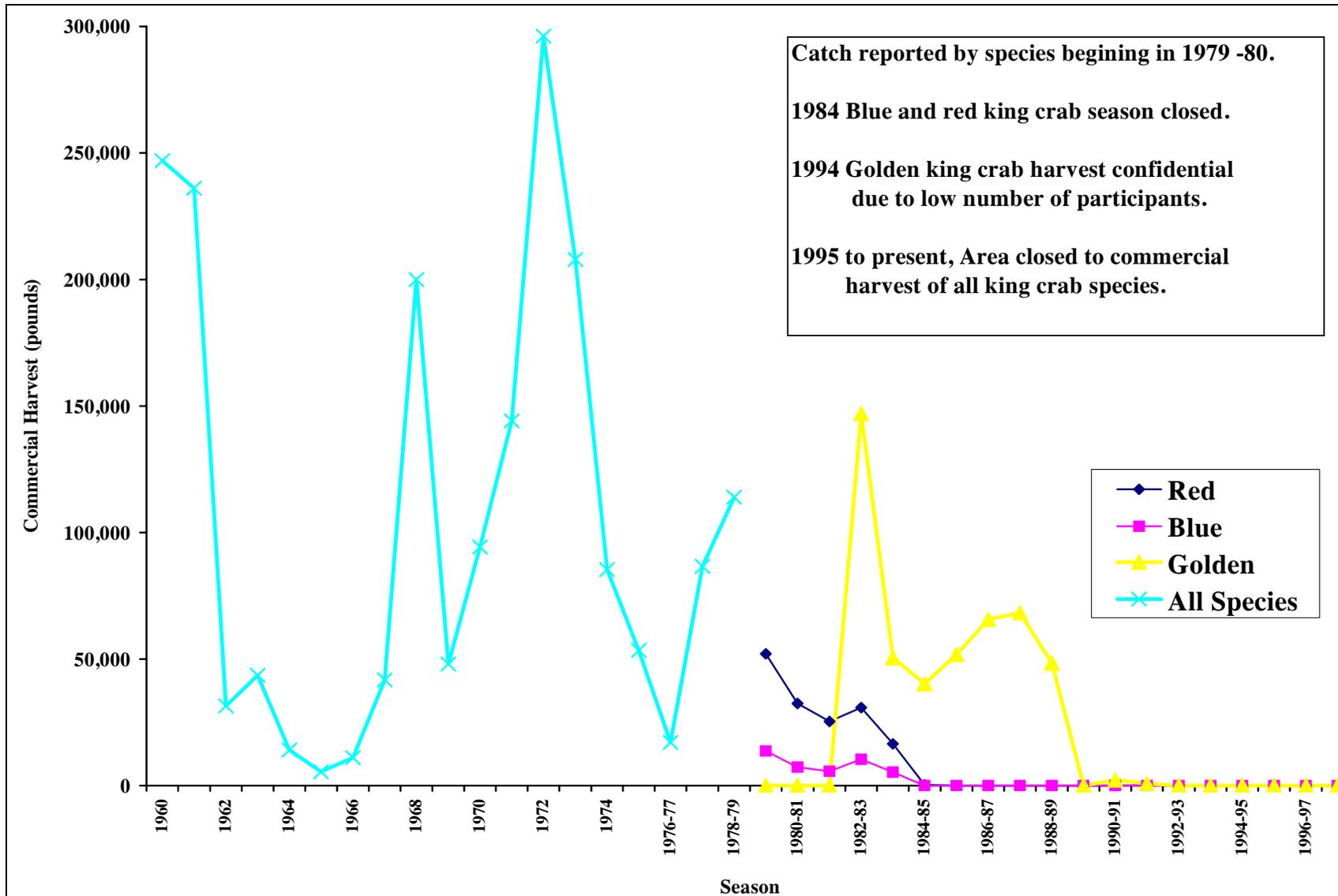


Figure 6.—Commercial king crab harvests from the Prince William Sound Management Area during 1960–1998.

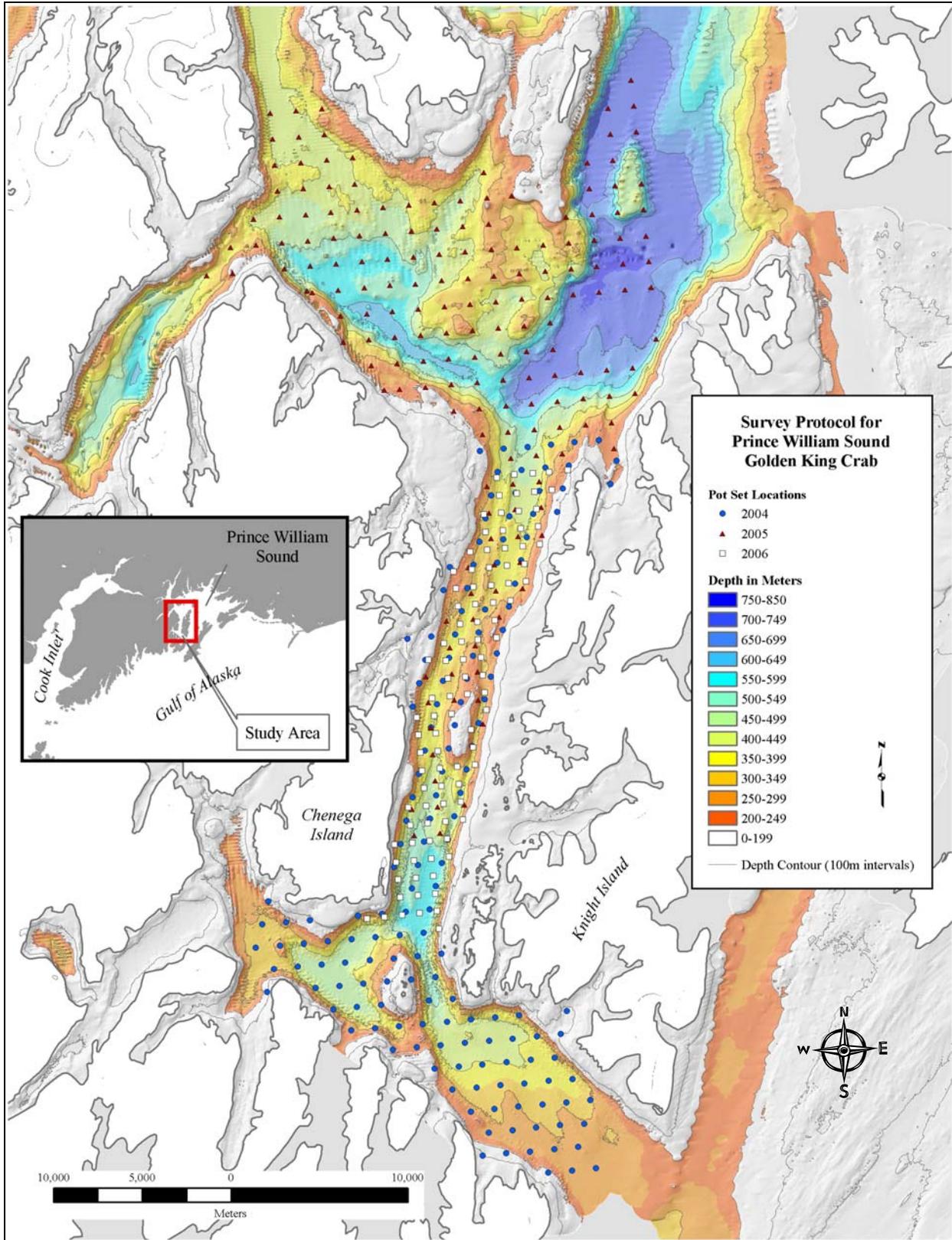


Figure 7.—Golden king crab survey locations in Knight Island Passage, Prince William Sound, Alaska.
Note: Pot set locations for all 3 years of the survey and depth strata are shown.