Fishery Management Report No. 20-10

Cook Inlet and Prince William Sound Area Management Report for Tanner and King Crab Fisheries through 2019

by

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and

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Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

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 (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null 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

FISHERY MANAGEMENT REPORT NO. 20-10

COOK INLET AND PRINCE WILLIAM SOUND AREA MANAGEMENT REPORT FOR TANNER AND KING CRAB FISHERIES THROUGH 2019

by
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ABSTRACT

This management report summarizes Tanner crab *Chionoecetes bairdi*, red king crab *Paralithodes camtschaticus*, and golden king crab *Lithodes aequispina,* fisheries in the Cook Inlet Area (Registration Area H) and Prince William Sound Area (PWS; Registration Area E) through 2019. Alaska Department of Fish and Game surveys to estimate Tanner crab abundance has been conducted since the early 1990s in Cook Inlet and PWS. Due to low survey estimates of abundance, commercial fisheries for Tanner and king crab have been closed in the Cook Inlet Area since 1995. Based on surveys in Kachemak and Kamishak Bays, legal Tanner crab abundance estimates reached noncommercial management thresholds in 2008, which allowed those fisheries to be prosecuted in the Cook Inlet Area; however, abundance levels declined in both surveys, and the noncommercial fishery was closed following the survey in Kachemak Bay in 2011, and in the remainder of the management area in 2012 following the Kamishak Bay survey. However, in 2017, regulations were amended, allowing a more restricted, limited noncommercial Tanner crab fishery in the Cook Inlet Area for the 2017/18 and 2018/19 seasons. Commercial Tanner and king crab fisheries in PWS were closed from 1989 until 2016 when a Tanner crab test fishery was conducted. In 2017, a limited commissioner's permit Tanner crab fishery was adopted into regulation, followed by the fishery being prosecuted in 2018 and 2019. In PWS, legal Tanner crab abundance levels have been high enough to allow a subsistence fishery since 2008. Red and golden king crab levels have been at low abundance levels in both areas and a small amount of golden king crab have been harvested in the PWS subsistence fishery.

Key words: Tanner crab *Chionoecetes bairdi*, red king crab *Paralithodes camtschaticus*, golden king crab *Lithodes aequispina*, noncommercial fishery, commercial fishery, guideline harvest level, catch per unit effort, trawl survey, Alaska Board of Fisheries, Cook Inlet, Prince William Sound

INTRODUCTION

This management report provides information on Tanner and king crab fisheries managed by the Alaska Department of Fish and Game (ADF&G) in the Cook Inlet Area, Registration Area H, and Prince William Sound Area (PWS), Registration Area E (Figure 1).

The purpose of this report is to summarize: 1) recent noncommercial Tanner crab fisheries in Cook Inlet and PWS, 2) historical Tanner and king crab commercial fisheries in Cook Inlet and PWS, 3) PWS Tanner crab test fishery conducted in 2016, 4) PWS commercial commissioner's permit Tanner crab fishery prosecuted in the Eastern and Western Districts in 2018 and 2019, and 5) PWS golden king crab subsistence fishery. Regulations and management actions guiding these fisheries will be reviewed and fishery-specific harvest and effort will be presented.

ADF&G bottom trawl surveys to estimate Tanner crab abundance have been conducted in Cook Inlet and PWS since the early 1990s. These surveys monitor population status, provide an indication of recruitment to the fishery, and are the basis of harvest strategies in both areas. During the past 3 years (2017–2019), the Kachemak Bay trawl survey was conducted with funds from the Division of Sport Fish (DSF) while utilizing both Division of Commercial Fisheries (DCF) and DSF staff; DCF staff continues to analyze trawl survey results. DCF was unable to conduct the trawl survey from 2014 to 2016 due to budget constraints. This partnership between DCF and DSF has provided monitoring of the Tanner crab population in Kachemak Bay and the continuation of this important long-term data set. DCF continues to conduct the PWS trawl survey and recently began developing a PWS Tanner crab pot survey.

Tanner crab abundance in Cook Inlet and PWS has been at low levels since the mid-1980s, resulting in closures of commercial fisheries and some closures in noncommercial fisheries. One highlight was the reopening of the PWS subsistence Tanner crab fishery in 2008 because of an increase in legal male Tanner crab abundance, estimated from the PWS trawl survey. A Tanner crab test fishery was conducted in PWS in 2016. Following this, regulatory changes adopted by the Alaska Board of Fisheries (BOF) in 2017 allowed ADF&G to open a commissioner's permit

Tanner crab fishery in the Western and Eastern Districts of PWS. In 2017, the BOF also adopted regulations to allow a more restricted, limited noncommercial fishery in the Cook Inlet Area in the absence of a survey or if legal male Tanner crab abundance fell below thresholds.

Commercial harvest data from Cook Inlet and PWS were compiled from historical management reports, previous BOF reports, and ADF&G's fish ticket database. PWS subsistence Tanner and golden king crab and Cook Inlet Tanner crab sport and subsistence catch data were summarized from reported information on required permits. Other sport fishing information was compiled from the DSF statewide harvest survey (SWHS). Additional information on subsistence harvests was gathered from the Division of Subsistence.

COOK INLET AREA

MANAGEMENT AREA

For commercial, personal use, and subsistence fisheries, the Cook Inlet Area (Registration Area H; Figure 1) includes all waters west of Cape Fairfield (long 148°50′W) and north of Cape Douglas (lat 58°51′N). Because there is no federal management plan for crab fisheries in federal waters of the Gulf of Alaska, state regulations for king and Tanner crab fisheries also apply to federal waters adjacent to the Cook Inlet Area. For commercial fisheries management, the Cook Inlet Area is further divided into the Southern, Kamishak Bay, Barren Islands, Central, Outer, and Eastern Districts (Figure 2). For the noncommercial (sport and subsistence) Tanner crab fishery, the Cook Inlet Area is divided into Areas A, B, C, D, and E (Figure 3).

COOK INLET AREA TANNER CRAB

Research Results

ADF&G has conducted surveys to assess Tanner crab abundance levels within Cook Inlet since 1974 (Goldman et al. 2018). Surveys were conducted using pot gear through 1990 (Kimker 1991a). Pot survey objectives were to provide indices of legal and sublegal male Tanner crab and to monitor the 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.

Recognizing the inherent weaknesses of pot surveys, primarily the inability to expand catches to estimate population abundance, ADF&G implemented trawl surveys as the primary survey method in 1990 (Kimker 1991b; Bechtol 2005). 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 (Knutson 2018) and by the National Marine Fisheries Service for the Bering Sea. Large-mesh trawl surveys are conducted in 2 locations within the Cook Inlet Area: 1 in Kachemak Bay in the Southern District, and the other in Kamishak Bay in the Kamishak Bay and Barren Islands Districts (Figures 4 and 5). The Kachemak Bay survey was conducted by DCF annually from 1990 through 2013, excluding 2010 (Figure 6). As noted, the survey was not conducted between 2014 and 2016 because of DCF funding reductions. The survey resumed in 2017 with funding support from DSF and has been conducted annually through 2019. The Kamishak Bay survey was conducted annually through 2007, and then again in 2010 and 2012; the survey has not been conducted since 2012 due to DCF budget constraints and low abundance of legal crab in the survey (Figure 7). Data from these surveys have been used to estimate the relative abundance of Tanner crab, to track numbers of red

king crab, and to set harvest limits, since 2002, when a harvest strategy was adopted by the BOF (Bechtol et al. 2002).

In the Kachemak Bay trawl survey, legal male Tanner crab estimated abundance had declined to just under 200,000 crab in 1994 (Figure 6), the last year the commercial fishery was open (Table 1). The estimated abundance of legal male Tanner crab increased by almost 50% in 1995 before dropping again the following year and remained between 100,000 and 200,000 legal male crab through 1999 (Figure 6). After 1999, abundance estimates showed a further declining trend, and by 2005, estimates were approximately 45,000 legal crab (Figure 6). After an increase in 2006 to over 200,000 crab, the abundance of legal male Tanner crab remained between 100,000 and 200,000 crab through 2009 (Figure 6). This enabled the noncommercial fisheries to open for the 2008/09 season after the regulatory recent average abundance thresholds were met. However, after no survey in 2010, the 2011 through 2013 legal male abundance estimates were at the lowest levels since 1990 (Figure 6). This triggered the noncommercial fisheries in Kachemak Bay to close after the abundance estimate dropped below the single-year threshold of 50,000 legal crab, where it remained through 2013 (Figure 6).

No survey was conducted from 2014 through 2016 and there was no mechanism to evaluate abundance, which prevented a fishery from being opened. However, the noncommercial fishery reopened in the entire Cook Inlet Area for the 2017/18 season after the BOF adopted regulations in 2017 to allow a restricted, limited noncommercial fishery to be prosecuted when abundance estimates were below minimum thresholds, or in the absence of a survey (Table 2). In 2017, the BOF also adopted a new legal size of Tanner crab of 4.5 in (114 mm), which was reduced from 5.5 in (140 mm), but the minimum legal male abundance stock thresholds were not changed in the harvest strategy. Beginning in 2017, Kachemak Bay trawl survey abundance estimates of legal male Tanner crab used the new size, and since then estimates have increased each year (Figure 6). The 2019 survey provided a third consecutive year of estimates and the recent 3-year average was above the minimum stock threshold for a noncommercial fishery, which allowed the standard (unrestricted) regulatory noncommercial fishery to reopen for the 2019/20 season (Figure 6).

In the Kamishak Bay trawl survey, abundance estimates of legal male Tanner crab steadily declined from nearly 900,000 crab in 1990 to approximately 245,000 crab in 1992 (Figure 7). The commercial fishery in the Kamishak Bay and Barren Islands Districts has been closed every year since 1992 (Table 1). Legal male Tanner crab abundance estimates exceeded 600,000 crab in 1996 and 1997, but declined precipitously in 1998, and declined further in 1999 to just over 100,000 crab (Figure 7). From 2000 through 2005, legal male abundance estimates were at the lowest levels since 1990 and averaged less than 50,000 crab (Figure 7). Trawl survey results between 2006 and 2010 were highly variable, estimates ranged from 508,000 legal crab in 2006, to approximately 54,000 crab in 2007, followed by 2 years with no survey, and then to over 300,000 crab in 2010 (Figure 7). There was no survey in 2011. In 2012, the final year of the survey, the estimated legal male Tanner crab abundance was 0 crab because no legal crab were caught (Figure 7).

Survey estimates in Kamishak Bay in 2006 and 2010 enabled the noncommercial fisheries to open for the 2008/09 season, in conjunction with the Kachemak Bay noncommercial fisheries, because average abundance minimum thresholds were met. During the 2012 survey, no legal male Tanner crab were captured in Kamishak Bay (Figure 7). In response to the low level of Tanner crab abundance and reduction in project funding, the Kamishak Bay trawl survey was discontinued and there are no future survey plans. The noncommercial fisheries closed for the 2012/13 season and remained closed until the BOF adopted regulations in 2017 allowing a limited noncommercial

fishery to open in the entire Cook Inlet Area in the absence of a trawl survey. The fishery could also open if legal male Tanner crab abundance estimates were below the minimum threshold. The limited noncommercial fishery has been open in Kamishak Bay concurrent with the areawide Cook Inlet opening and, although there is low effort, any population rebound could be reflected in the noncommercial harvest.

Commercial Fisheries Harvest

Historically, the Cook Inlet Area has supported commercial Tanner crab fisheries in the Central, Kamishak Bay, Southern, Barren Islands, Outer, and Eastern Districts (Figure 2). The fishery has been closed since 1995; however, all districts saw closures in the late 1980s, and, except for some limited openings between 1990 and 1992, only the Southern District was open during the final years of the fishery (Table 1). When commercial seasons were open, the Southern, Kamishak Bay, and Barren Islands Districts supported the largest commercial harvests (Table 1). The Outer and Eastern Districts produced lower, although substantial harvests, but minimal harvest occurred in the Central District only in 1987 and 1988 (Table 1).

When the Cook Inlet Area was open for commercial Tanner crab harvest, effort in the Southern District occurred in the relatively protected waters of Kachemak Bay and fishing depths ranged between 30 and 65 fathoms. Commercial Tanner crab fishing began in the mid-1960s when Tanner crab were harvested incidentally to red king crab (Davis 1981). Greater fishing effort was directed toward Tanner crab during the 1970s when price and demand increased. The first large Tanner crab harvest was 1.4 million lb in the 1968/69 season, mainly from the Southern District. Fishing effort quickly expanded to other districts and a peak harvest of 8.0 million lb from all districts combined occurred during the 1973/74 season. Commercial Tanner crab fishing closures began in 1989 in all districts, followed by limited fishing through 1992, and only the Southern District were open in 1993 and 1994 (Table 1). The commercial fishery has remained closed since 1995 due to depressed Tanner crab abundance levels.

Tagging, survey, and fishery information indicate that the Tanner crab population in Kamishak and Barren Islands Districts are probably a different stock than those crab in the Southern District. Therefore, the districts were managed separately with different surveys.

Noncommercial Fisheries Harvest

Recent Fishery – 2017/18 and 2018/19

A fishery was opened for the 2017/18 and 2018/19 seasons following the adoption of new regulations by BOF in 2017. The new regulations provided a restricted, limited noncommercial (sport and subsistence) Tanner crab fishery in the absence of a survey or when survey estimates of legal male Tanner crab abundance are below minimum thresholds. For the limited fishery, regulations specify reduced bag and gear limits and a shortened season. The pot limit was 1 pot per vessel (reduced from 2 pots) and the bag and possession limit was 3 legal crab per person (reduced from 5 crab). The fishery was open from October 1 through the last day of February (reduced from September 1 through March 31), and a permit was required for each fishery participant.

Beginning in 2017/18, separate permits were issued for the sport and subsistence fisheries; prior to this, only a single noncommercial fishery permit was issued. Although sport and subsistence data may now be evaluated separately, an unintended consequence is that many users acquired both types of permits, making noncommercial fishery effort data more difficult to analyze. For the

sport permits, all areas are open within the Cook Inlet Area, including the nonsubsistence area, but subsistence users are limited to the area outside the nonsubsistence area (Figure 3). A sport fishing license is required for a sport permit, but only Alaskan residents may apply for the subsistence permit (a sport fishing license is not required in order to participate in the subsistence fishery). For the 2017/18 season, 1,930 permits were issued and 53% of those permits were fished; 8% of total permits issued were subsistence and only 34% of subsistence permits were fished (Table 3). In the 2018/19 season, 1,752 permits were issued and 61% of those permits were fished; 10% of total permits issued were subsistence and the percentage of permits fished was similar among permit types (Table 3).

The total harvest was similar for the 2 recent seasons, at 8,629 crab in 2017/18 and 8,769 crab in 2018/19 (Table 2). The majority of the harvest, approximately 8,100 crab, or over 93% of the total harvest, was taken from noncommercial Area E, which is located in the western portion of Kachemak Bay (Figure 3). Similar to harvest, a majority of the effort occurred in Area E at approximately 3,000 crabber days for both seasons (Table 2). During the 2017/18 season, the second highest harvest and effort, 338 crab and 163 crabber days occurred in Area D, the eastern portion of Kachemak Bay (Table 2). In the 2018/19 season, there was a slight shift, and harvest increased in Area C the North Gulf Coast, but effort decreased in Area D, possibly due to more effort out of the port of Seward (Table 2).

Fishery 2008/09 through 2011/12

The noncommercial fishery reopened for the 2008/09 season when minimum stock thresholds were achieved. The bag and possession limit remained 5 male Tanner crab, with a carapace width of 5.5 inches or greater. The new, more detailed permit required harvest reporting. The season was July 15 through March 31, with a closure period of January 1 to January 14. Separate permits were issued for the fall and spring seasons to track harvest and effort by period throughout the calendar year. The noncommercial Tanner crab fishery areas were designated as A, B, C, D, and E (Figure 3) on the permit. Although not defined in regulation, a map was provided on the harvest permit to facilitate the reporting of harvest by these areas. As provided by the harvest strategy and related regulations, Areas A, B, and C, were aligned with the Kamishak Bay trawl survey (Figure 5) and corresponded with the commercial Southern District west of a line from Point Pogibshi to Anchor Point and also the Kamishak, Barren Islands, Outer, Eastern, and Central Districts (Figure 2). Areas D and E were aligned with the Kachemak Bay trawl survey (Figure 4) and corresponded to that portion of the Southern District east of a line from Point Pogibshi to Anchor Point (Figure 2). Most of the noncommercial Tanner crab harvest occurred in Areas D and E in Kachemak Bay, within the commercial Southern District (Figure 8).

Guideline harvest levels (GHL) were set from 2008/09 to 2011/12 for both groups of areas corresponding to the 2 trawl surveys: A, B, C for Kamishak Bay; and D and E for Kachemak Bay. The GHL for Areas D–E was set at 13,373 Tanner crab for the 2008/09 season and 14,860 crab for the 2009/10 season. Harvest exceeded the GHL in both seasons, by 21% and 15%, respectively. The bag limit was reduced by emergency order (EO) because of conservation concerns from 5 crab to 4 crab in Areas D–E during the 2010/11 season and the GHL was set at 18,284 crab. Harvest during the 2010/11 season was 31% below the GHL, therefore the bag limit was returned to a 5-crab limit for the 2011/12 season and the season opened by regulation on July 15, 2011 (Table 4).

The 2011 Kachemak Bay trawl survey was conducted during the summer, close to the regulatory opening date of the noncommercial fishery. After analysis of the survey data was complete, the

legal male Tanner crab abundance was estimated at 41,595 crab (Figure 6; Rumble et al. 2014), which was below the single-year threshold of 50,000 crab for Areas D–E. Because of this, Areas D–E were closed by EO on September 6, 2011, after 8,271 crab had been harvested (Table 4). The season remained open in Areas A–C through the remainder of the 2011/12 season. Areas D–E remained closed until the 2017/18 limited noncommercial fishery was opened.

The GHL for the less productive Areas A–C (Figure 3) averaged just over 21,000 crab for the 4 seasons the fishery was open and annual harvest averaged approximately 885 crab (Table 4). The 2012 Kamishak Bay trawl survey produced an abundance estimate of 0 legal male Tanner crab and the season was closed in Areas A–C for the 2012/13 season and remained closed until the 2017/18 limited noncommercial fishery was opened (Figure 3).

Historical Fishery – pre 2008/09

The noncommercial fishery has been managed through a harvest permit since 1996. Noncommercial harvest data (sport and personal use) from 1981 through 1995 are available from the annual SWHS administered through DSF.

Noncommercial Tanner crab harvest data estimated from the SWHS from 1981 to 1995 in Cook Inlet, including Kachemak Bay, ranged between 1,142 and 10,936 crab annually with season closures in 1989 and 1990 (Table 4; Mills 1982–1994; Howe et al. 1995–1996). The highest harvests occurred during the 3 years prior to the permit being implemented in 1996. Harvest reported on shellfish permits increased between 1996 and 2000 to an average harvest of approximately 15,400 crab, under a bag and possession limit of 20 Tanner crab. Noncommercial Tanner crab harvest reported on shellfish permits are considered more accurate and are higher than harvest estimated from the SWHS (Kerkvliet et al. 2013). The noncommercial Tanner crab fishery harvest peaked in 2000 at 19,672 crab. The bag limit was reduced by EO to 5 Tanner crab in 2001 and resulted in a decreased harvest of 6,499 crab for the calendar year. In 2002, the fishery closed early in the season by EO to protect Tanner crab in Kachemak Bay from overharvest; the total harvest in 2002 was 3,574 crab (Table 4).

The BOF adopted the current harvest strategy in March 2002. After analysis of 2002 trawl survey data, according to the harvest strategy, abundance estimates of legal male Tanner crab did not meet the thresholds required to open the fishery and the noncommercial fishery was closed August 3, 2002, by EO (Figure 6). In the Kachemak Bay trawl survey, the 2002 abundance estimate of legal male Tanner crab was below 100,000 crab, which marked the third consecutive year this occurred (Figure 6). In the Kamishak Bay trawl survey, this estimate was below the 40,000-crab single-year threshold in 2002 (Figure 7). Noncommercial fisheries in the entire Cook Inlet Area remained closed from 2003 until the 2008/09 season.

Commercial Fisheries Regulations

Regulations governing the commercial harvest of Tanner crab in the Cook Inlet Area are codified in 5 AAC 35.408 *Registration Area H Tanner Crab Harvest Strategy*. In addition, 5 AAC 35.080 directs ADF&G to establish an annual harvest strategy for each Tanner crab stock that is consistent with the BOF's *Policy on King and Tanner Crab Resource Management*. These regulations also require that the BOF review harvest strategy changes prior to allowing fishing. The Cook Inlet Area is designated a superexclusive registration area for commercial fishing of Tanner crab (5 AAC 35.406), and therefore a vessel used to harvest Tanner crab may not be used to take Tanner crab in any other registration area during that registration year (5 AAC 35.005). Additionally, an

operator of a Tanner crab vessel validly registered for a superexclusive registration area may not operate any other Tanner crab vessel registered for any other superexclusive registration area in the same registration year (5 AAC 35.020 (h)).

For the Cook Inlet Area Tanner crab fishery, elements of the harvest strategy include minimum stock thresholds for the Southern, Kamishak, and Barren Islands Districts, and exploitation rates related to the abundance of legal crab. For the Southern District, the commercial fishery may only open if the legal male Tanner crab abundance is at least 500,000 crab. More specifically, if this abundance is higher than 1,000,000 legal crab, then the harvest rate, in combination with noncommercial fisheries, is 25%. If the estimated abundance falls between 500,000 and 1,000,000 crab, then the commercial fishery will open to harvest at a rate, in combination with the noncommercial fishery, that will not exceed 15% of the estimated abundance of legal male Tanner crab. This commercial fishery will not open if the attainment of the GHL would cause the level of legal male Tanner crab to fall below 500,000 crab. The fishery may not open if the harvest capacity (number of registered vessels multiplied by the legal pot limit) and the estimated catch rate exceed the GHL during a commercial fishery with a minimum 12-hour duration.

In the Kamishak and Barren Islands Districts combined, the commercial fishery may only open if the legal male Tanner crab abundance is at least 700,000 crab. If the abundance is higher than 1,400,000 legal male crab, then the harvest rate, in combination with noncommercial fisheries, is 25%. If the estimated abundance falls between 700,000 and 1,400,000 crab, then the commercial fishery will open to harvest at a rate, in combination with the noncommercial fishery, that will not exceed 15% of the estimated abundance of legal male Tanner crab. The commercial fishery may not open if the attainment of the GHL would cause legal crab abundance to fall below 700,000 crab. This fishery has the same harvest capacity and catch rate limits as the Southern District.

In 2017, following an analysis of the harvest strategy and legal size for Cook Inlet Tanner crab, ADF&G proposed a reduction in the legal size of male Tanner crab in the Cook Inlet Area, which was adopted by BOF as regulation 5 AAC 35.420 *Size Limits For Registration Area H*. This reduced the legal size from 5.5 inches (140 mm) to 4.5 inches (114 mm) for all commercial and noncommercial fisheries in the Cook Inlet Area. This was supported in part because of a condition called terminal molt in male Tanner crab. Studies suggest that male crab that have reached morphological maturity, evident by a larger claw size, will not molt again (Tamone et al. 2007). Analysis of chelae (claw) height in relation to carapace width data collected during Cook Inlet Area surveys indicated that size at maturity may have decreased in the Tanner crab population because a larger proportion of male crab in the population were observed in terminal molt condition before reaching the previously established legal size, and therefore were not recruiting to the fishery. The goal of reducing the legal size was to allow more of these smaller-sized terminally molted crabs to be available for harvest and reduce harvest of larger, potentially faster-growing crab, and to minimize handling mortality from the reduced discard of undersized crab.

Minimum stock threshold levels of legal male Tanner crab abundance have not been adjusted using the most recent analysis that led to the size reduction in legal male Tanner crab. Regulatory changes have been proposed by ADF&G and will be considered at the upcoming 2020 BOF Statewide King and Tanner crab meeting.

Commercial Tanner crab seasons for the Cook Inlet Area are established under 5 AAC 35.410. Commercial seasons for the Southern District may only be established by EO within the period January 15 through March 31 and must consider weather factors that affect crab mortality. In all

other districts, the commercial season may occur only from 12:00 noon on January 15 through March 31. There is also a provision closing the commercial Tanner crab seasons in the Outer, Eastern, and Central Districts until the Tanner crab stocks have recovered and a harvest strategy is developed by ADF&G and adopted into regulation by BOF. Lawful gear and differential pot limits are established under 5 AAC 35.425.

Noncommercial Fisheries Regulations

Several regulatory changes have been adopted by the BOF regarding noncommercial fisheries in the Cook Inlet Area over the past 6 years. These include changes to the start and end date of the fishery, the legal size for male Tanner crab, and changes to the circumstances that trigger the opening of a noncommercial fishery. In addition, personal use regulations have been stricken from the regulations to minimize regulatory redundancy.

In 2014, the regulatory season dates for the noncommercial (sport and subsistence) fisheries were changed from July 15 through March 15 to September 1 through March 31. Additionally, the period for evaluating average legal male stock abundance was reduced from the recent 5-year period to the recent 3-year period; this change was made to the *Registration Area H Tanner Crab Harvest Strategy* (5 AAC 35.408).

In 2017, the harvest strategy was again amended, this time to allow limited noncommercial (sport and subsistence) fisheries in the absence of a trawl survey or when legal male Tanner crab abundance levels fell below minimum thresholds. When abundance levels meet thresholds, the allowable bag and possession limits in the standard regulatory fishery are 5 crab per person and allowable gear is 2 pots per person and 2 pots per vessel. The restricted, limited fishery allows 1 pot per person and 1 pot per vessel, bag and possession limits are 3 crab per person, and the season is reduced to October 1 through the last day in February (5 AAC 58.022 and 5 AAC 02.325). As previously noted, the legal size of male Tanner crab was reduced from 5.5 inches to 4.5 inches for all fisheries, including noncommercial (sport and subsistence) fisheries.

Noncommercial fishery permits have been required since 1996. Permits have been available online for sport and subsistence users since the 2018/19 season and include mandatory online reporting. Subsistence regulations require that crab must remain whole and intact until the crab has been processed or prepared for consumption so that the sex and size of the crab may be determined (5 AAC 02.010 (g)).

The *Registration Area H Tanner Crab Harvest Strategy* (5 AAC 35.408) was first adopted by the BOF in March 2002 and contains thresholds for commercial and noncommercial fisheries. When legal male stock abundance is below the minimum stock threshold for a commercial fishery, the noncommercial GHL may not exceed 10% of the recent 3-year average abundance of legal male Tanner crab. For Kachemak Bay (that portion of the Southern District east of a line from Point Pogibshi to Anchor Point), the noncommercial fisheries will be limited (as adopted in 2017) in the absence of a trawl survey. The Kachemak Bay noncommercial fisheries will also be limited if the 1) recent 3-year average stock abundance of legal male Tanner crab estimated from the Kachemak Bay trawl survey is less than 100,000 Tanner crab, 2) estimated stock abundance of legal male Tanner crab from that same survey is less than 100,000 Tanner crab for 3 consecutive years, or 3) estimated stock abundance of legal male Tanner crab is less than 50,000 Tanner crab in any given year. For that portion of the Southern District west of a line from Point Pogibshi to Anchor Point and the Kamishak and Barren Islands Districts, the noncommercial fisheries will be limited in the absence of a trawl survey or if the 1) recent 3-year average stock abundance of legal male Tanner

crab estimated from the Kamishak Bay trawl survey is less than 50,000 Tanner crab or 2) estimated stock abundance level of legal male Tanner crab from Kamishak trawl survey is less than 40,000 in any given year.

Registration Area H Tanner Crab Harvest Strategy minimum stock threshold levels of legal male Tanner crab abundance have not been adjusted (for either noncommercial or commercial fisheries) using the most recent analysis that led to the size reduction in legal male Tanner crab. Regulatory changes have been proposed by ADF&G and will be considered at the 2020 BOF Statewide King and Tanner crab meeting.

When minimum thresholds are met by survey abundance estimates, separate noncommercial Tanner crab fishery GHLs are established for 1) that portion of the Southern District east of a line from Point Pogibshi to Anchor Point using the abundance estimated from the Kachemak Bay trawl survey, and 2) for the Southern District west of that line, including the Kamishak and Barren Islands Districts, using the abundance estimated from the Kamishak Bay trawl survey.

If the noncommercial season is closed in the Kamishak or Barren Island Districts, the season will also close in the Eastern, Outer, and Central Districts (5 AAC 35.410), which includes noncommercial Areas A, B, and C (Figures 2 and 3).

COOK INLET AREA KING CRAB

Research Results

In the ADF&G large-mesh trawl survey for Kachemak Bay, low numbers of red king crab were caught between 1990 and 2019, ranging between 0 and 102 male crab. No red king crab have been caught in the Kachemak Bay survey since 2005. Red king crab catches in the Kamishak Bay large-mesh trawl survey have been more consistent than in the Kachemak Bay survey over the years, but numbers are still very low overall, ranging between 0 and 131 male crab. During the last Kamishak Bay survey in 2012, 2 male red king crab were caught (Table 5).

Commercial Fisheries Harvest

Both red king crab and golden king crab are found in the Cook Inlet Area, although golden king crab have been caught infrequently, and only in the outer portion of the management area in the Gulf of Alaska. Commercial fisheries for both species of king crab have been closed due to low abundance following the 1983/84 season. Harvest ranged from a high of 8.6 million lb during the 1962/63 season to a low of 192,531 lb in 1983/84, the final season the fishery was open (Table 6). When commercial fisheries were open, most of the red king crab harvest occurred in the Southern, Kamishak, and Barren Islands Districts (Figure 2 and Table 6). Very small harvests occurred in the Outer District, and no harvests were reported from the Eastern District (Table 6).

Noncommercial Fisheries Harvest

Noncommercial fishing for king crab has been closed in the Cook Inlet Area (5 AAC 77.514) since 1985. Estimates of king crab harvests are only available from 1981 to 1984; harvests ranged from a high of 6,178 crab in 1981 to a low of 62 king crab in 1984 (Rumble et al. 2014). After this marked decrease, the fishery was closed and not reopened.

Commercial and Noncommercial Fishery Regulations

In 1999, the BOF closed the commercial harvest of king crab in the Cook Inlet Area until the crab stocks have recovered enough for a harvest strategy to be developed by ADF&G (5 AAC 34.310).

When king crab commercial fisheries were open in the Cook Inlet Area, it was designated a superexclusive registration area (5 AAC 34.005). Regulations that guided the fishery included the following: only male king crab 7 inches (178 mm) or greater in shell width could be taken or possessed, king crab could be harvested using king crab pots and ring nets, and there were pot limits and pot marking requirements.

Noncommercial king crab fishing regulations exist for subsistence and sport fishing. In regulation, all of these fisheries are closed: 5 AAC 02.320 *Subsistence king crab fishery*; 5 AAC 58.022 (9) *Waters; seasons; bag, possession, and size limits; and special provisions for Cook Inlet–Resurrection Bay Saltwater Area*.

PRINCE WILLIAM SOUND

MANAGEMENT AREA

For commercial, personal use, and subsistence fisheries, PWS (Registration Area E; Figure 1) includes waters of Prince William Sound and the Gulf of Alaska bounded by 144°00′W longitude near Cape Suckling on the east and Cape Fairfield (long 148°50.25′W) on the west. For commercial fisheries management, PWS is further divided into the Northern, Hinchinbrook, Eastern, and Western Districts for commercial crab fisheries (Figure 9). ADF&G manages all commercial shellfish fisheries within the territorial waters of PWS or those waters from the shoreline to 3 nautical miles offshore. ADF&G also manages all commercial shellfish fisheries in the adjacent waters of the federal exclusive economic zone (EEZ), which are those waters beyond 3 nautical miles offshore.

PRINCE WILLIAM SOUND AREA TANNER CRAB

Research Results

ADF&G has conducted surveys to assess Tanner crab abundance levels within PWS since 1977 (Berceli et al. 2002). As in Cook Inlet, these surveys were initially conducted using pot gear (Kimker 1984) but switched solely to bottom trawl surveys in 1991 (Bechtol 1999; Kimker and Trowbridge 1992). The trawl survey area is based on the historical pot survey area and has stations in the Northern, Hinchinbrook, and Western Districts of PWS, and are located within Port Fidalgo, Orca Bay, and the North Montague area from Smith Island to Green Island (Figure 10). Pot survey data indicated steady declines in the numbers of male and female Tanner crab beginning in 1981 (Table 7). For the duration of the historical pot survey, the mean catch per unit effort (CPUE) of Tanner crab decreased 86%, from a high of 93 crab per pot in 1977 to 13.0 crab per pot in 1991 (Table 7).

Large-mesh trawl surveys were conducted annually in PWS from 1991 through 1995 and occurred on a biennial basis from 1996 through 2012, and annually since 2013, except 2016 when no survey occurred (Figure 11). Data from these surveys have been used to estimate the relative abundance of Tanner crab, and to track king crab numbers within the Hinchinbrook District and portions of the Northern District in Orca Bay and adjacent fjords. The Registration Area E Tanner Crab Harvest Strategy was adopted by BOF in 2017 and uses estimates from the PWS trawl survey to potentially open or continue the closure of a Tanner crab fishery in the entire PWS management area.

The PWS trawl survey abundance estimates of legal male Tanner crab declined sharply from 135,000 crab in 1991 to less than 70,000 crab in 1992, the first 2 years of the survey (Figure 11).

After rebounding to approximately 120,000 crab in 1993, survey estimates of legal crab declined again and continued to drop precipitously through 1999 to just over 3,500 crab. The numbers of legal crab then began to increase from 6,600 crab in 2001 to 44,000 crab in 2009. In 2011 and 2013, estimates of legal male abundance reached the highest levels seen in the survey, at just over 186,000 crab in 2011 and approximately 185,000 crab in 2013. Estimates of legal male abundance again decreased over the next 2 years to just over 100,000 crab in 2015. After increasing to approximately 150,000 crab in 2017, estimates of legal male abundance again dropped to approximately 75,000 and 63,000 crab in 2018 and 2019, respectively. These recent estimates are much lower than the average of approximately 150,000 legal crab from 2011 through 2017 (Figure 11). All legal male abundance estimates reflect the historical legal size of 5.3 in and are defined as T_H in the *Registration Area E Tanner Crab Harvest Strategy* (5 AAC 35.308).

In addition to the harvest strategy being adopted by BOF in 2017, the legal size of Tanner crab was also reduced at that BOF meeting from 5.3 inches (135 mm) to 5.0 inches (127 mm). The minimum threshold in the harvest strategy to open a commercial fishery is 200,000 crab and is based on the historical legal size (T_H; 5.3 in) of male Tanner crab. This threshold has not been met since the harvest strategy was adopted.

In response to the prosecution of a commissioner's permit fishery starting in 2018 and most effort focused in the Western District, a new Tanner crab pot index survey was conducted in 2018 and 2019. This survey is in the development phase to determine the feasibility of using a pot survey as an index of abundance for this currently unassessed portion of PWS (Figure 12).

Commercial Fisheries Harvest

The PWS regulatory Tanner crab commercial fishery was last prosecuted in 1988. However, a test fishery was conducted in 2016, followed by a regulatory change adopted by BOF in 2017, that allowed ADF&G to open a commissioner's permit fishery for Tanner crab in the Eastern and Western Districts of PWS in 2018 and 2019. The long PWS fishery closure from 1989 to 2015 was due to low abundance demonstrated in the trawl survey and poor fishery performance in the later years of the commercial fishery, a span of approximately 30 years (Table 8).

Commissioner's Permit Fishery

2019 Summary

The 2019 PWS commissioner's permit Tanner crab season opened on March 1, the pot limit was 25 pots per vessel and the closure date was March 31, unless closed earlier by EO due to conservation measures. Because adverse weather conditions in the middle of the season limited participation for approximately a week in duration, ADF&G extended the season until April 7. In addition, in order to provide opportunity for prospecting in areas that had not been explored during the regular season, the Eastern District and the area of the Western District east of 148°W longitude and south of Montague Island, and not including Statistical Area 475934, opened from April 8 through April 17, with an increased pot limit of 40 pots per vessel. The initial season and all subsequent changes were established by EO.

There were 28 PWS Commercial Tanner crab Commercial Fisheries Entry Commission (CFEC) permit cards purchased, 25 commissioner's permits issued, and 14 commissioner's permit holders that participated on 14 vessels. The total harvest from the fishery was 124,707 lb from 74,405 crab in 4,853 pot lifts (includes all statistical areas), resulting in an overall fishery CPUE of 15.2 crab per pot. Fishing occurred in 12 statistical areas in the Eastern and Western Districts. Fewer than

3 vessels fished in 7 of these statistical areas; the harvest and effort information reported for these statistical areas is confidential, therefore, this information was combined. The highest effort and harvest occurred in Statistical Area 485931 in federal waters on the western boundary of the management area; 9 vessels had 2,635 pot lifts and harvested 83,837 lb of Tanner crab, with an average CPUE of 19.7 crab per pot (Table 9 and Figure 13).

There was also some successful fishing in Statistical Area 476003, where the second highest harvest of 17,522 lb occurred, which represented an increase from 2,643 lb in 2018 (Table 10). The CPUE was 12.6 crab per pot by 5 vessels that reported harvest in this area north of Montague Island (Table 9 and Figure 13).

During the 2018 fishery, most of the effort and harvest was focused in Statistical Area 486005, primarily in Icy Bay, where 1,071 pot lifts by 11 vessels harvested about 30,000 lb of Tanner crab (Table 10 and Figure 14). In 2019, some vessels started out in Statistical Area 486005 but switched to other areas when fishing proved less successful. This area still had the third highest harvest in 2019 and 9 vessels pulled 551 pots for a harvest of 10,254 lb (Table 9 and Figure 14). The CPUE in this area decreased from 13.9 crab per pot in 2018 to 9.7 crab per pot in 2019 (Tables 9 and 10).

In Statistical Area 485931, the trend was the opposite. Harvest, pot lifts, and participation increased in 2019; the most notable change was the more than threefold increase in harvest from 25,813 lb in 2018 to 83,837 lb in 2019 (Tables 9 and 10). Increased participation and harvest in this offshore statistical area is probably due to successful fishing in this area by a few vessels in 2018. CPUE in Statistical Area 485931 decreased from 21.9 crab per pot in 2018 to 19.7 crab per pot in 2019, but there was more overall effort in 2019 (Tables 9 and 10). The CPUE also dropped in this area during the 2019 fishery, from 23.6 crab per pot during the first week to 19.1 crab per pot during the final week (Table 11). Logbooks and information from required call-in reports indicated increased sorting and higher ratios of sublegal to legal crab per pot in this area as the season progressed. Overall CPUE in 2019 increased as the fishery progressed, with a slight decrease the final week of the fishery; the CPUE was 10.4 crab per pot during the first week of the fishery and peaked at 18.4 crab per pot during the fourth week (Table 11), which was somewhat similar to the progression observed in 2018 (Table 12).

Tanner crab were sampled by ADF&G staff in 3 ports: 30 landings were sampled in Seward, 15 in Cordova, and 2 in Whittier. An onboard observer monitored the fishery and collected additional samples on the discarded crab catch during 2 of those trips. The average Tanner crab weight was estimated by counting crab in weighed brailer bags. For individual landings, the average weight of Tanner crab in 2019 ranged from 1.38 lb to 1.92 lb, with an average from all trips sampled of 1.63 lb (0.74 kg; Table 13). The 2019 average weight was 0.24 lb or 12.8% less than the average weight of 1.87 lb in 2018. There were 4,420 crab sampled for carapace width and shell condition during port sampling operations. Chelae height (right claw height) was also collected during port sampling and on observer trips to assess the morphometric maturity and potentially terminally molted crab in the harvest. Tanner crab with new-shell condition composed 63% and old-shell crab composed 36% of those sampled; there were few crab with very old-shell condition observed in the harvest (<0.5%). There was a higher percentage of new-shell and a lower percentage of very old-shell crab harvested in 2019 compared to 2018 (Table 13).

Per the terms of the commissioner's permit, vessels participating in the fishery were required to call in daily. Because there is a 7-day potential lag between the time crab are landed and fish tickets are received by ADF&G, call-in reports were relied upon as a real-time management tool used to

track the harvest and CPUE throughout the fishery. The compliance rate for call-in reports improved from 2018 to 2019 but was still less than 100%.

2018 Summary

The 2018 PWS commissioner's permit Tanner crab season occurred March 1 through March 31. There were 21 PWS commercial Tanner crab CFEC permit cards purchased, 18 commissioner's permits issued, and 15 commissioner's permit holders that participated on 14 vessels. The total harvest from the fishery was 83,338 lb from 47,397 crab in 3,788 pot lifts (includes all statistical areas) resulting in an overall fishery CPUE of 12.5 crab per pot (Table 10 and Figure 14). Fishing occurred in 22 statistical areas in the Eastern and Western Districts. Fewer than 3 vessels fished in 14 of these statistical areas, therefore, the harvest and effort information reported for these statistical areas is confidential. Between 3 and 11 vessels fished in the remaining 8 statistical areas. The highest effort and harvest occurred in Statistical Area 486005; 11 vessels had 1,071 pot lifts and harvested 29,853 lb of Tanner crab, with an average CPUE of 13.9 crab per pot (Table 10). The second highest harvest of 25,813 lb occurred in Statistical Area 485931; however, this area showed the highest average CPUE, by far, of any statistical area at 21.9 crab per pot with 3 vessels fishing (Table 10).

Harvest and effort information in Statistical Area 486005 from the call-in reports indicated a substantial decrease in CPUE through the first week of the fishery, resulting in the closure of that statistical area on March 13 by EO for the remainder of the season. All other statistical areas remained open for the duration of the fishery.

Vessels were more dispersed at the beginning of the fishery because many were prospecting, and 19 statistical areas were fished from March 1 through March 10; however, fishing became more concentrated through the season, decreasing to 3 statistical areas in the last week of the fishery. Between March 11 and March 17, ADF&G fish tickets indicated the highest harvest and effort of 29,417 lb from 1,537 pot lifts. The highest average CPUE of 18.6 crab per pot occurred during the final days of the fishery, March 25 through March 31, with only 4 vessels fishing (Table 12).

Port sampling of Tanner crab by ADF&G staff was conducted in 3 ports: 13 landings were sampled in Whittier, 11 in Cordova, and 9 in Seward. An onboard observer monitored the fishery and collected additional samples on harvested crab and discarded crab catch during 2 of those trips (Table 13).

The average crab weight was collected in pounds by counting crab in weighed brailer bags. For individual landings, average weight ranged from 1.58 to 2.54 lb and the average weight derived from all trips sampled was 1.87 lb (0.85 kg; Table 13). There were 3,055 crab sampled for carapace width and shell condition: new-shell composed 34%, old-shell 44%, and 22% of the crab sampled were very old-shell. The crab with very old shells were probably in a terminally molted condition.

As part of the commissioner's permit, vessels were required to call in daily by 3:00 PM and report statistical area fished, number of pots pulled, number of legal Tanner crab harvested, and number of sublegal male Tanner crab released. The call-in information provided management with critical daily information about harvest and effort in statistical areas. Of the 14 vessels participating in the fishery, the compliance rate ranged from 27% to 100%. Ten of the 14 vessels called in less than 60% of the days they were fishing. This lack of compliance in 2018 was addressed with participants prior to the 2019 fishery. Permit holder call-in reports did not adequately identify the number of sublegal crabs released, but logbooks provided some of this information.

In Statistical Area 485931, a large amount of sublegal crab were reported, where an average of 74% of the catch was composed of sublegal male Tanner crab. Vessels that fished in Statistical Area 486005 sorted through a lot less sublegal crab and the percentage of sublegal crab in the catch ranged between 7% and 47%.

Test Fishery 2016

In response to the public's interest in a pot survey similar to the historical ADF&G index pot surveys, and due to decreased budgets with no surplus funds for survey costs, a request for quotations (RFQ) for a PWS Tanner crab test fishery was offered in February 2016 and again in September 2016. The minimum bid was 10% of legal male Tanner crab harvested paid to ADF&G for 2 lots of 300 pots each. In February 2016, there were no bids submitted, however, in September 2016, 5 bids were submitted. Provisions of the RFQ bid packet allowed up to one-third of pots to be set in locations of the "captain's choice," and remaining pots to be set in historical pot survey locations provided by ADF&G. The F/V *Miss Michelle* was the highest bidder for the contract at 12.5% for both lots.

The vessel departed Seward on November 11 and Tanner crab were landed in Kodiak on December 6, 2016; a total harvest of 3,946 lb was delivered (Table 8) with 506 lb of deadloss (13%). The total value of Tanner crab sold was $9,006. Legal male crab harvested averaged 1.99 lb per crab. In numbers of crab, a total of 1,982 legal (5.3 inches or greater) male Tanner crab were harvested in the test fishery with a total of 5,961 Tanner crab caught (legal males, sublegal males, and females; Table 14). Most of the Tanner crab caught in the fishery were in old-shell condition; 69% of legal crab were old-shell and 63% of sublegal male crab were old-shell.

For all ADF&G survey stations combined, the average number of legal male Tanner crab caught per pot was 4 crab, the highest catches were in the Northern District, and the average was 7 legal crab per pot. The average number of total Tanner crab caught (legal, sublegal males, and females) in ADF&G survey stations was 17 crab per pot. For the captain's choice pots (all in Northern District), the average number of legal male Tanner crab caught was 30 crab per pot, and the average total crab caught was 68 crab per pot (Table 14).

A total of 206 pots were set, and 23% of those pots were set at captain's choice locations (48 pots; Table 14). Although fewer than one-quarter of pots set were captain's choice, 71% of legal male crab came from those captain's choice pots. Nearly all the captain's choice pots were set in a concentrated area of the Northern District corresponding to the most productive ADF&G station (N03; Figure 15). In station N03, the 4 pots set averaged a catch of 35 legal crab per pot. This area is in the mouth of Orca Bay on the north side of Port Gravina. The captain's choice pots with the highest catches in this area were set at depths between 70 and 75 fathoms.

The original plan outlined by the test fishery RFQ designated 600 total pot sites and 200 of those captain's choice sites. Pot sites corresponded to an ADF&G survey station, and for the area fished, there were 4 pot sites per station. Due to poor weather, time constraints, smaller vessel size (48 feet), vessel mechanical issues, and low Tanner crab CPUE, the test fishery was not completed in its entirety. There never was a weather window to attempt to set gear in Gulf of Alaska stations (Eastern and Outside Western Districts).

All Tanner crab pots used in the test fishery were the same configuration of 6 foot by 6 foot pyramid style pots, tapering up to 4 foot by 4 foot with a top opening of 28 inches square. Plastic squares were inserted around the perimeter of the opening to help prevent crab from escaping.

Mesh openings were 3.5 inches stretched measure. All escape rings were closed using zip ties in order to catch sublegal and female Tanner crab. Herring and Pacific cod were used for bait.

Historical Fishery

The PWS commercial Tanner crab fishery began in 1968 when 1.2 million lb were landed. The harvest peaked at 13.9 million lb in the 1972/73 season, which was 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. The final 3 years of the fishery, 1986 to 1988, yielded smaller harvests of approximately 0.5 million lb (Table 8).

Potential 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. 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 GHL. Handling mortality of undersized and female crab may have contributed to the decline, particularly during fishing seasons of 7 months duration, which encompassed some of the molting and mating seasons. Finally, and perhaps more importantly, changes in environmental conditions, documented throughout the Gulf of Alaska, 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 (Rumble et al. 2014).

Noncommercial Fisheries Harvest

Shellfish, including crab, have a long history of harvest in the PWS. All noncommercial fisheries were closed by regulation in 1999 after years of documented declines in abundance by ADF&G surveys (Rumble et al. 2014). In 2008, the BOF opened a subsistence fishery for Tanner crab following rising estimates of legal male Tanner crab abundance from trawl survey results. Participation and harvest increased in the first 5 seasons the PWS subsistence Tanner crab fishery was open, and have been consistent for the past 6 seasons (Tables 15 and 16).

Prior to 2008, there was no mechanism to directly monitor effort or harvest of Tanner crab in historical noncommercial fisheries within PWS. Data from DSF SWHS indicated an annual harvest range of between 137 and 537 crab, and an average annual harvest of 300 Tanner crab from 1994 to 1998 (Howe et al. 1995–1996, 2001a–c), which seems low, considering the harvest of Tanner crab after the subsistence fishery opened in 2008. Limited data developed through household interviews by ADF&G Division of Subsistence staff suggested that subsistence harvests totaled less than 4,900 Tanner crab among all PWS communities in 1997 (ADF&G 1999). No harvest occurred between 1999 and 2008 when the noncommercial fisheries were closed by regulation.

In March 2008, the BOF made a positive customary and traditional (C&T) use finding for Tanner crab in PWS and subsequently opened a subsistence fishery, which is open to Alaska residents only and is monitored through a required permit system. Information collected included total harvest of legal male crab and the number of Tanner crab released (legal males, sublegal males, and females). A map has been provided to permit holders with a requirement to report location fished by statistical area (Figure 16).

The number of permits issued for this fishery has averaged approximately 200 from the 2014/15 season through the 2018/19 season. Participation has remained steady, although 50% or less of

permit holders actually participated in the fishery in all seasons except the 2012/13 season when it reached a high of 58%. This was probably the result of fishing success where the average catch of 24 legal male crab per permit was the highest harvest in this permit fishery's history (Table 15).

During the 11 seasons when the subsistence fishery was open, the 2012/13 season harvest was exceptional. This above-average harvest success (Table 15) was corroborated by the ADF&G survey results of Tanner crab abundance from 2011 and 2013 (Figure 11). All of the metrics of the fishery were high, including the 368 trips made; the next highest was 225 trips during the 2015/16 season (Table 15). The number of legal males harvested reached a high of 2,067 crab in the 2012/13 season; the next highest harvest was 1,073 legal male crab in the 2017/18 season (Table 15). Also, the total number of legal crab caught, which is the number of legal male crab harvested plus the number of legal male crab released, was the highest on record at 3,514 male crab (Table 15 and Figure 17). The number of sublegal male crab that were released during the 2012/13 season was 3 times higher than any other season, close to 5,000 crab (Table 15).

At the 2017 BOF meeting, the bag and possession limit was increased from 5 legal crab per person to 12 legal crab per person. With this increase, the legal male Tanner crab harvested increased from 548 crab in the 2016/17 season to 1,073 crab during the following season. However, in the 2018/19 season, the harvest dropped to 624 crab and total legal crab caught dropped to 876 crab, the lowest values since the 2011/12 season (Table 15 and Figure 17).

For the recent subsistence fishery, or from the 2008/09 season through the 2018/19 season, the statistical areas associated with Orca Bay had the highest harvest, with an average of 433 crab taken annually; these areas are geographically close to the port of Cordova. The Northwest area, which contains statistical areas that are closest to the port of Whittier, had the second highest seasonal harvest, and an average of 137 crab harvested annually. Over the last 2 seasons, there has been a shift in fishery location; harvest has increased in the Northwest portion of PWS and decreased in Orca Bay (Table 16 and Figure 18).

Commercial Fishery Regulations

At the 2017 BOF meeting, a PWS Tanner crab harvest strategy was proposed by ADF&G and adopted by the BOF. Prior to adoption of the harvest strategy, regulations prohibited a commercial fishery from being opened. The legal size of Tanner crab was also reduced from 5.3 in (135 mm) to 5.0 in (127 mm) at the 2017 BOF meeting. Elements of the *Registration Area E Tanner Crab Harvest Strategy* (5 AAC 35.308) include thresholds that must be met before a commercial fishery can open. These thresholds were developed from historical fishery and ADF&G survey information and were based on the abundance of historical legal-size Tanner crab (T_H; 5.3 in), although the fishery may harvest male crabs at the new legal size, 5.0 in, and larger. The minimum stock threshold of T_H is 200,000 crab for the commercial fishery to open. If the fishery has been closed for 3 or more consecutive years, then the minimum T_H threshold must be achieved for 2 or more years before the fishery may open. In addition, different abundance levels trigger distinct harvest rates or GHLs. These tiers are defined in the harvest strategy; the higher the T_H estimate, the higher the harvest rate, ranging from a minimum of 15% to a maximum of 25% if T_H is greater than or equal to 400,000 crab. Another provision of the harvest strategy allows for the GHL to be reduced or the commercial fishery closed if the estimated commercial harvest would cause T_H to fall below the minimum stock threshold. This harvest strategy also contains a provision that opens a sport fishery for Tanner crab in PWS if the commercial fishery is opened as provided in 5 AAC 55.022 (b)(3), which contains the methods and means for this sport fishery.

Other regulations passed by the BOF in 2017 that drive management of the PWS commercial Tanner crab fishery include the following:

1) Registration deadline 30 days before commercial opening (5 AAC 35.306);
2) Season dates are January 15 through March 31 in Northern and Hinchinbrook Districts, unless changed by emergency order (5 AAC 35.310);
3) Size limit of 5.0 inches or larger of male Tanner crab (5 AAC 35.320);
4) Operation of gear from 8:00 AM to 6:00 PM (5 AAC 35.325 (g));
5) Maximum pot limit of 30 pots, which could be reduced by ADF&G depending on: number of registrants, CPUE during the fishery, or GHL (5 AAC 35.325 (d));
6) ADF&G inspection if they deem it necessary (5 AAC 35.345);
7) Not allowing operation of pot gear within 30 days of the opening of the season to deter prospecting (5 AAC 35.325 (b));
8) Pot storage requirements for rectangular pots (5 AAC 35.327 (a));
9) Log sheet requirement (5 AAC 35.350); and
10) Daily call-in requirement (5 AAC 35.358).

The harvest strategy regulates the prosecution of the Tanner crab commercial fishery in all districts of PWS. In 2017, the BOF also adopted a regulation to allow commissioner's permits for Tanner crab in Registration Area E (5 AAC 35.311) that allows for a limited fishery in the Eastern and Western Districts only. The commissioner's permit fishery has a larger maximum pot limit of 50 pots. Other provisions, including season dates, are somewhat broad to allow flexibility for specifying requirements on the permit, as needed, for conservation and management purposes.

PWS is designated a superexclusive registration area for commercial fishing of Tanner crab (5 AAC 35.306) and therefore a vessel used to harvest Tanner crab may not be used to take Tanner crab in any other registration area during that registration year (5 AAC 35.005). Additionally, an operator of a Tanner crab vessel validly registered for a superexclusive registration area may not operate any other Tanner crab vessel registered for any other superexclusive registration area in the same registration year (5 AAC 35.020 (h)).

Noncommercial Fisheries Regulations

The PWS subsistence Tanner crab fishery has been open for 11 seasons (Table 15). The season is open from October 1 through March 31. Participants in the subsistence fishery must obtain a permit according to 5 AAC 02.206, and Tanner crab may only be taken using pots, ring nets, dip nets, diving gear, hooked or hookless hand lines, or by hand (5 AAC 02.207 (1)). Only 2 pots may be fished per person and a maximum of 2 pots per vessel (5 AAC 02.206 (3)). Pots must have 2 escape rings that are at least 4⅜ inches inside diameter (5 AAC 02.207 (2)). Buoy and line requirements also exist. Certain waters, including Port Valdez, Galena Bay, Port Fidalgo, and Port Gravina, remain closed to subsistence Tanner crab harvest (5 AAC 02.236; Figure 16).

Two regulatory changes occurred at the 2017 BOF meeting. The legal size limit for male Tanner crab was reduced from 5.5 inches to 5.0 inches, and females and sublegal males must be returned to the sea. The daily bag and possession limit was increased from 5 legal male Tanner crab per permit holder to 12 legal crab.

Mandatory permits require harvest information, including date of harvest, area of harvest, number of pots fished, number of legal male Tanner crab harvested, number of legal male Tanner crab discarded, number of sublegal male Tanner crab caught, and the number of females captured. This harvest information must be recorded each time the crab pots are pulled. The permit must be returned by April 15 each season.

PRINCE WILLIAM SOUND KING CRAB

Research Results

Both red and golden king crab have been caught in the PWS large-mesh trawl survey. Numbers of red king crab caught in the survey have ranged between 0 to 2 crab in a given year and none have been caught in the survey since 2005, whereas only 2 golden king crab have ever been captured in the history of the survey (1995 and 1997; Goldman et al. 2018; Rumble et al. 2014). ADF&G conducted a 3-year pot survey for golden king crab in western PWS from 2004 through 2006[1]. Data obtained over the course of that 3-year survey provided an indication that the golden king crab numbers in the Knight Island Passage area of PWS appear stable, but were at low levels, and not close to being high enough to sustain commercial harvest (Rumble et al. 2014).

Commercial Fisheries Harvest

The first commercial harvest of king crab in PWS occurred in 1957 (Kaydas and Koppen 1957). The fishery quickly developed, and the second highest harvest of 246,965 lb was landed in 1960 (Table 17). Species separation of the king crab species in harvest reporting began in the 1979/80 season. In 1972, 296,200 lb of primarily blue king crab were landed. Between 1979 and 1984, both blue and red king crab harvest declined, and commercial fisheries for both these species were closed by EO from the 1984/85 season through the 1990/91 season, and also from 1991 through 1998. These closures coincided with the development of the golden king crab fishery from 1982 to 1989 (Rumble et al. 2014).

Harvest levels of golden king crab were relatively small for the duration of the fishery or from the 1979/80 season through the 1988/89 season, with negligible harvest in the first 3 seasons (Table 17). During the fishery, the average weight of the crab decreased from 9.7 lb in the 1982/83 season to 6.6 lb in the 1988/89 season. Because of the low harvest level and the decrease in average size of harvested crab, the BOF established a guideline harvest range (GHR) of between 40,000 and 60,000 lb for the fishery. For the following years, the lower end of the GHR was not achieved leading to a closure of the commercial fishery in 1992 and the following season. Although the fishery did reopen for a month during the 1994/95 season, participation and harvest were low, and the fishery was closed by EO each season until the BOF closed it by regulation in 1999 (Rumble et al. 2014).

Noncommercial Fisheries Harvest

There was no mechanism in place to directly monitor the effort or harvest in noncommercial king crab fisheries in PWS. Unpublished data from the DSF SWHS indicates that some limited sport fish catch of king crab occurred in 1997 and 1998, and limited data developed through household

[1] Goldman, K. G., and M. Spahn. *Unpublished*. Prince William Sound golden king crab abundance and distribution. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.

interviews by ADF&G Division of Subsistence staff suggested that subsistence harvests totaled fewer than 150 king crab among all PWS communities in 1997 (ADF&G 1999).

In March 2008, the BOF made a positive C&T use finding for king crab in PWS and subsequently opened a subsistence fishery, which is only open to Alaska residents. Harvest in this fishery is monitored with a required permit and administered in conjunction with the subsistence Tanner crab fishery. Harvest and participation have remained low since the fishery opened in 2008; the number of trips has ranged from 0 in 2012/13 to a high of 42 in the 2018/19 season (Table 18). During the 2018/19 season, the highest number of golden king crab were caught in all categories since the subsistence fishery was implemented in 2008. During the 2018/19 season, there were 181 legal male golden king crab caught (47 crab retained), 230 sublegal male crab released, and 605 female crab released (Table 18).

Commercial Fisheries Regulations

The commercial harvest of king crab in Registration Area E is closed until the crab stocks have recovered enough for a harvest strategy to be developed by ADF&G and adopted by the BOF (5AAC 34.210).

Registration Area E is a superexclusive registration area for king crab. Other regulations in the fishery allow only male king crab 7 inches (178 mm) or greater (red and golden king crab) or 5.9 inches (150 mm) or greater (blue king crab) width of the shell to be taken or possessed. King crab may be harvested only with king crab pots; pot marking requirements are specified in 5 AAC 34.051. Pots may be stored in the waters before and after the fishery with no bait and doors open (5 AAC 34.227). Inspection requirements exist for vessels participating in the fishery before the season opens according to 5 AAC 35.030. Past regulatory seasons provided 2 open periods, October 1 to December 20, and January 15 to March 15. A GHR for golden king crab is defined in 5 AAC 34.217 at 40,000 to 60,000 lb.

Noncommercial Fisheries Regulations

The noncommercial king crab fishery is restricted to subsistence harvest of golden king crab, which may only be harvested west of long 147°20.00′W. (Figure 16). Only male golden king crab with a carapace width of 7.0 inches (178 mm) or greater may be retained, and there is an annual household limit of 3 legal crab. All other regulations in the fishery are identical to the subsistence Tanner crab fishery: the season is open from October 1 through March 31 and participants in the subsistence fishery must obtain a permit according to 5 AAC 02.206. King crab may only be taken with pots, ring nets, dip nets, diving gear, hooked or hookless hand lines, or by hand (5 AAC 02.207 (1)). Only 2 pots may be fished per person and a maximum of 2 pots per vessel are allowed (5 AAC 02.206 (3)). Pots must have 2 escape rings that are at least 4⅜ inches inside diameter (5 AAC 02.207 (2)). Buoy and line requirements also exist.

Mandatory permits require the following harvest information to be recorded: date of harvest, statistical area of harvest, number of pots fished, number of legal male golden king crab retained, number of legal male golden king crab released, number of sublegal male golden king crab released, and the number of females released. This harvest information must be recorded each time the crab pots are pulled. The permit must be returned by April 15 after each season.

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TABLES AND FIGURES

Table 1.–Cook Inlet Area (Registration Area H) commercial Tanner crab harvest by district, 1968–2019 seasons.

	Southern		Kamishak/Barren Islands		Outer/Eastern		Central		
Season	Vessels	Harvest	Vessels	Harvest	Vessels	Harvest	Vessels	Harvest	Harvest
1968/69		1,388,282		12,398		816			1,401,496
1969/70		1,147,154		71,196		104,191			1,322,541
1970/71		1,046,803		541,212		3,000			1,591,015
1971/72		2,462,956		974,962		804,765			4,242,683
1972/73		2,935,662		3,361,023		1,266,023			7,562,708
1973/74		1,387,535		4,689,251		1,891,021			7,967,807
1974/75		967,762		2,150,462		656,660			3,774,884
1975/76		1,339,245	17	3,281,084		850,964			5,471,293
1976/77	35	2,009,633	24	1,765,926		824,520			4,600,079
1977/78	55	2,806,568	28	2,077,092		502,049			5,385,709
1978/79	75	2,323,420	27	2,713,339		694,728			5,731,487
1979/80	68	1,134,940	24	3,338,623		595,645			5,069,208
1980/81	46	1,047,630	20	1,757,331		463,201			3,268,162
1981/82	41	548,529	18	1,286,332	9	524,897			2,359,758
1982/83	48	584,908	20	1,693,794	20	682,919			2,961,621
1983/84	45	996,763	17	1,373,674	14	443,384			2,813,821
1984/85	83	1,229,298	19	1,535,547	7	259,083			3,023,928
1985/86	103	1,164,261	24	1,288,711	5	177,041			2,630,013
1987	87	1,077,379	21	1,111,339	13	251,174	2	7,771	2,447,663
1988	127	944,763	24	417,182	23	168,969	3	8,396	1,539,310
1989		closed		closed		closed		closed	closed
1990		closed	7	510,034		closed		closed	510,034
1991	68	271,379	8	266,106		closed		closed	537,485
1992	110	354,868		closed	16	53,049		closed	407,917
1993	136	534,003		closed		closed		closed	534,003
1994	110	284,676		closed		closed		closed	284,676
1995–2019		closed		closed		closed		closed	closed

Note: blank cells indicate no data.

Table 2.–Cook Inlet Area noncommercial (sport and subsistence) Tanner crab fishery effort and harvest reported on ADF&G permits, 2008–2019 seasons.

		Effort (crabber days)[a]			Harvest (number of crab)[a]		
Year	Location	Sport	Subsistence	Total	Sport	Subsistence	Total
2008/09	A			3			0
	B			249			823
	C			19			9
	D			1,203			3,443
	E			3,580			12,742
	Unknown			54			156
	Total			5,108			17,173
2009/10[b]	A			5			20
	B			357			1,320
	C			128			241
	D			1,149			3,358
	E			3,625			13,783
	Unknown			23			105
	Total			5,287			18,827
2010/11[b]	A			14			34
	B			197			610
	C			31			41
	D			759			1,708
	E			3,537			10,968
	Unknown			185			384
	Total			4,723			13,745
2011/12[b]	A			9			21
	B			104			372
	C			19			48
	D[c]			518			1,509
	E[c]			2,145			6,762
	Unknown			68			267
	Total			2,863			8,979
2017/18[b]	A	2	1	3	4	3	7
	B	7	0	7	15	0	15
	C	45	5	50	48	15	64
	D	163	0	163	338	0	338
	E	2,939	131	3,070	7,744	345	8,089
	Unknown	55	0	55	116	0	116
	Total	3,211	137	3,348	8,266	363	8,629
2018/19[bd]	A	15	0	15	28	1	29
	B	8	13	21	45	1	46
	C	118	0	118	308	5	313
	D	129	0	129	242	0	242
	E	2,882	123	3,005	7,886	253	8,139
	Unknown	0	0	0	0	0	0
	Total	3,152	136	3,288	8,509	260	8,769

[a] Single permit issued for all users 2008–2012 seasons; split into sport and subsistence permits for 2017/18 season.

[b] Harvest numbers were expanded for non-respondents.

[c] Fishery closed by emergency order September 6, 2011.

[d] Separate sport and subsistence permits issued online beginning in 2017/18 season.

[e] Online reporting did not show unknown area beginning in 2018/19 season.

Table 3.–Cook Inlet Area noncommercial (sport and subsistence) Tanner crab permits issued, 2008–2019 seasons.

	Number of permits issued[a]			Percent of permits fished[a]		
Season	Sport	Subsistence	Total	Sport	Subsistence	Total
2008/09			1,611			61%
2009/10			1,457			63%
2010/11			1,592			62%
2011/12[b]			1,023			54%
2017/18[c]	1,782	148	1,930	55%	34%	53%
2018/19	1,570	182	1,752	61%	62%	61%

[a] Single permit issued for all users 2008/09–2011/12 seasons; split into sport and subsistence permits for 2017/18 season.

[b] Fishery closed by emergency order September 6, 2011.

[c] Personal use fishery was repealed after BOF determined that it was redundant with the sport fishery.

Table 4.–Cook Inlet Area noncommercial (sport and subsistence) Tanner crab harvest (number of crab) and GHL grouped by noncommercial area (A–E), 1981–2019.

Year	Total Harvest[a,b]	Harvest Area A–C[c]	GHL Area A–C	Harvest Area D–E[c]	GHL Area D–E	Unknown
1981	4,320					
1982	4,234					
1983	3,084					
1984	2,332					
1985	3,502					
1986	7,926					
1987	8,988					
1988	4,669					
1989–90	closed					
1991	1,142					
1992	4,165					
1993	9,206					
1994	9,648					
1995	10,936					
1996	12,059	306		11,607		146
1997	11,376	815		10,415		146
1998	16,763	46		15,671		1,046
1999	17,045	792		15,664		589
2000	19,672	204		18,557		911
2001[d]	6,499	76		6,306		117
2002[e]	3,574	10		3,459		105
2003–2007	closed					
2008–2009[d]	17,173	832	16,212	16,185	13,373	156
2009–2010[e]	18,827	1,581	20,797	17,141	14,860	105
2010/11[e]	13,745	685	28,984	12,676	18,284	384
2011/12[e]	8,979	441	18,058	8,271	11,709	267
2012/13			closed			
2013/14			closed			
2014/15			closed			
2015/16			closed			
2016/17			closed			
2017/18[e]	8,629	86	none	8,427	none	116
2018/19[e]	8,769	388	none	8,381	none	0

Note: blank cells indicate no data.

[a] Harvest estimate from Statewide Harvest Survey (SWHS) 1981–1995.

[b] Harvest reported on Tanner crab harvest permits 1996–present, with harvest data available by Area A–E.

[c] Unknown not included in Area A–C and D–E harvest totals.

[d] Harvest reporting changed from calendar year to season (July–March).

[e] Harvest numbers are expanded for non-respondents.

Table 5.–Male and female red king crab caught (number) in the Kachemak and Kamishak Bay trawl surveys, 1990–2019.

	Kachemak			Kamishak		
Year	No. of Tows	Females	Males	No. of Tows	Females	Males
1990	14	2	4	24	4	6
1991	15	8	102	17	0	7
1992	15	81	51	25	3	17
1993	16	21	15	15	0	2
1994	16	10	11	17	0	3
1995	16	1	3	24	4	6
1996	16	2	5	18	9	31
1997	16	0	1	18	67	57
1998	16	0	0	22	5	14
1999	16	0	2	19	0	2
2000	16	0	2	24	9	131
2001	16	0	4	24	53	79
2002	14	0	0	19	1	5
2003	16	0	2	17	0	3
2004	16	0	3	22	2	6
2005	15	0	0	21	1	0
2006	17	0	0	27	10	8
2007	16	0	0	24	5	6
2008	16	0	0		No survey	
2009	15	0	0		No survey	
2010		No survey		23	1	0
2011	37	0	0		No survey	
2012	37	0	0	23	0	2
2013	37	0	0		No survey	
2014–2016		No survey			No survey	
2017	38	0	0		No survey	
2018	39	0	0		No survey	
2019	38	0	0		No survey	

Table 6.–Cook Inlet Area commercial king crab harvest (lb) by district, 1960–1984 seasons.

	District			
Year	Southern	Kamishak and Barren Islands	Outer	Total
1960/61	2,699,680	986,551	118,067	3,804,298
1961/62	1,619,642	3,642,500	368,909	5,631,051
1962/63	2,769,343	5,509,708	343,505	8,622,556
1963/64	1,960,426	4,915,303	59,352	6,935,081
1964/65	1,892,479	1,850,572	963	3,744,014
1965/66	1,948,012	1,684,346	14,491	3,646,849
1966/67	1,347,904	1,386,008	89,510	2,823,422
1967/68	1,117,394	1,883,605	239,518	3,240,517
1968/69	750,906	1,711,296	87,302	2,549,504
1969/70	1,464,721	1,688,803	73,644	3,227,168
1970/71	1,540,018	2,115,991	9,468	3,665,477
1971/72	1,992,224	2,868,315	12,657	4,873,196
1972/73	1,391,024	2,756,023	1,966	4,149,013
1973/74	1,971,841	2,236,131	5,613	4,213,585
1974/75	1,816,512	2,965,310	2,035	4,783,857
1975/76	1,674,872	1,832,484	45,293	3,552,649
1976/77	1,035,316	3,103,895	16,384	4,155,595
1977/78	584,090	1,099,279	1,350	1,684,719
1978/79	664,388	480,261	1,753	1,146,402
1979/80	853,584	489,365	4,871	1,347,820
1980/81	508,670	1,635,922	8,022	2,152,614
1981/82	183,899	1,371,821	4,142	1,559,862
1982/83	closed	807,079	15,280	822,359
1983/84	closed	188,027	4,504	192,531
1984–2019	closed	closed	closed	closed

Table 7.–Tanner crab catch by pot surveys of traditional stations in the Northern and Hinchinbrook Districts, Prince William Sound Area, 1977–1991.

Year	Number of pots	Male Tanner crab	Female Tanner crab	Total Tanner crab (both sexes)	Mean Tanner crab per pot
1977	51	2,773	1,972	4,745	93
1978	146	6,376	1,099	7,475	51.2
1979	237	16,831	3,210	20,041	84.6
1980	240	11,012	2,092	13,104	54.6
1981	216	8,114	1,064	9,178	42.5
1982	224	4,734	849	5,583	24.9
1983	180	3,225	573	3,798	21.1
1984	178	3,440	610	4,050	22.8
1985	163	2,191	212	2,403	14.7
1986	168	2,473	570	3,043	18.1
1987	138	2,336	1,010	3,346	24.2
1988	119	1,195	750	1,945	16.3
1989	114	1,640	459	2,099	18.4
1990	109	1,336	255	1,591	14.6
1991	81	724	331	1,055	13

Note: The fishery was closed in 1989.

Table 8.–Prince William Sound Area commercial Tanner crab harvest, 1968–2019 seasons.

Season[a]	Vessels	Landings	Harvest by area (lb)				Total	Mean weight (lb/crab)	Number of crab
				Inside	Outside				
1968/69							1,235,613		
1969/70							1,284,597		
1970/71							4,159		
1971/72							7,788,498		
1972/73							13,927,868		
1973/74				1,658,000	8,500,000		10,158,000		
1974/75				1,187,000	2,667,000		3,854,000		
1975/76				3,322,482	3,810,262		7,132,744		
			Northern	Hinchinbrook	Western	Eastern	Total		
1976/77[b]	23	316	782,048	766,650	701,725	70,925	2,321,348		
1977/78	38	591	994,721	1,161,831	2,079,549	570,573	4,806,674	2.2	2,184,852
1978/79	51	783	649,977	708,562	2,248,545	3,443,471	7,050,555	2.1	3,357,408
1979/80	49	561	140,228	332,583	1,462,059	4,057,847	5,992,717	2.0	2,996,359
1980/81	30	304	152,196	812,352	1,561,207	250,076	2,775,831	2.1	1,321,824
1981/82	29	216	351,139	722,834	1,503,253	288,425	2,865,651	ND	
1982/83	40	304	471,422	31,447	921,663	45,308	1,469,840	2.1	699,924
1984[c]	0	0	Closed	Closed	Closed	No Effort	0		
1985	0	0	Closed	Closed	No Effort	No Effort	0		
1986	14	35	137,720	236,241	160,829	587	535,377	2.1	254,941
1987	23	65	152,834	222,052	196,246	0	571,132	2.1	271,968
1988	21	46	55,929	226,509	191,654	0	474,092	2.1	225,758
1989–2017							FISHERY CLOSED		
2016[d]							3,946		
2018[e]							83,338		
2019[e]							124,707		

Note: blank cells indicate no data.

[a] Closed from 1989 to 2017.

[b] New districts and minimum legal size established.

[c] Calendar year season established.

[d] Tanner crab test fishery conducted in 2016.

[e] Tanner crab commissioner's permit fishery prosecuted in Eastern and Western Districts in 2018 and 2019 (harvest from Eastern District confidential).

Table 9.–Prince William Sound Area commissioner's permit commercial Tanner crab harvest in the Eastern and Western Districts, 2019.

Statistical Area	Pot Lifts	Harvest (number)	Harvest (lb)	Percent of harvest	CPUE (crab/pot)	Vessels
476003	793	9,962	17,522	14%	12.6	5
476007	472	3,436	6,174	5%	7.3	4
476008	158	2,062	3,914	3%	13.1	4
485931	2,635	51,992	83,837	67%	19.7	9
486005	551	5,324	10,254	8%	9.7	9
476002/476004/476005/476006	74	196	333	0%	2.6	4
476031/476032/486001	170	1,433	2,673	2%	6.8	3
Total	4,853	74,405	124,707		15.2	14

Table 10.–Prince William Sound Area commissioner's permit commercial Tanner crab harvest in the Eastern and Western Districts, 2018.

Statistical area	Pot lifts	Harvest (number)	Harvest (lb)	% of harvest	CPUE (crab/pot)	Vessels
476002	48	30	51	0%	0.6	3
476003	128	1,537	2,643	3%	12	5
476004	26	107	203	0%	4.1	4
476005	21	86	173	0%	4.1	3
476007	895	7,028	10,873	13%	7.9	6
485931	732	16,039	25,813	31%	21.9	3
486001	313	4,025	7,724	9%	12.9	7
486005	1,071	14,867	29,853	36%	13.9	11
Other[a]	554	3,678	6,006	7%	6.6	11
Totals	3,788	47,397	83,338		12.5	

[a] Includes statistical areas where harvest is confidential: 456001, 466001, 466004, 466005, 475931, 475932, 475933, 476006, 476008, 476009, 476032, 485935, 486002, 486031.

Table 11.–Prince William Sound Area commissioner's permit Tanner crab fishery harvest and effort information derived from fish tickets, 2019.

Dates	Vessels fished	Statistical areas fished	Pot lifts	Harvest (number)	Harvest (lb)	Avg CPUE (crab/pot)
March 1–7	8	6	701	7,304	12,960	10.4
March 8–14	9	9	1,285	19,079	33,098	14.8
March 15–21	7	4	458	7,067	11,732	15.4
March 22–28	8	4	562	10,353	17,299	18.4
March 29–April 8	9	7	1,847	30,602	49,888	16.6
April 9–17	confidential					

Table 12.–Prince William Sound Area commissioner's permit Tanner crab fishery harvest and effort information derived from fish tickets, 2018.

Dates	Vessels fished	Statistical areas fished	Pot lifts	Harvest (number)	Harvest (lb)	Avg. CPUE (crab/pot)
March 1–10	10	19	1,100	10,736	20,900	9.8
March 11–17	11	15	1,537	15,952	29,417	10.4
March 18–24	5	5	577	10,022	15,854	17.4
March 25–31	4	3	574	10,687	17,167	18.6

Table 13.–Prince William Sound Area Tanner crab sampling summary, including minimum, maximum, and average crab weight (WT), carapace width (CW), and shell condition, 2018–2019.

			Average weight and carapace width				Shell condition			
Year	Min wt (lb)	Max wt (lb)	Wt (lb)	Wt (kg)	CW (in)	CW (mm)	New	Old	Very old	Number crab sampled
2018	1.58	2.54	1.87	0.85	5.47	139	34%	44%	22%	3,055
2019	1.38	1.92	1.63	0.74	5.20	132	63%	36%	<0.5%	4,420

Table 14.–Prince William Sound Area Tanner crab test fishery catch by district and average crab per pot, 2016.

District	Number of pots	Legal male Tanner crab	Average legal male Tanner crab per pot	Sublegal male Tanner crab	Female Tanner crab	Total Tanner crab	Average total Tanner crab per pot
				ADF&G survey stations			
Hinchinbrook	49	44	<1	229	6	279	6
Northern	67	485	7	1,010	12	1,507	22
Western	42	37	<1	837	22	896	21
ADF&G totals	158	566	4	2,076	40	2,682	17
				Captain's choice sites			
Northern	48	1,416	30	1,781	82	3,279	68
				Test fishery totals			
Combined all pots	206	1,982	9	3,857	122	5,961	29

Note: ADF&G survey stations and captain's choice pots (Northern District only).

Table 15.–Prince William Sound Area subsistence Tanner crab harvest, catch, and effort, 2008–2019 seasons.

						Catch (number of crab)					
Year	Permits issued	Permits not fished	Permits fished	Participation %	Total trips made	Legal males harvested	Total legal males released	Total legal crab caught	Total sublegal crab released	Total female crab released	Average harvest per permit fished
2008/09	115	75	40	35%	82	44	5	49	127	18	1
2009/10	93	60	33	35%	74	85	16	101	265	55	3
2010/11	73	44	29	40%	61	78	11	89	223	18	3
2011/12	79	45	34	43%	91	213	41	254	465	77	6
2012/13	151	64	87	58%	368	2,067	1,447	3,514	4,892	750	24
2013/14	173	93	80	46%	186	629	274	903	1,515	185	8
2014/15	211	120	91	43%	221	793	1,249	2,042	1,679	204	9
2015/16	206	113	93	45%	225	816	2,370	3,186	1,582	219	9
2016/17	183	92	91	50%	192	548	1,259	1,807	1,050	191	6
2017/18	179	109	70	39%	196	1,073	344	1,417	740	100	15
2018/19	192	96	96	50%	202	624	252	876	713	219	7

Table 16.–Prince William Sound Area subsistence Tanner crab harvest by location, 2008–2019 seasons.

	Season											
Location	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Average annual harvest
Orca Bay [a]	0	0	5	32	1,935	520	713	566	333	463	193	433
Northwest [b]	30	45	26	42	87	104	115	176	152	427	307	137
Northern [c]	0	6	25	97	4	11	6	14	3	40	19	20
Southwest [d]	13	32	34	103	32	6	23	43	32	31	135	44
Hinchinbrook [e]	0	0	0	0	19	1	32	50	29	67	0	18
Totals	43	83	90	274	2,077	642	889	849	549	1,028	654	

[a] Statistical Areas 456031, 456032, 466031, and 466032.

[b] Statistical Areas 476033, 486031, 486033, and 486034.

[c] Statistical Areas 466033, 476034, 476035, 476036, and 476101.

[d] Statistical Areas 476004, 476005, 476006, 476007, 486001, and 486005.

[e] Statistical Area 466003.

Table 17.–Prince William Sound Area commercial king crab harvests, 1960–2019.

Season[a,b,c]	Vessels	Landings	King crab harvest biomass (lb) Red	Blue	Golden	Total	Avg. wt. 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	ND
1981/82	11	43	25,358	5,634	0	30,992	ND
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	ND
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]	ND
1991/92	[d]	[d]	[d]	[d]	[d]	[d]	ND
1992/93	0	0	closed	closed	closed	0	
1993/94	0	0	closed	closed	closed	0	
1994/95	[d]	[d]	closed	closed	[d]	[d]	
1996–2019			closed by regulation				

Note: blank cells indicate no data.

[a] Fishery closed 1995–1999 by emergency order.

[b] Seasons closed by regulation effective August 1999.

[c] Catch not reported by species prior to the 1979/80 season.

[d] Data are confidential under AS 16.05.815.

Table 18.–Prince William Sound Area subsistence golden king crab fishery annual effort, harvest, and catch, 2008–2019 seasons.

Season	Number of legal crab retained	Number of legal crab released	Total legal crab caught	Number of sublegal released	Number of females released	Number of trips
2008/09	5	8	13	9	12	13
2009/10	3	7	10	21	22	9
2010/11	12	0	12	5	8	12
2011/12	10	8	18	23	39	9
2012/13	0	0	0	0	0	0
2013/14	27	2	29	6	97	20
2014/15	35	22	57	15	179	24
2015/16	16	7	23	9	39	16
2016/17	5	0	5	4	7	15
2017/18	6	4	10	12	27	6
2018/19	47	134	181	230	605	42

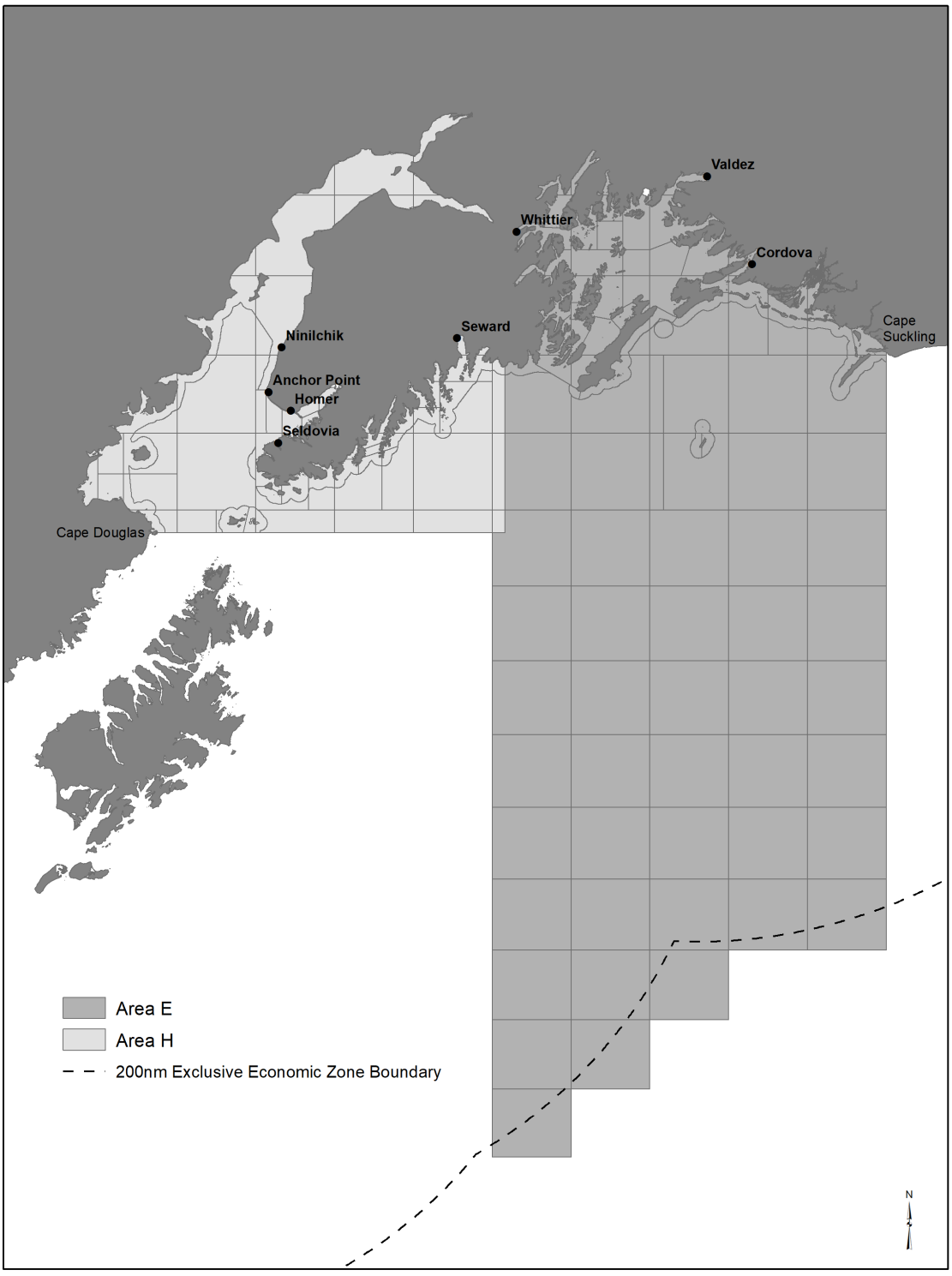

Figure 1.–Cook Inlet (Area H) and Prince William Sound (Area E) registration areas.

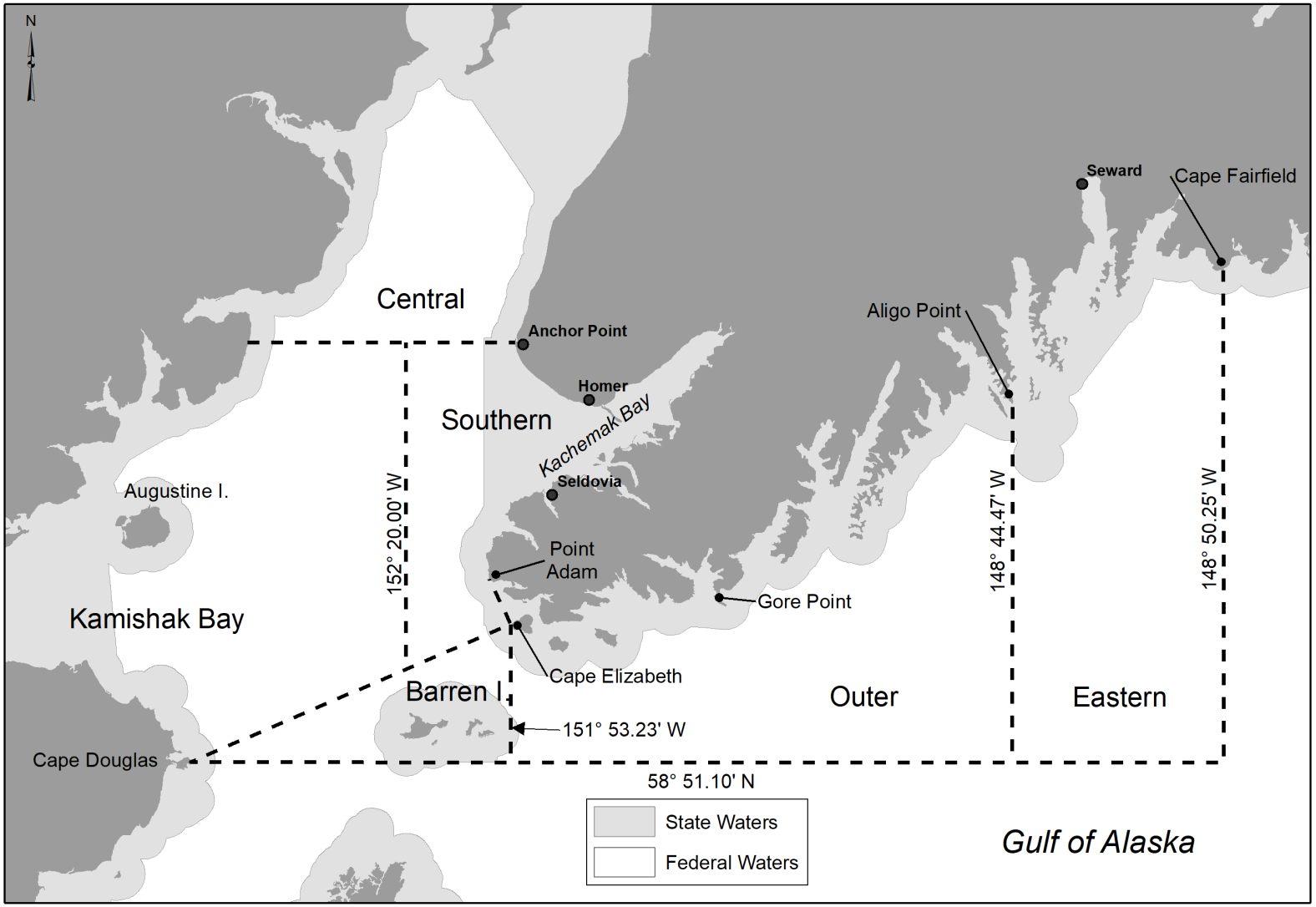

Figure 2.–Cook Inlet Area (Registration Area H) commercial crab fishing districts.

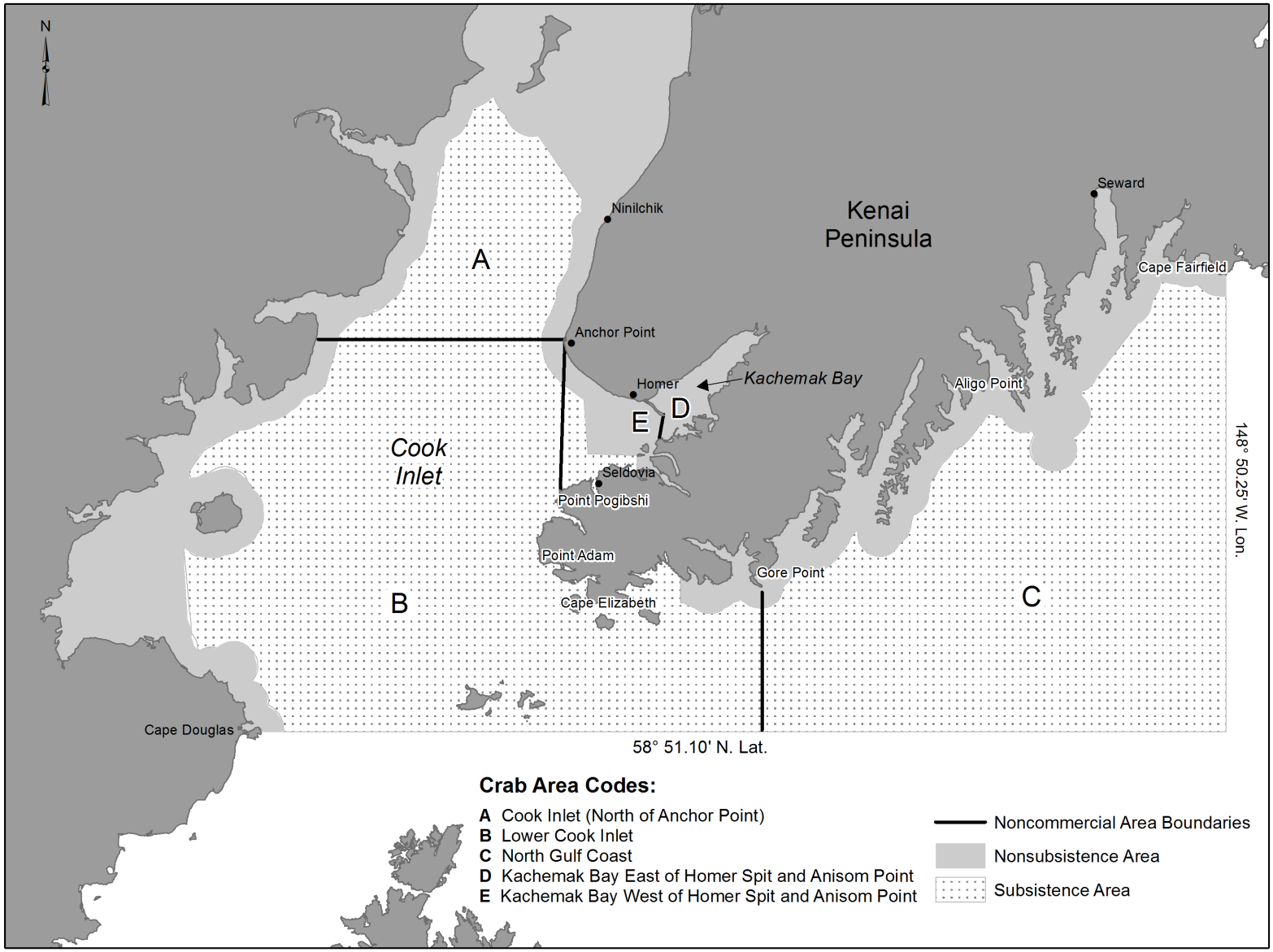

Figure 3.–Cook Inlet Area noncommercial Tanner crab fishing areas.

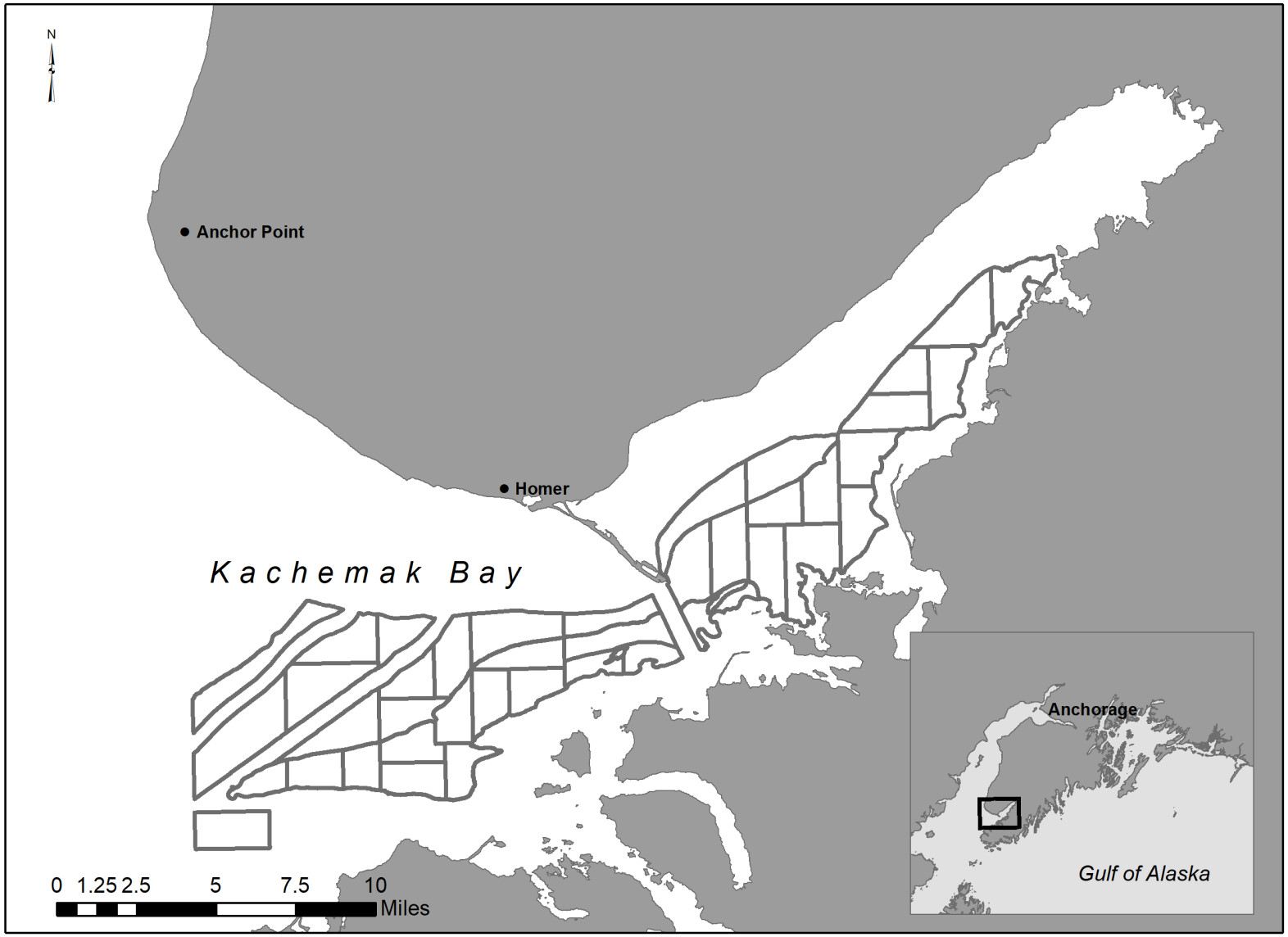

Figure 4.–Kachemak Bay large-mesh trawl survey stations.

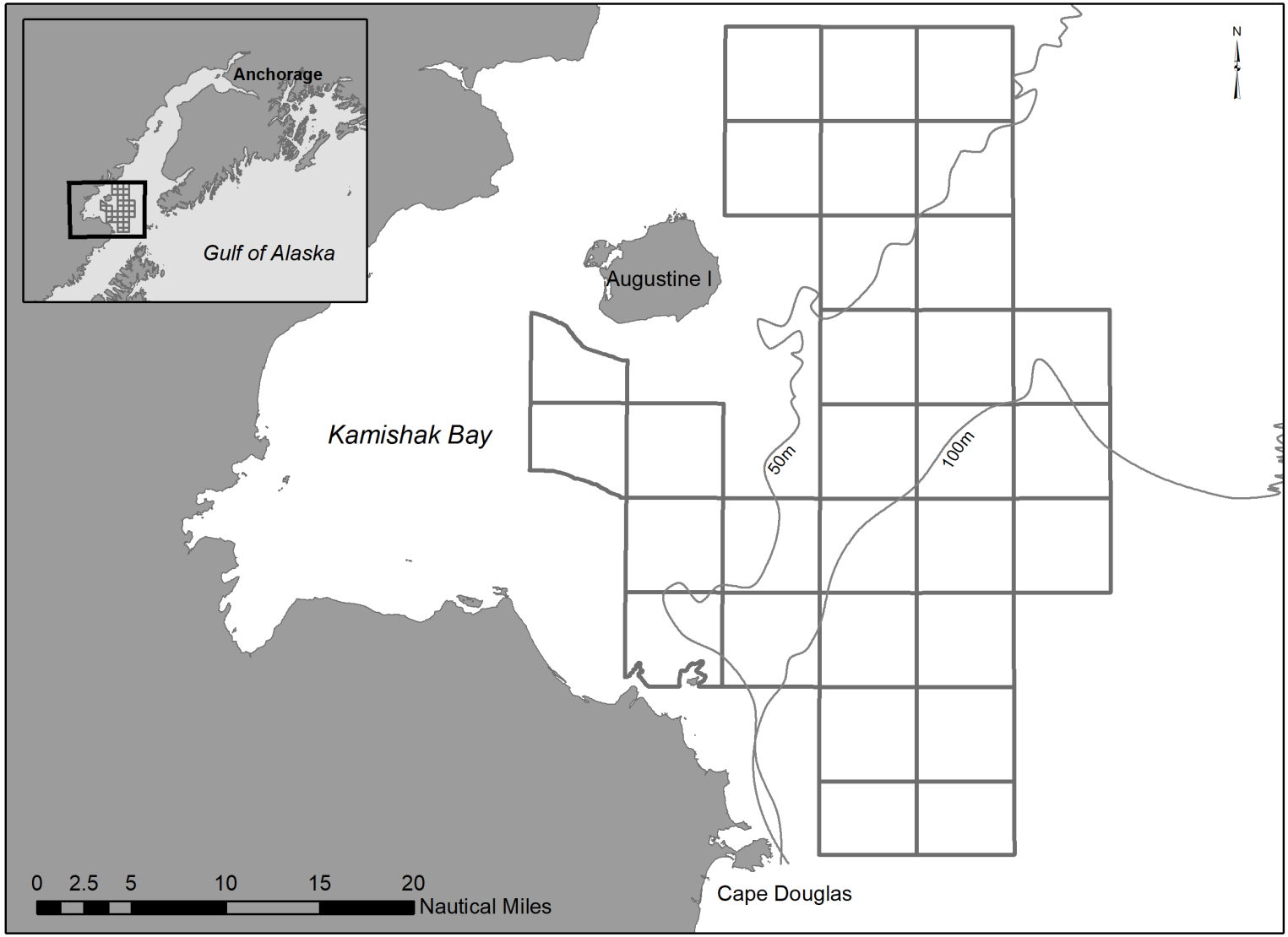

Figure 5.–Kamishak Bay and Barren Islands large-mesh trawl survey locations.

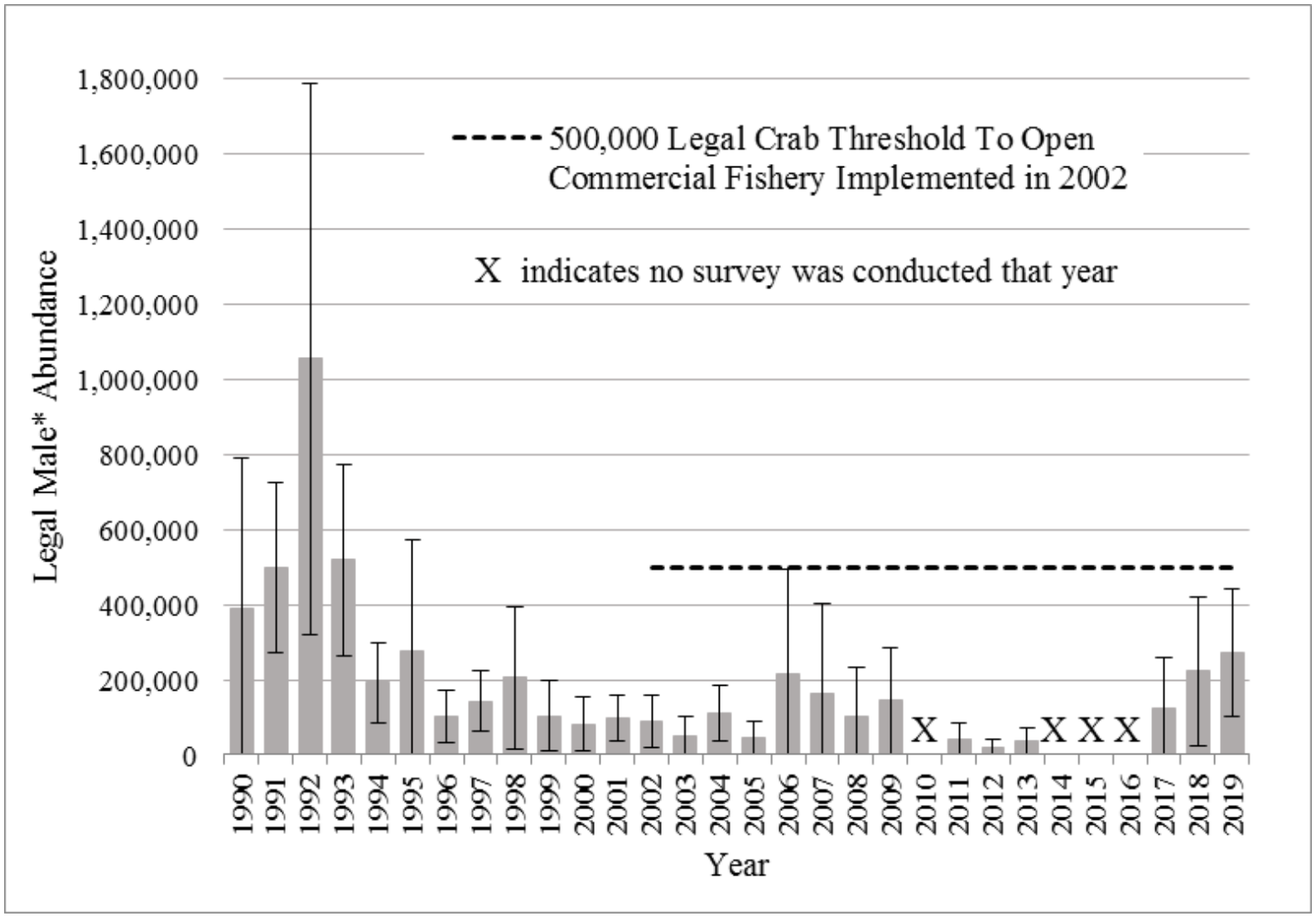

Figure 6.–Kachemak Bay trawl survey legal male Tanner crab abundance estimates, 1990–2019.

Note: Legal male Tanner crab carapace width was 5.5 in (140 mm) through 2016 and 4.5 in (114 mm) beginning in 2017.

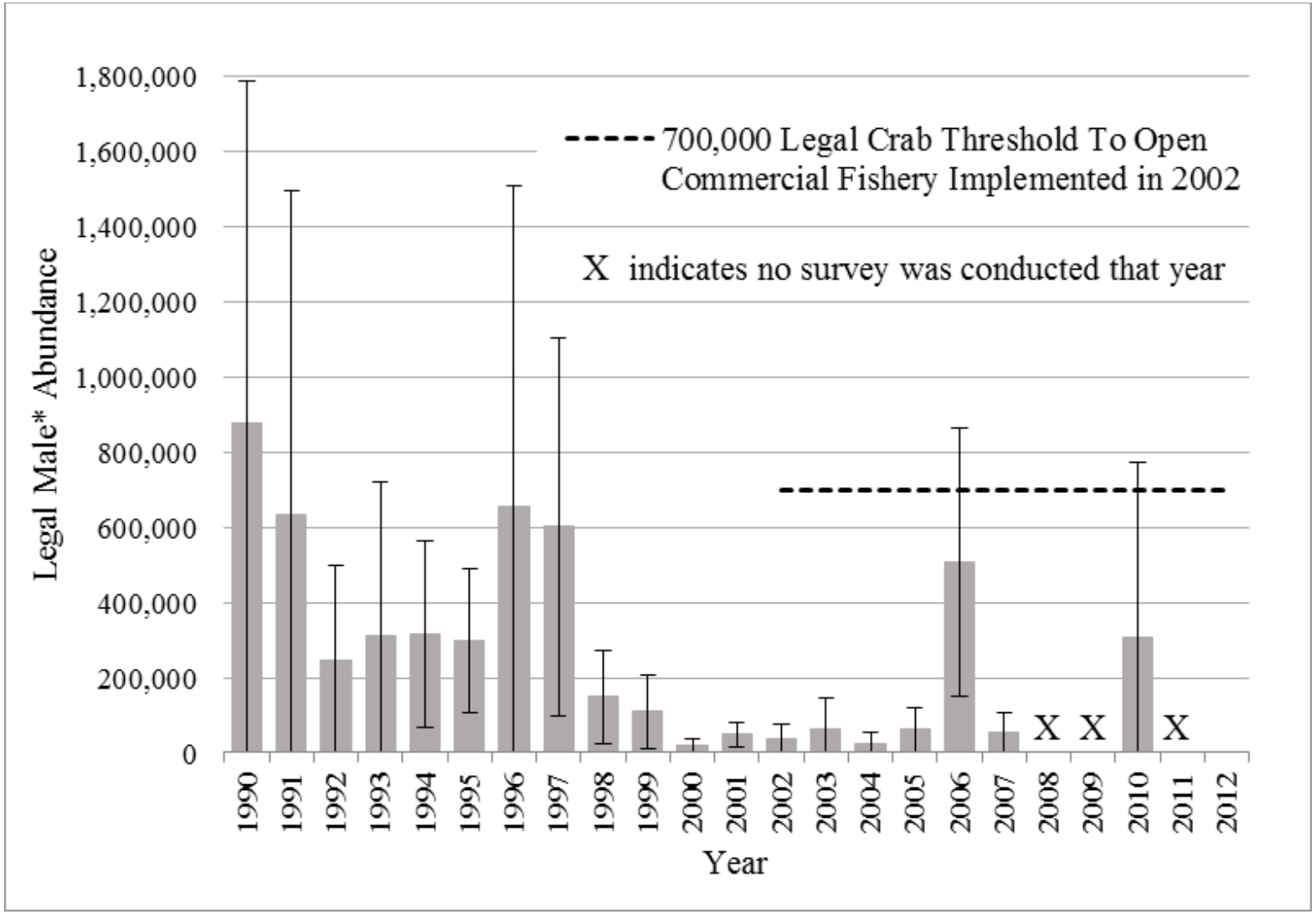

Figure 7.–Kamishak Bay trawl survey legal male Tanner crab abundance estimates, 1990–2012.

Note: Estimated legal abundance was 0 in 2012; legal male Tanner crab carapace width was 5.5 in (140 mm).

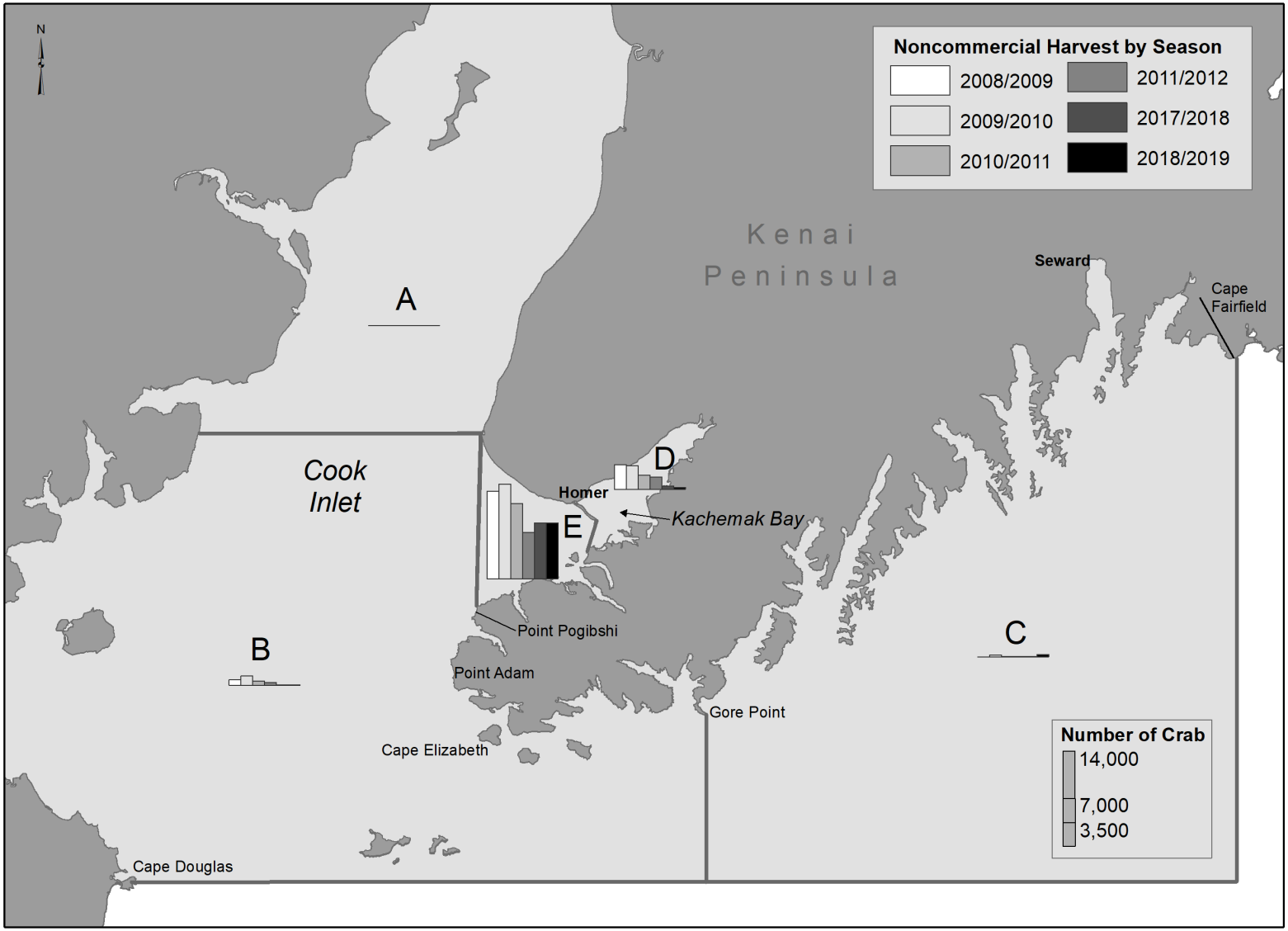

Figure 8.–Cook Inlet Area noncommercial Tanner crab harvest, 2008–2019 seasons.

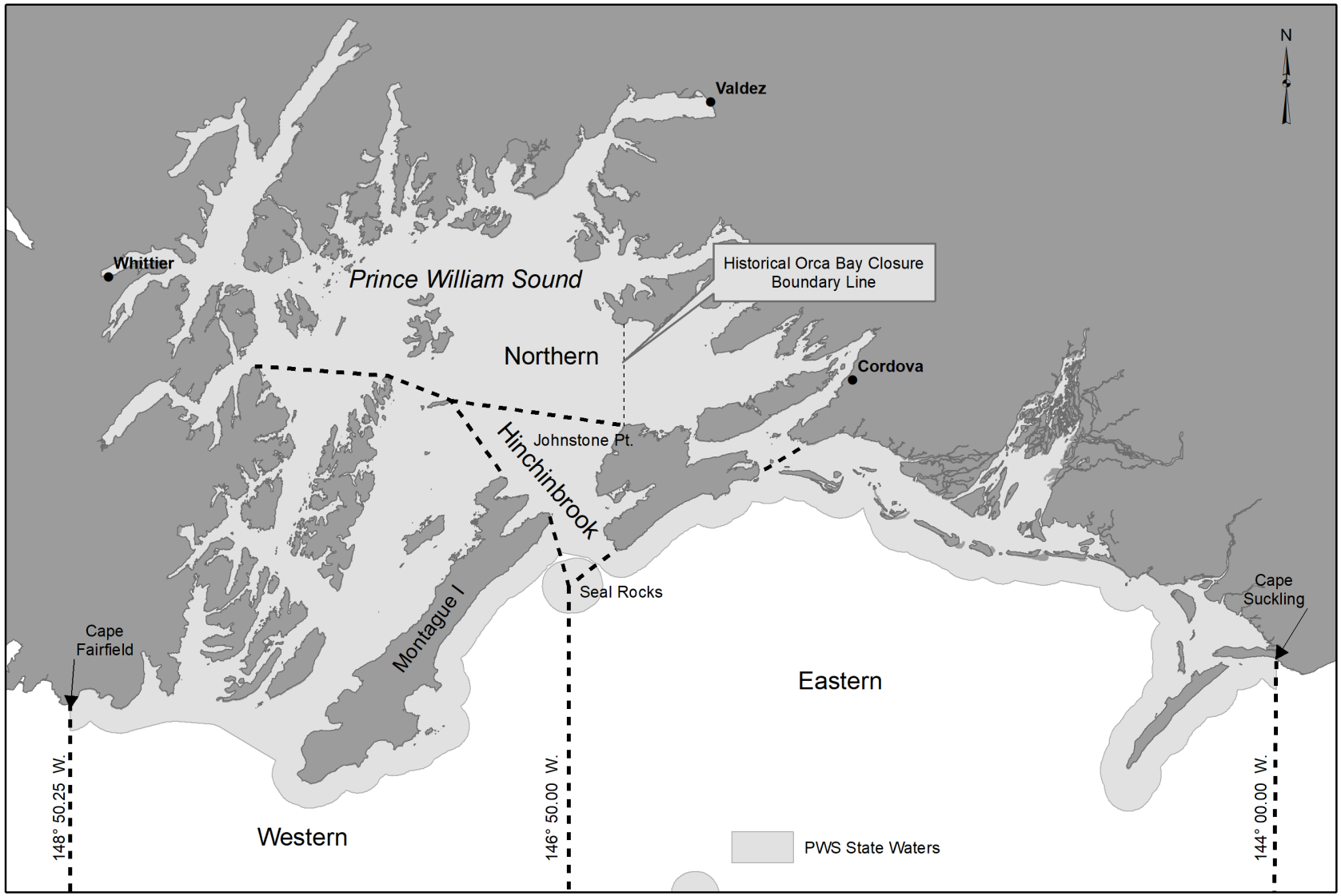

Figure 9.–Prince William Sound Area (Registration Area E) commercial crab fishing districts.

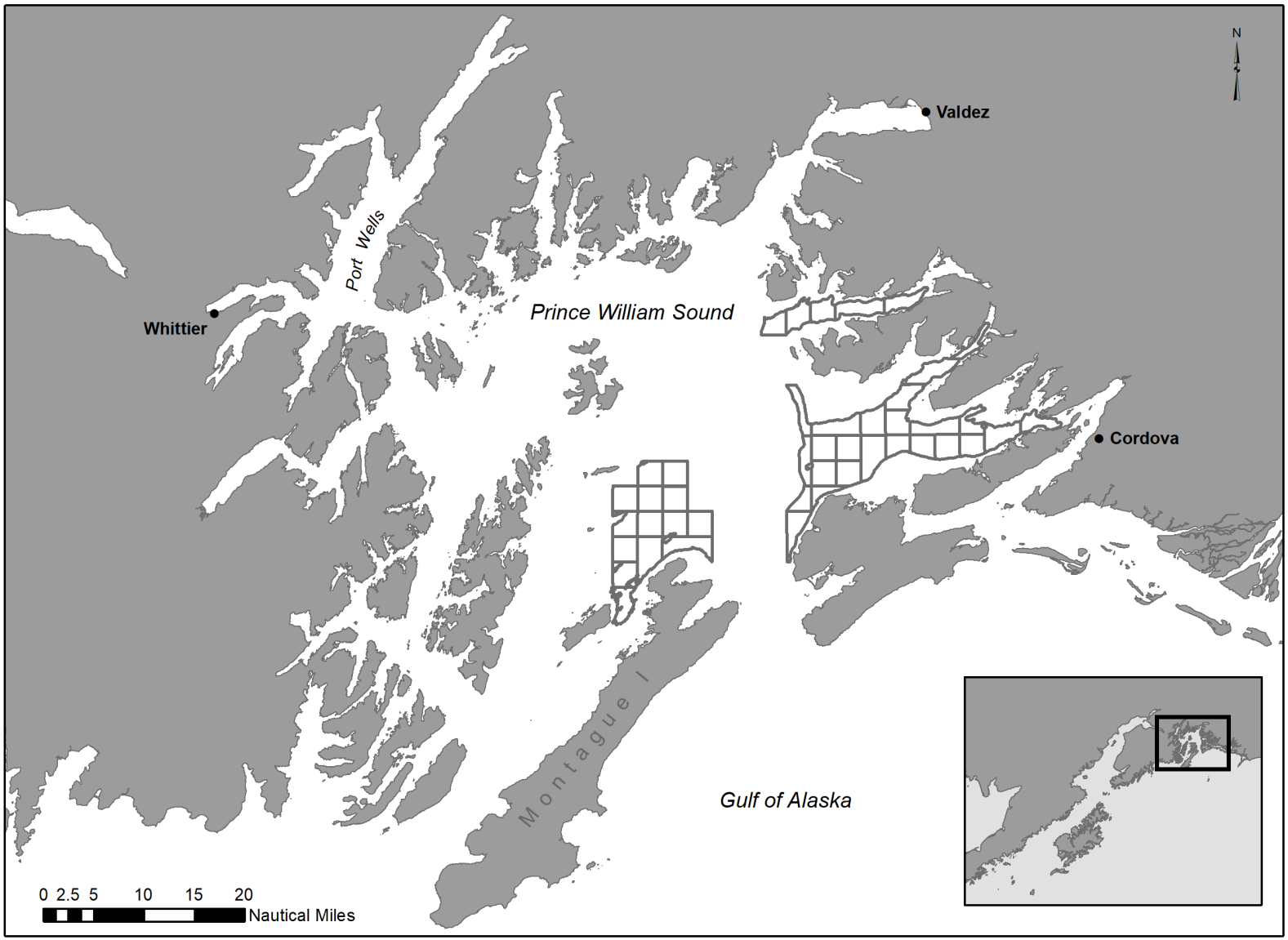

Figure 10.–Prince William Sound large-mesh trawl survey locations.

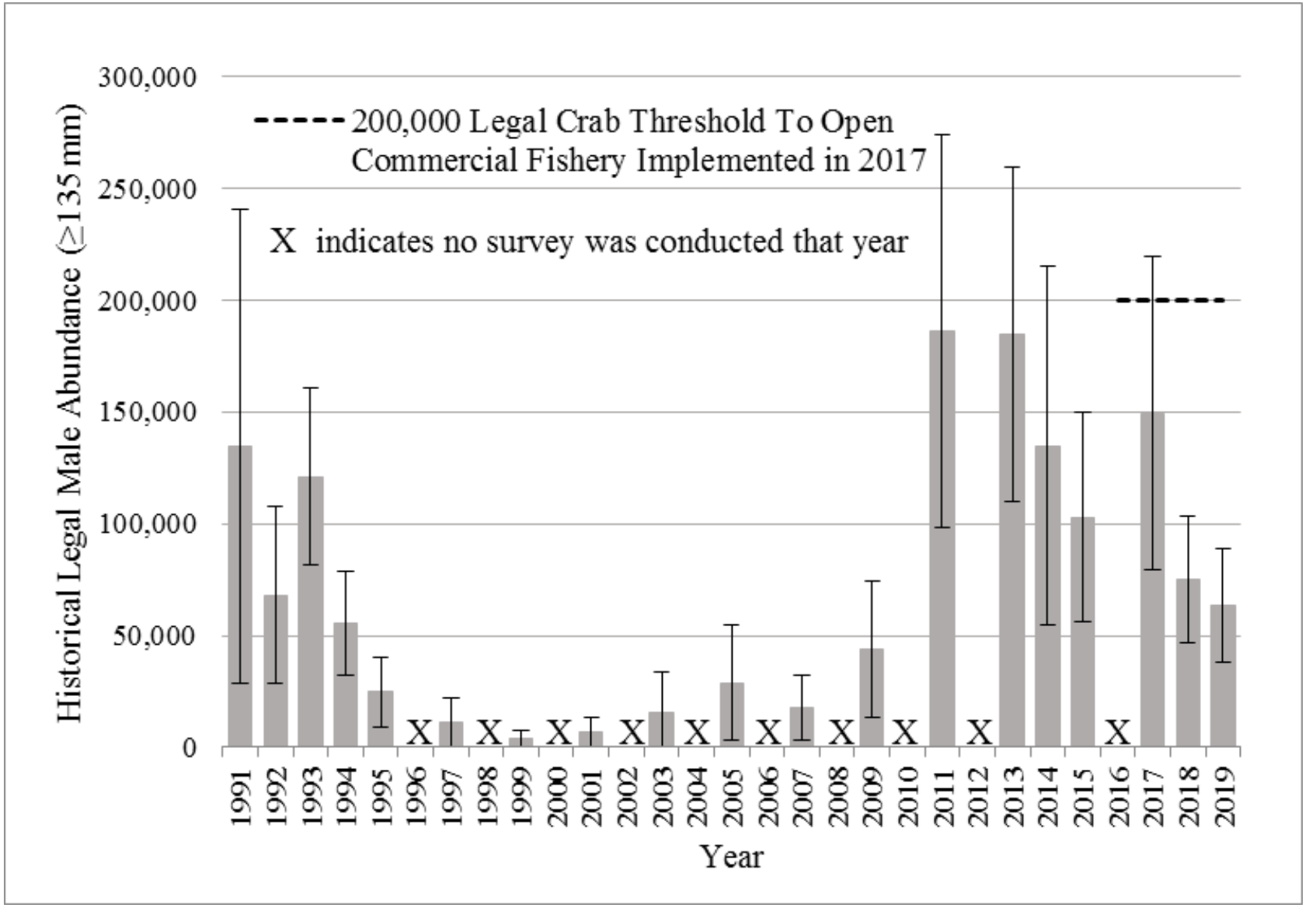

Figure 11.–Prince William Sound trawl survey Tanner crab historical legal male (5.3 inches or ≥135 mm carapace width) abundance estimates, 1990–2019.

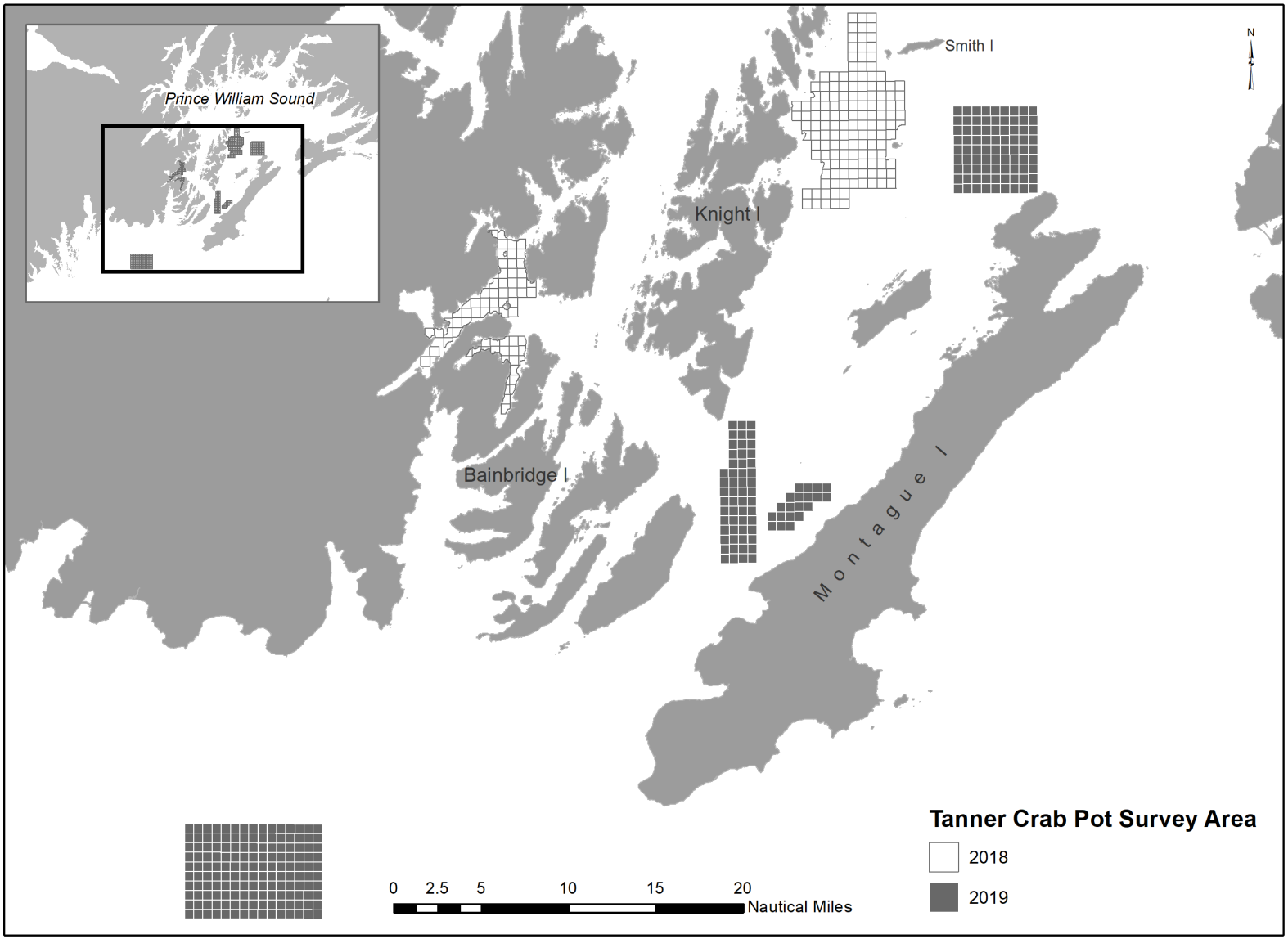

Figure 12.–Prince William Sound Area Tanner crab pot survey locations, 2018 and 2019.

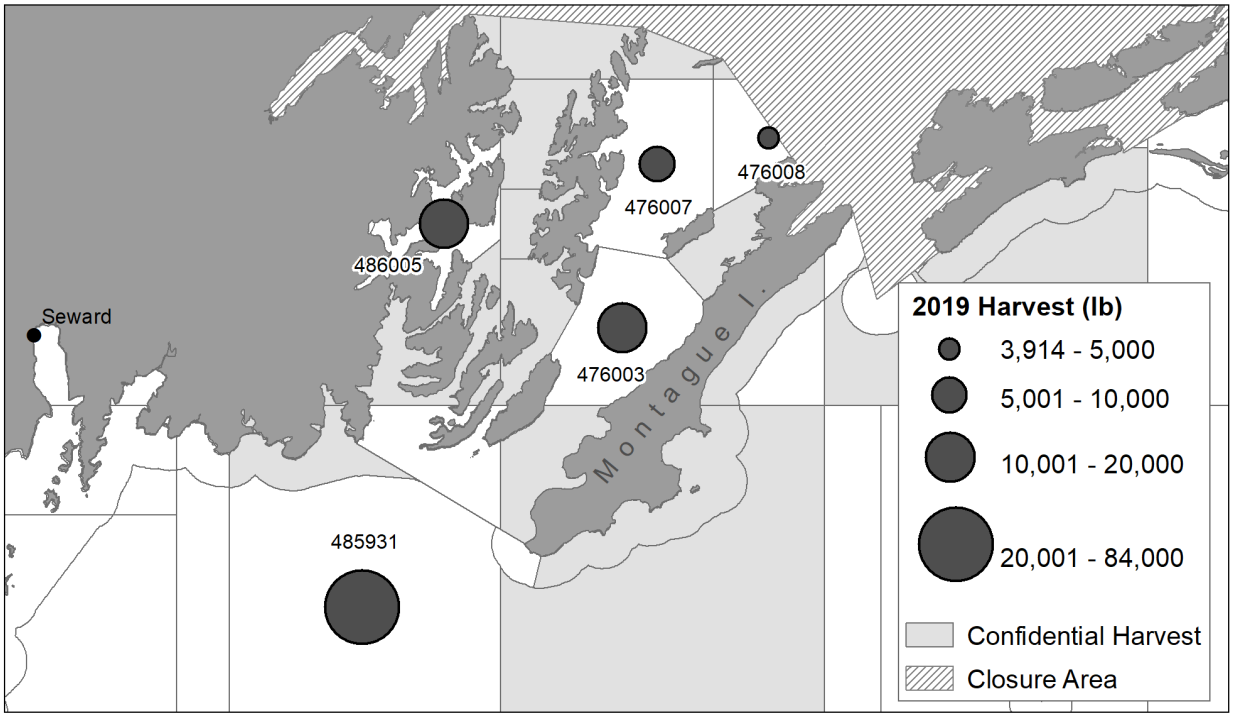

Figure 13.–Prince William Sound Area commissioner's permit Tanner crab harvest by statistical area, 2019.

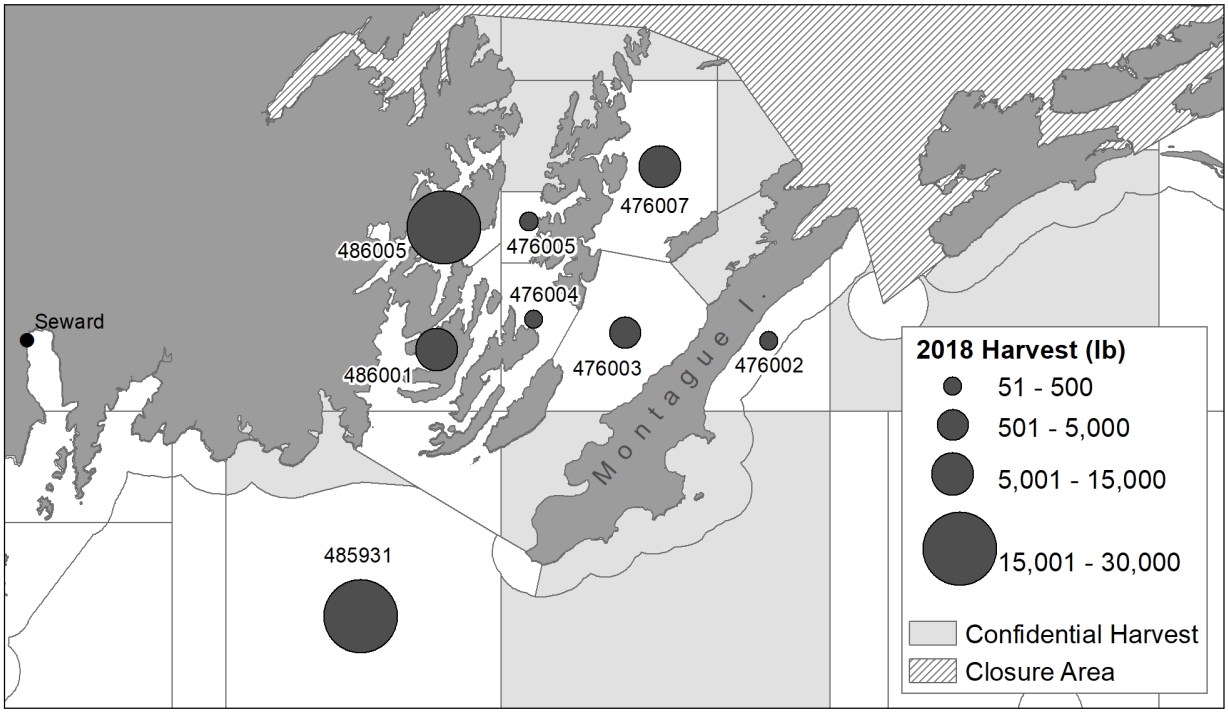

Figure 14.–Prince William Sound Area commissioner's permit Tanner crab harvest by statistical area, 2018.

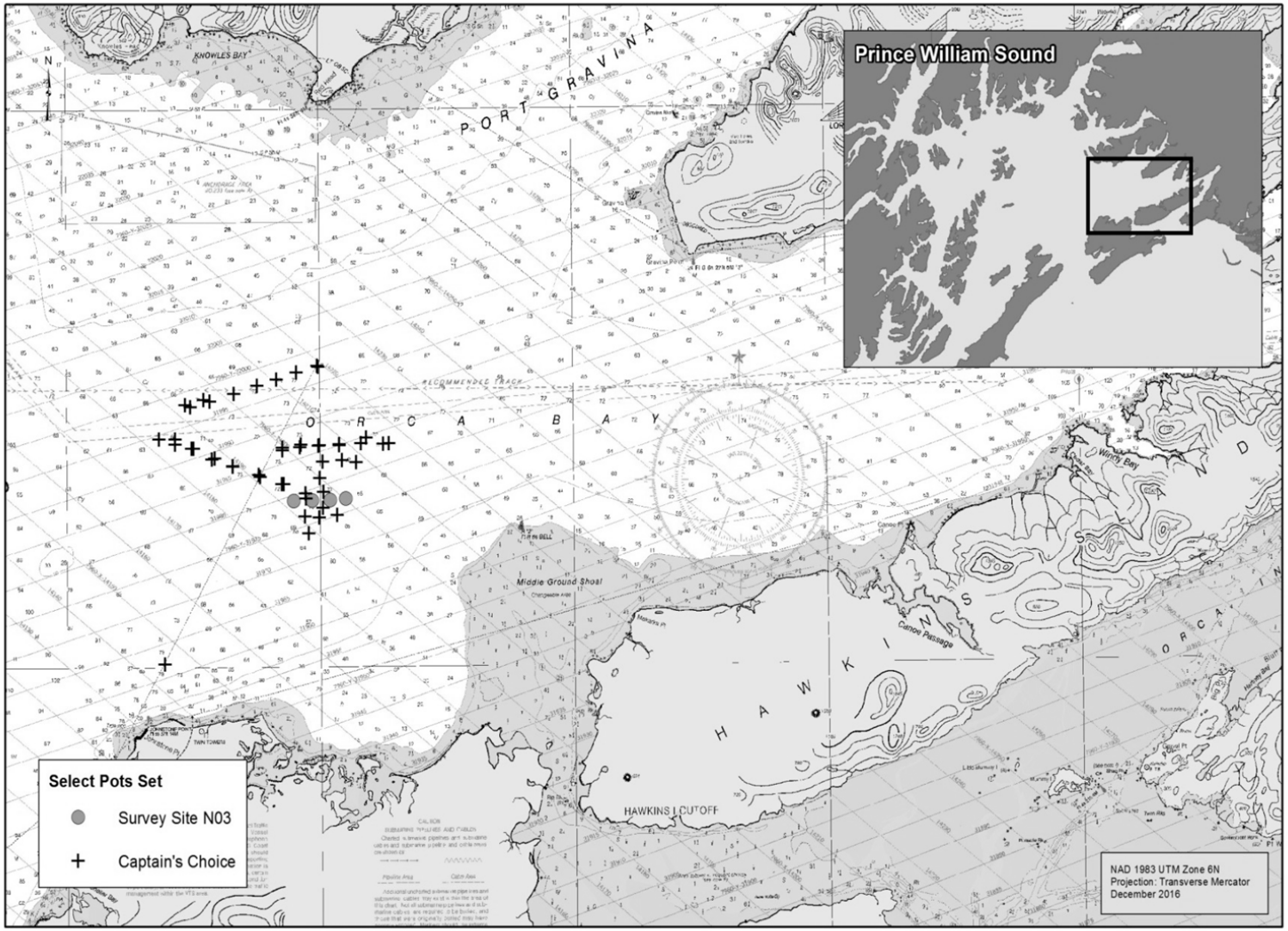

Figure 15.–Prince William Sound area pot locations; ADF&G survey station N03 and captain's choice sets during the Tanner crab test fishery, 2016.

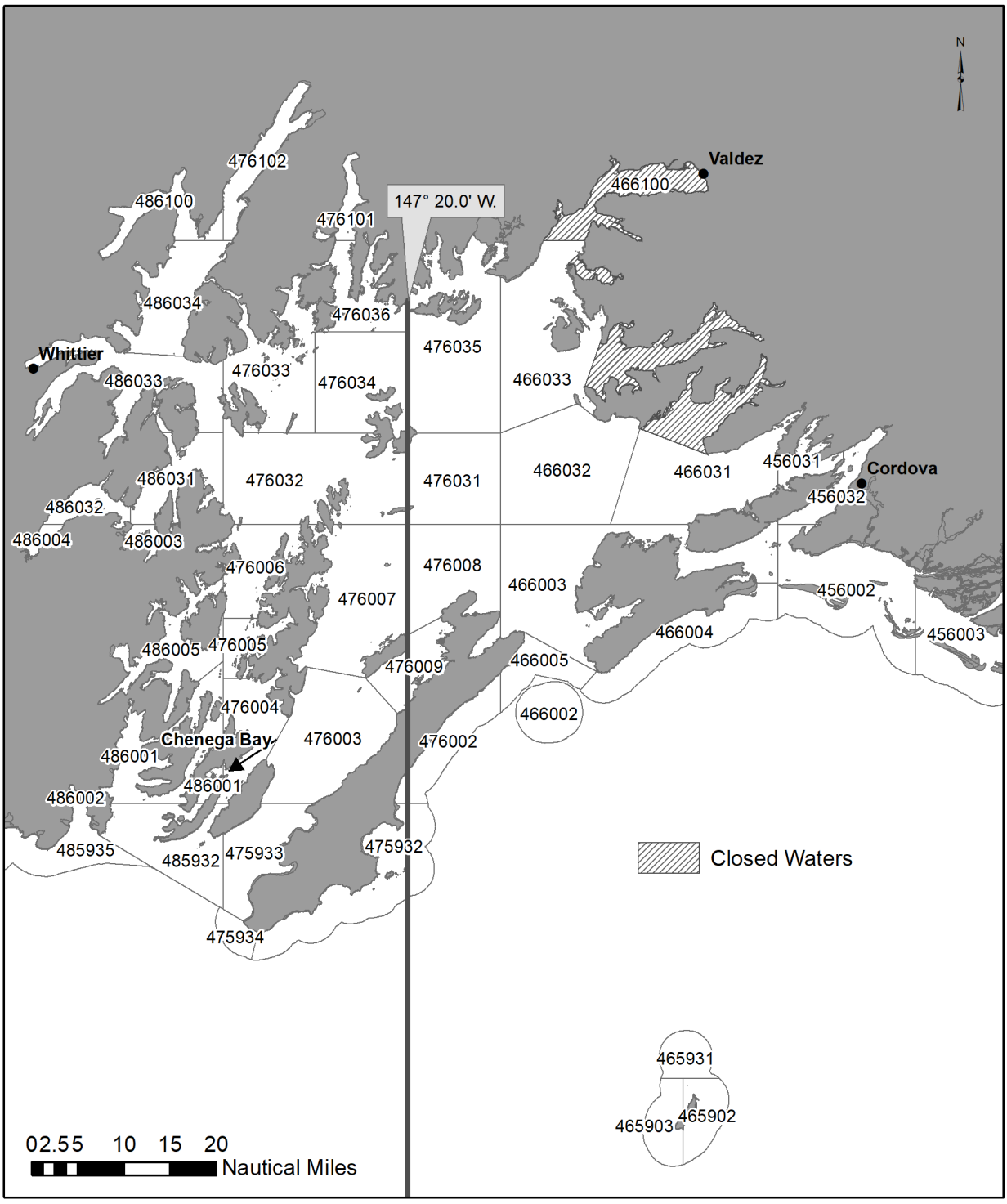

Figure 16.–Prince William Sound Area statistical areas for reporting subsistence fishing location and waters closed to subsistence harvest of Tanner and golden king crab.

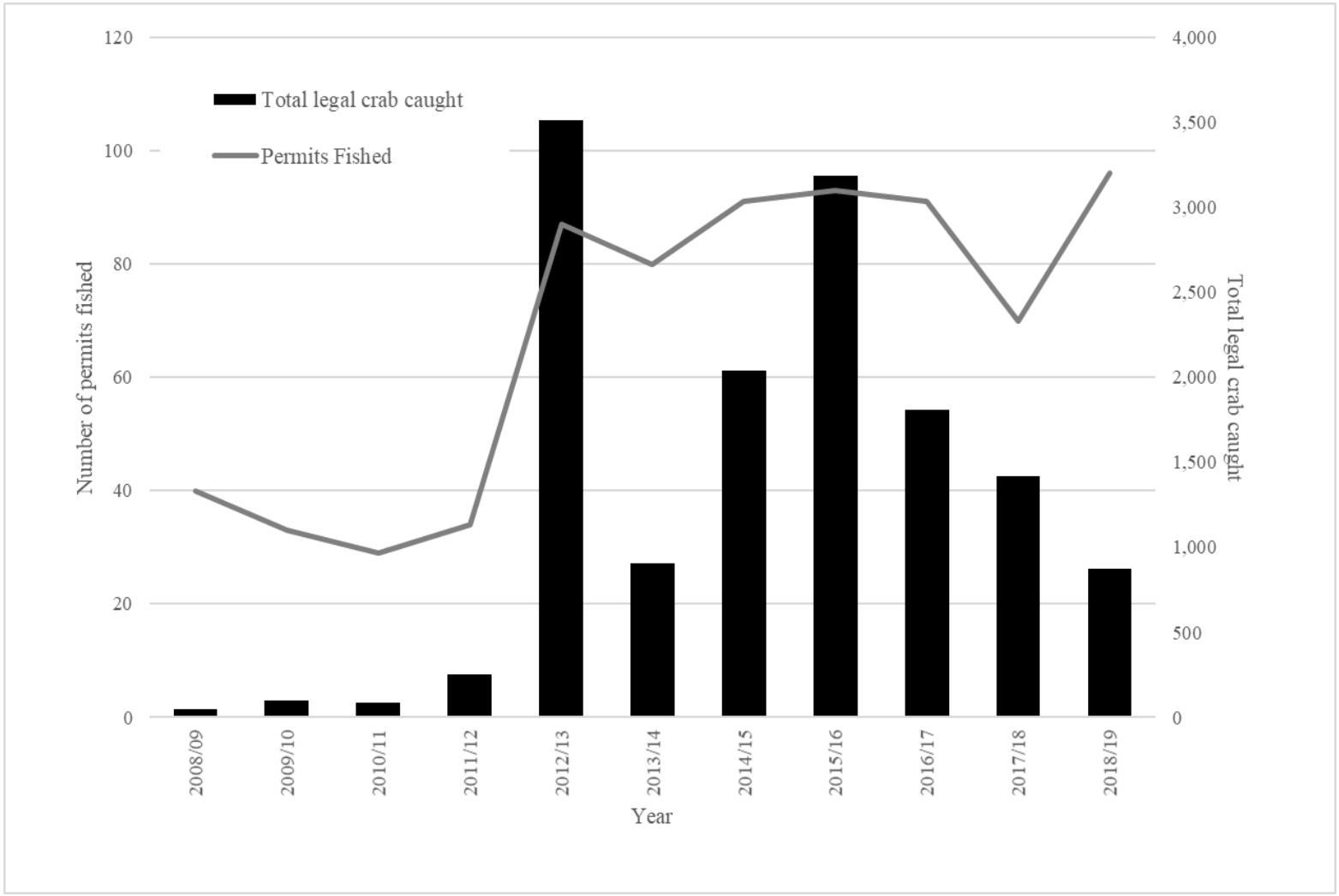

Figure 17.–Prince William Sound Area subsistence Tanner crab summary of number of permits fished and number of total legal crab caught, 2008–2019 seasons.

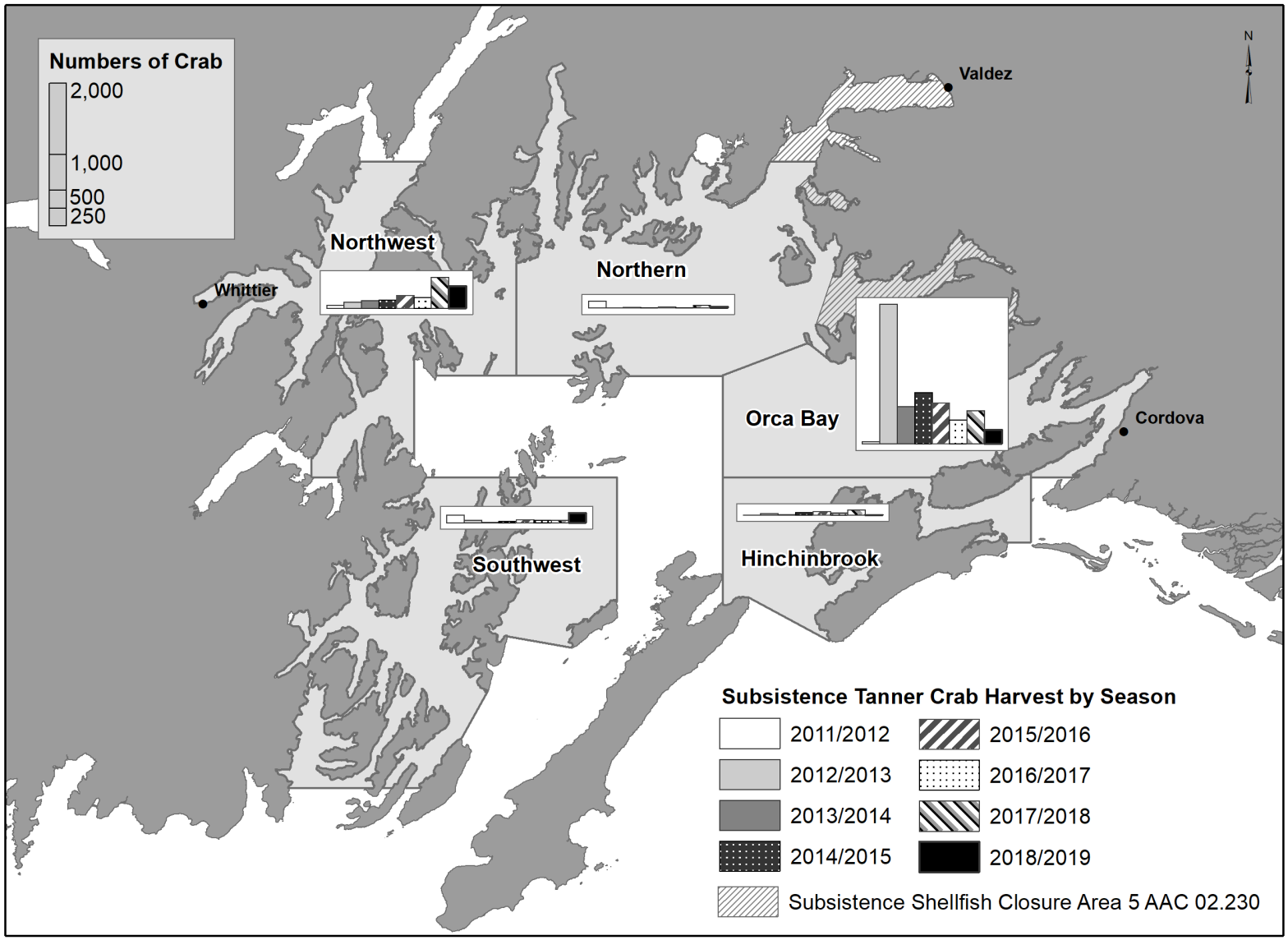

Figure 18.–Prince William Sound Area subsistence Tanner crab harvest, by fishery location, 2011–2019 seasons.