

Fishery Management Report No. 21-15

Management Report for Southeast Alaska and Yakutat Tanner Crab Fisheries, 2017/18–2019/20

by

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Mathematics, statistics	
centimeter	cm	Alaska Administrative Code	AAC	<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	H_A
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
hectare	ha	at	@	catch per unit effort	CPUE
kilogram	kg	compass directions:		coefficient of variation	CV
kilometer	km	east	E	common test statistics	(F, t, χ^2 , etc.)
liter	L	north	N	confidence interval	CI
meter	m	south	S	correlation coefficient	
milliliter	mL	west	W	(multiple)	R
millimeter	mm	copyright	©	correlation coefficient	
		corporate suffixes:		(simple)	r
Weights and measures (English)		Company	Co.	covariance	cov
cubic feet per second	ft ³ /s	Corporation	Corp.	degree (angular)	°
foot	ft	Incorporated	Inc.	degrees of freedom	df
gallon	gal	Limited	Ltd.	expected value	E
inch	in	District of Columbia	D.C.	greater than	>
mile	mi	et alii (and others)	et al.	greater than or equal to	≥
nautical mile	nmi	et cetera (and so forth)	etc.	harvest per unit effort	HPUE
ounce	oz	exempli gratia	e.g.	less than	<
pound	lb	(for example)		less than or equal to	≤
quart	qt	Federal Information Code	FIC	logarithm (natural)	ln
yard	yd	id est (that is)	i.e.	logarithm (base 10)	log
		latitude or longitude	lat or long	logarithm (specify base)	log ₂ , etc.
Time and temperature		monetary symbols		minute (angular)	'
day	d	(U.S.)	\$, ¢	not significant	NS
degrees Celsius	°C	months (tables and figures): first three letters	Jan, ..., Dec	null hypothesis	H_0
degrees Fahrenheit	°F	registered trademark	®	percent	%
degrees kelvin	K	trademark	™	probability	P
hour	h	United States	U.S.	probability of a type I error	
minute	min	(adjective)		(rejection of the null hypothesis when true)	α
second	s	United States of America (noun)	USA	probability of a type II error	
		U.S.C.	United States Code	(acceptance of the null hypothesis when false)	β
Physics and chemistry		U.S. state	use two-letter abbreviations (e.g., AK, WA)	second (angular)	"
all atomic symbols				standard deviation	SD
alternating current	AC			standard error	SE
ampere	A			variance	
calorie	cal			population	Var
direct current	DC			sample	var
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
(negative log of)					
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

FISHERY MANAGEMENT REPORT NO. 21-15

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YAKUTAT TANNER CRAB FISHERIES, 2017/18–2019/20**

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ABSTRACT

This report reviews the commercial fishery for Tanner crab in Region I, which includes Registration Area A–Southeast Alaska and Registration Area D–Yakutat.

Tanner crab harvests in the Southeast portion of Region I totaled 1,212,725 lb valued at \$3.89 million for the 2019/20 season. The average dock price per pound for Tanner crab during the 2019/20 season was \$3.68.

Tanner crab stocks in Southeast Alaska are assessed annually in summer and fall stock assessment surveys. Yakutat stocks of Tanner crab have been designated as collapsed and recovering since 2000; they remain closed until signs of recovery are apparent and a management plan and stock assessment plans are developed to provide sustainable harvest. This report provides an overview of the commercial fishery, stock assessment development, and seasonal updates for the 2017/18, 2018/19, and 2019/20 seasons.

Keywords: Tanner crab, *Chionoecetes bairdi*, Southeast Alaska, Yakutat, fisheries management, crab, invertebrate fisheries, Region I, harvest statistics

INTRODUCTION

Tanner crab *Chionoecetes bairdi* are a widely distributed brachyuran (true) crab that inhabit temperate and subarctic waters of the eastern Pacific Ocean from northern California to the Bering Sea. Tanner crab reproduction begins with pubescent (first-year) mating females that terminally molt to maturity and mate with smaller males in shallow water from January to May. Females that have reproduced once (primiparous) and more than once (multiparous) mate in deeper water with larger males from April to May. The multiparous females form mating aggregations, toward which large males migrate (Stevens et al. 1994). Embryos are then subsequently hatched in late winter to early summer. Larvae are suspended in the water column for approximately 2 months through 3 stages of molts and settle as megalopae. This stage can last from one month to a year. The megalopae migrate to the ocean floor where they continue to molt and grow for approximately 5 years for females and 6 years for males before they terminally molt to maturity (Donaldson et al. 1981). In Southeast Alaska, Tanner crab stocks are probably composed of several distinct populations within limited geographic areas where most settled crab make localized movements (Donaldson 1985 and Taggart et al. 2008).

Male Tanner crab vary in morphometric maturity across Southeast Alaska. Morphometric maturity is the size at which males become large clawed and able to properly grasp females during reproduction, with an estimated mean size of 117.2 mm carapace width (CW) at 50% morphometric maturity (Siddon and Bednarski 2010). Male size at maturity is smallest in Glacier Bay (107.9 mm CW) and largest in Stephens Passage (135.1 mm CW; Siddon and Bednarski 2010). Tamone et al. (2007) provide supporting evidence that large males are terminal molts, indicating that growth is final once the males become large clawed. Large-clawed males are important to have in the population because they have higher quality sperm reserves than small males. Studies on snow crab *C. opilio* suggest that a disproportionate ratio of small to large males can cause variability in primiparous female sperm reserves, suggesting that a reduction in abundance of large males may decrease the quality of sperm reserves rather than the number of females not receiving sperm (Rondeau and Sainte-Marie 2001; Sainte-Marie et al. 2002).

The current active Tanner crab commercial fishery occurs in Registration Area A (Southeast Alaska) and is divided into Districts 1–16 (Figure 1). Southeast Alaska is designated as a superexclusive registration area for Tanner crab whereby vessels registered to fish in Southeast Alaska cannot fish any other registration area for Tanner crab during the same registration year. Management of the fishery is based on the *Policy on King and Tanner Crab Resource Management*

(90-04-FB) and the Tanner crab harvest strategy (5 AAC 35.113), which (1) minimize sorting of juveniles and females, (2) allow a season (5-day minimum) that avoids sensitive life history stages of reproduction, including mating and molting in February–March (Stone 1999), (3) restrict harvest to males only with a minimum legal size of 140 mm (5½ inches) CW, allowing at least 1 to 2 years of reproducing prior to entering the fishery (Stone et al. 2003), (4) establish gear restrictions, (5) limit participation, and (6) utilize mature male abundance estimates from a stock assessment survey to determine additional days for the fishing season in conjunction with the quantity of pots registered for the fishery. The most productive fishing grounds are classified as “core” and less productive fishing grounds are classified as “noncore” and “exploratory” areas (Figure 2).

Vessels participating in the fishery range from 35 to 80 ft in length. Smaller boats generally participate in the ring net fishery. Almost all vessels using pot gear have live-tanking capability. Currently, lighter cone or pyramid nesting pots that occupy less deck space are used more often than the heavier, 7x7 ft square stacking pots, which were originally designed for king crab in the Bering Sea fisheries.

This report describes the Southeast Alaska Tanner crab commercial fishery development and history, stock assessment, and summaries of recent seasons. The Yakutat Tanner crab commercial fishery has been closed since 2000 and is collapsed and recovering (ADF&G 2002). Information regarding the Yakutat Tanner crab commercial fishery history, development, and collapse is reported in Wood et al. (2017).

FISHERY DEVELOPMENT AND HISTORY

COMMERCIAL FISHERY HISTORY

Pot Fishery

Tanner crab have been harvested since the early 1960s and were incidentally caught during the red king crab commercial fishery. Fishery participants began targeting Tanner crab in the 1970s when harvest averaged 1,624,931 million lb (Table 1). The 1970s were characterized by gradual fishery development and corresponding managerial response. Open seasons during this time averaged 10 months in length. Historically, most of the harvest from the major fishing grounds was taken from January–April of each year regardless of season length.

In the 1980s, Tanner crab harvest averaged 1,626,500 million lb. As fishing pace increased over this period, season length shortened to an average of less than 2 months. During the 1981/82 season, 74 vessels landed a record 3,305,857 million lb of which approximately two-thirds was caught in Icy Strait (District 14). Participation increased to 97 vessels during the 1982/83 season due to increasing product demand, an earlier season opening in Southeast than in other registration areas to the north and west, and open-access registration. Many larger crab vessels on their way to Kodiak and Bering Sea fished first in Southeast Alaska. The 1982/83 season closed after two weeks by emergency order based on onboard observer catch-rate information collected from the Icy Strait fishing grounds. Both the fishing effort and exploitation rates were extremely high, and the stocks were depressed in District 14 for many subsequent years. There was no fishery in 1983 and during the 1983 shellfish board meeting, the season opening was changed to early February to align with other state Tanner crab commercial fisheries and to discourage larger vessels from fishing in Southeast Alaska because the more lucrative grounds to the north and west opened at the same time.

In the 1990s, Tanner crab harvest increased to an average of 2,085,495 million lb. During this period, the fishery continued to intensify and seasons were reduced to an average of 11 days. Effort became increasingly concentrated on the most productive fishing grounds and many marginal Tanner crab grounds were ignored due to the shorter seasons. The fleet adapted to short seasons in several ways, including the use of tenders; a higher frequency of leasing larger vessels; and increases in crew size, pot pulling frequency, and bait volumes. Thus, the fishery continued to intensify despite the shorter seasons.

Tanner crab harvest from 1999/00 to 2019/20 seasons averaged 1,038,527 lb (Table 1). For most of the 2000s, closure dates were announced preseason based upon the estimated length of time to harvest two million pounds. By the end of the decade, catch survey estimates had become reliable enough to set preseason GHLs. Fishery regulations did not allow the department to target GHLs inseason, so closure dates were announced preseason based upon the estimated length of time needed to harvest the GHL. The Tanner crab harvest strategy regulation (5 AAC 35.113) changed in 2009 to provide a minimum season length and additional days to the season in core, noncore, and exploratory areas based on the number of pots registered for the fishery. The core and noncore areas were defined in regulation at the 2009 board meeting and exploratory areas were defined in 2018 (Figure 2). In 2012, weather delay criteria were added to regulation to delay the fishery start date due to adverse weather conditions.

Ring Net Fishery

With the beginning of the pot permit moratorium in 1984, new entrants who wished to harvest Tanner crab commercially were limited to ring net gear only. Use of ring nets is most appealing when the abundance and price of crab is high because their use is labor intense and less efficient than pots.

Between the mid-1980s and 1990, use of ring nets increased due to the pot permit moratorium. In 1990, the board adopted a comprehensive set of regulations to control the increasing use of ring net gear by people who did not have limited entry permits for the pot fishery. The number of ring nets was limited to 20 per vessel with ring net marking requirements. Ring nets had limits set on their size, and longlining them was prohibited. The allowable ring net harvest was capped at 4% of the total harvest. Vessels could not concurrently be registered to fish with both ring nets and pots. Regulations developed that stipulated ring net gear could not be used to conduct preseason test fishing under the guise of subsistence or personal use fishing.

Total ring net harvest increased from 1,451 lb in the 1984/85 season to 101,045 lb, or 5.0% of the total harvest, during the 1989/90 season. During the 1990 board meeting, several restrictive regulations passed that capped the ring net portion of the total Tanner crab harvest at a maximum of 4%. After adoption, ring net harvests were consistently below 4% until the mid-1990s. Ring net harvest in the 1990s fluctuated between 33,544 lb and 89,211 lb, exceeding the 4% cap in the 1996/97, 1999/00, and 2000/01 seasons at 4.3%, 5.2%, and 5.7%, respectively, of the total harvest. To avoid exceeding the 4% regulatory limit, the ring net season shortened to 5 days relative to a 6-day pot season for the 2001/02 season. As effort in the ring net fishery has declined in recent seasons, so has the overall harvest and proportion of total harvest. For the 5 most recent seasons, average harvest in the ring net fishery is 11,384 lb, slightly less than 1% of the total harvest.

GEAR RESTRICTIONS

Gear restrictions have evolved throughout the history of the fishery; they were first imposed in 1954 to allow pots and in 1960 to allow ring nets as a legal gear (Wood et al. 2017). Current gear restrictions, including escape rings and large mesh panels sewn with biodegradable twine, reduce handling mortality and allow undersized and female crab to escape. Several gear restrictions facilitate enforcement and management of the fishery: 80-pot limit per vessel, buoy-marking and gear storage requirements, preseason fishing restrictions, and operating limits of other pot gear (Wood et al. 2017).

LIMITED ENTRY

At the request of locally based vessel operators and processors in 1984, the Commercial Fisheries Entry Commission (CFEC) instigated a permit moratorium for the king and Tanner crab fisheries in Southeast Alaska.

The CFEC instituted a complex system of combined permits for Tanner crab and the 3 species of king crab. The full impact of the moratorium did not occur until the 1985/86 season because many prospective entrants to the 1984/85 fishery had exercised the 2-year option on permit renewals and obtained their permits prior to the cutoff for the moratorium on new permit issuance. Moreover, the CFEC was obligated by their regulatory guidelines to set the maximum number of permits at 83, which was high relative to historical participation. This had long-term implications, such as progressively shortened seasons as fleet efficiency improved.

The Tanner crab pot fishery in Southeast was the first Tanner crab fishery in the state to have limited entry. As of August 2020, 82 permits have been issued (CFEC permit category K49A, K59A, K69A, and T19A); 79 are permanent permits, and an additional 3 are interim-entry permits. There are 73 active permanent and interim permits issued that could potentially register a vessel in the pot fishery. Ring net gear (CFEC permit category T10A) is not under limitation.

PORT SAMPLING

Commercial Tanner crab fishery landings are sampled dockside in Juneau, Petersburg, Sitka, and Wrangell for important biological information. Separate sampling goals in terms of the number of deliveries are set in 4 fishery areas: Icy Strait (District 14), Lynn Canal/Upper Stephens Passage (combined Districts 11 and 15), Frederick Sound/Lower Stephens Passage (combined Districts 8, 9, and 10), and all other areas. Carapace width is measured and shell condition determined for 75-crab samples as crab are delivered to processors. Crab average weight is also estimated for each delivery and skippers are interviewed about fishing location and effort. Recruit composition of the harvest is estimated from carapace width and shell condition frequency.

LOGBOOKS

Logbooks are mandatory for pot permits, providing information on Tanner crab catch and effort by statistical area and date. Logbooks are not required for the ring net Tanner crab fishery. As of 2019, the logbook data include average pot soak time (hours) and bitter crab observations to improve management considerations.

Bitter Crab Syndrome

Poor taste associated with bitter crab syndrome (BCS) has been reported since the 1980s, with anecdotal references to off-tasting Tanner crab dating back to the mid-1970s. BCS has been

reported from most major fishing grounds in Southeast Alaska and sporadically from other areas as well (Meyers et al. 1989 and 1990). Its definitive identification (*Hematodinium*) in Bering Sea snow crab (*C. opilio*) stocks, with its economic implications, has accelerated research on it.

Hematodinium infects all sizes and both sexes of Tanner crab and is believed to be fatal within 1 to 1.5 years after infection, although little research exists to confirm this timeline. It severely reduces the vitality and reproductive capacity of crab; egg clutches of infected females are greatly reduced in size (Meyers 1993). The mechanism and seasonal timing of *Hematodinium* transmission is unknown (Eaton et al. 1991; Love 1991; Love et al. 1993). The disease may be spread by free-living, infective spores released by dying crab, or vegetative stage organisms passively transmitted during periods of crab aggregation, such as immediately before and during seasonal mating periods.

Crab in later stages of infection are unmarketable because of the astringent taste and soft, chalky texture of the meat. These crab can be identified on the fishing grounds by an abnormal pink or pale coloration on their abdomens and ventral sides of their walking legs. Infected crab continue to be transported out of the areas in which they are caught when they are transported to processors. This may have contributed to the spread of this disease.

Currently, the fishing season occurs during a period of optimum meat condition in the majority of heavily fished stocks. Unfortunately, the season also occurs during a period when crab infected during the previous year have developed advanced symptoms of the disease, including the characteristic bitter taste.

There are no industry-wide standards, procedures, or regulations for safe disposal of infected crab. Control measures are limited to voluntary retention of bitter crab for later disposal in upland landfills, heat or chemical disinfections before marine disposal, or hard freezing before marine disposal. Viability of the resource continues with transport and handling of infected crab. The bitter crab level of infection has remained consistent over the past three seasons (ranging from 9% to 12% regionwide). High percentages of bitter crab, up to 40%, have been observed in some districts.

STOCK ASSESSMENT

Tanner crab stock assessment has evolved continually over the past 20 years. Prior to 1997, stock assessment analyses consisted of simple summary statistics and trends (Clark et al. 2001) based solely on fishery-dependent data from dockside sampling, logbooks, and fish tickets. With the beginning of the Tanner crab survey in 1997 through its maturation in 2006, relative abundance was determined using catch per unit effort (CPUE) from either the Tanner crab survey or the red king crab survey. A catch-survey analysis (CSA) from survey data began in 2005 (Zheng et al. 2006). Along with commercial logbook data, this model estimated mature Tanner crab biomass for the 2006/07 season (Siddon et al. 2009). The 2007/08 season was the first for which the CSA alone was used to provide an estimate of mature male Tanner crab biomass where prior trends in short and long term CPUE by recruit class composition were used to assess stock health (Siddon et al. 2009). After expansion of the biomass estimate to account for the proportion of harvest that comes from unsurveyed areas (29% prior to 2015, 34% after 2015), tiered harvest rates of 0%, 5%, 10%, 15%, or 20% of mature males or a maximum of 50% of legal males, depending upon stock health, are used to determine the harvestable surplus. Improvements to the survey and modeling methods will continue as the time series lengthens.

SURVEYS

Crab stock assessment surveys are conducted exclusively in 4 survey areas that target Tanner crab (Icy Strait, Glacier Bay, Holkham Bay, and Thomas Bay) and in 7 survey areas (Juneau, Lynn Sisters, Excursion Inlet, Seymour Canal, Pybus Bay, Gambier Bay, and Peril Strait) that target red king crab, which also catch a significant amount of Tanner crab (Figure 3). Surveyed areas correspond with commercial fishing grounds that account for over 65% of the total Tanner crab harvest (25-year average). The methods are similar between the two surveys, described by Rebert et al. (2020) for the Tanner crab survey and Stratman et al. (2020) for the red king crab survey. Crab surveys are stratified using the density of historical survey catches. Stratified sampling methods provide greater reliability in CPUE estimates for application in the CSA, which in turn provides greater reliability in biomass projections. Pots are located randomly within each density stratum.

RECENT SEASONS

2017/18 SEASON SUMMARY

For the 2017/18 season, Tanner crab biomass was estimated to be 6.6 million lb of mature males (CW > 108 mm) and 3.3 million lb of legal males (CW > 137 mm; Table 2). Applying harvest rates consistent with stock health criteria (poor, moderate, and healthy) to each area, the harvestable surplus was 1.0 million lb (Table 2).

The commercial fishery opened on February 10, 2018, with 4,640 pots registered. Because the mature male biomass exceeded the 2.3 million lb threshold in regulation, regulations dictated a 7-day fishery in the core areas and a 12-day fishery in the noncore areas.

A total of 1,199,551 lb of Tanner crab were caught by 73 permit holders (Table 1). The major discard class was bitter crab, accounting for 106,891 lb, followed by deadloss, totaling 3,806 lb. It was probable that the actual bitter crab catch was significantly higher, because an unknown amount were sorted and discarded on the fishing grounds. There were 1,441 lb of soft-shelled crab reported, and 513 lb retained for personal use. At \$3.39/lb, 1,086,900 lb of marketable product had a total exvessel value of \$3.68 million.

Of the 73 permits that participated in the fishery, 58 were pot permits and 15 were ring nets. Pot gear accounted for 98.9% of the total harvest, or 1,186,891 lb (1,074,628 lb were marketable), and ring net fishermen caught 12,660 lb (12,272 lb of marketable crab).

Crab sampled from Icy Strait had an average size of 149.2 mm CW and 2.4 lb. The percent of recruit-sized crab was 81.5% (Table 3). Crab from Lynn Canal were larger, with an average size of 153.6 mm CW and 2.4 lb, and 76.5% were recruit-sized crab; the highest since the 2008/09 season (Table 3). Average crab size for the Frederick Sound area was 150.1 mm CW and 2.4 lb, higher than previous seasons, with a percent recruit of 61.1% (Table 3).

2018/19 SEASON SUMMARY

For the 2018/19 season, Tanner crab mature male biomass remained stable from the previous season at 6.6 million lb but increased to 4.1 million lb of legal males (Table 2). The stock health in surveyed areas was poor in 1 area, moderate in 4 areas, above average in 6 areas, and healthy in one area (Tables 2). Applying harvest rates consistent with stock health criteria to each area, the harvestable surplus was estimated at 1.0 million lb (Table 2).

The commercial fishery opened on February 12, 2019. The mature male biomass exceeded the 2.3 million lb threshold in regulation, and 4,950 pots were registered at the start of the fishery. The season closed after 7 days in the core fishing areas on February 19, after 12 days in the noncore areas on February 24, and after 26 days in the exploratory areas on March 10.

A total of 1,286,091 lb of crab were harvested by 69 permit holders (Table 1). This consisted of 1,150,229 lb of marketable crab, 1,741 lb retained for personal use, 852 lb of soft-shelled crab, 4,201 lb of deadloss, and 128,755 lb of bitter crab. As in the past, an unknown additional amount of bitter crab were sorted and discarded on the fishing grounds. At approximately \$3.65/lb (Table 1), the marketable product had an exvessel value of \$4.20 million.

Reported landings during the season came from 61 pot and 8 ring net permits. Pot permit holders landed 1,279,648 lb of crab (99.5%), of which 1,143,864 lb were marketable. Ring net permit holders harvested 6,443 lb, or 0.5% of the total Tanner crab harvest (Table 1). Marketable crab accounted for 6,365 lb of the total ring net harvest.

A summary of the harvest by fishing area shows that about 1,219,729 lb, or 94.8% of the total season's harvest, was taken from the three major fishing areas: Icy Strait, Lynn Canal/Stephens Passage, and Frederick Sound (Table 1).

Crab sampled from Icy Strait had an average size of 151.7 mm CW, an average weight of 2.5 lb, and a recruit percentage of 84.1%, the highest since the 2003/04 season (Table 3). Crab from Lynn Canal had an average size of 153.9 mm CW and averaged 2.5 lb, a slight increase from the previous season (Table 3). Average crab size for the Frederick Sound area was 151.4 mm CW, similar to the previous season. Average weight was 2.5 lb, up slightly from the previous season, and percent recruit increased slightly to 65.0% (Table 3).

2019/20 SEASON SUMMARY

The Tanner crab biomass estimate declined in the 2019/20 season to 5.4 million lb of mature males and 3.4 million lb of legal males (Table 2). This is a decrease of 1.2 million lb of legal males from the 2018 estimate, predominantly due to biomass decreases in Seymour Canal, Excursion Inlet, Pybus Bay, and Gambier Bay. Stock health in the surveyed areas was poor in 1 area, below average in 1 area, moderate in 5 areas, above average in 4 areas, and healthy in 1 area (Table 2). Applying harvest rates consistent with stock health criteria to each area, the harvestable surplus was 1.07 million lb (Table 2).

The harvestable surplus remains stable over the last few years. Recently, surveyed areas showed a mix of increasing and decreasing abundances, stabilizing the overall regional abundance. The regional legal male biomass estimate is similar to levels observed in the late 1990s and has been generally increasing since 2010/11 (Figure 4). Overall, recruitment seems to be consistent regionwide and stock health has improved from previous years. Standardized commercial CPUE for the 2017/18–2019/20 seasons remained moderately stable (Figure 1.5). The heightened effort and increase in harvest of Tanner crab during the last 3 seasons may be a result of the recent decline in the golden king crab fishery.

The commercial fishery opened on February 17, 2020, with a mature male biomass exceeding the 2.3 million lb threshold in regulation, and 4,960 pots registered at the start of the season. This resulted in the season closing in core fishing areas after 6 days on February 23, noncore areas closing after 11 days on February 28, and exploratory areas closing after 25 days of fishing on March 13.

A total of 1,212,725 lb of crab were harvested by 76 permit holders (Table 1). This consisted of 1,058,643 lb of marketable product, 889 lb retained for personal use, 329 lb of soft-shelled crab, 15,161 lb of deadloss, and 137,703 lb of bitter crab. Again, an unknown additional amount of bitter crab were sorted and discarded on the fishing grounds. At \$3.68/lb (Table 1), the marketable product had an exvessel value of \$3.89 million.

Reported landings during the season came from 62 pot and 14 ring net permits. Pot permit holders landed 1,206,841 lb of crab (99.5%), of which 1,052,840 lb were marketable. A total of 5,884 lb was landed by ring net permit holders, or 0.5% of the total Tanner crab harvest (Table 1). Marketable crab made up 5,803 lb of the total ring net harvest.

A summary of the harvest by fishing area indicated that about 1,143,176 lb, or 94.3% of the total season's harvest, was taken from the three major fishing areas: Icy Strait, Lynn Canal/Stephens Passage, and Frederick Sound (Table 1).

Crab sampled from Icy Strait had a decreased average size of 150.6 mm CW and weight of 2.4 lb from the previous season (Table 3). Crab from Lynn Canal had a decreased average size of 151.8 mm CW and a 2.4 lb average weight, and 80.1% of them were of recruit size (Table 3). Average crab size for the Frederick Sound area decreased slightly to 150.9 mm CW from the previous season; however, the 2.5 lb average weight was the same as the previous season (Table 3). Percent recruit was 67.8%, up from the previous season (Table 3).

2020/21 OUTLOOK

The Tanner crab biomass estimate declined in the 2020/21 season to 4.95 million lb of mature males and 3.1 million lb of legal males. The decrease in biomass from the previous season is attributed to declines in Icy Strait, Glacier Bay, Seymour Canal, North Juneau, and Excursion Inlet. The commercial fishery opens on February 17, 2021, with mature male biomass exceeding the 2.3 million lb threshold in regulation, providing for a minimum season length of 5 days in length with additional days dependent upon the number of registered pots at the start of the fishery.

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TABLES AND FIGURES

Table 1.—Commercial Tanner crab harvest in pounds by season, by fishing area in Registration Area A, 1971/72 to present.

Season	Lynn Canal/ Upper Stephens Passage ^a		Icy Strait ^b		Frederick Sound/ Lower Stephens Passage ^c		Other ^d		Total (lb)
	lb	% of SE harvest	lb	% of SE harvest	lb	% of SE harvest	lb	% of SE harvest	
1971/72	13,440	2.0	310,803	47.3	200,854	30.6	131,564	20.0	656,661
1972/73	177,661	11.1	505,203	31.6	443,106	27.7	471,868	29.5	1,597,838
1973/74	377,190	28.8	404,347	30.9	396,400	30.3	131,736	10.1	1,309,673
1974/75	19,116	2.2	371,115	43.0	289,758	33.5	183,762	21.3	863,751
1975/76	782,127	36.4	505,089	23.5	406,565	18.9	455,616	21.2	2,149,397
1976/77	599,719	23.4	1,034,577	40.4	529,849	20.7	399,565	15.6	2,563,710
1977/78	394,041	18.4	762,491	35.6	648,802	30.3	337,075	15.7	2,142,409
1978/79	308,765	19.8	655,043	42.0	511,769	32.8	84,192	5.4	1,559,769
1979/80	330,221	18.5	391,185	22.0	907,178	50.9	152,591	8.6	1,781,175
1980/81	321,594	16.0	682,736	33.9	634,425	31.5	374,521	18.6	2,013,276
1981/82	384,252	11.6	2,102,755	63.6	428,259	13.0	390,591	11.8	3,305,857
1982/83	92,055	8.4	816,016	74.0	108,918	9.9	85,020	7.7	1,102,009
1983/84	298,975	18.8	656,496	41.2	468,461	29.4	169,536	10.6	1,593,468
1984/85	366,496	32.4	225,044	19.9	365,395	32.3	173,989	15.4	1,130,924
1985/86	421,236	41.7	182,316	18.1	282,490	28.0	122,963	12.2	1,009,005
1986/87	410,674	36.5	242,010	21.5	317,528	28.3	153,762	13.7	1,123,974
1987/88	458,190	34.4	239,194	18.0	459,709	34.6	173,392	13.0	1,330,485
1988/89	476,600	28.9	349,098	21.2	628,454	38.2	192,180	11.7	1,646,332
1989/90	386,754	19.2	621,277	30.9	709,733	35.3	291,905	14.5	2,009,669
1990/91	442,952	19.8	798,460	35.6	617,839	27.6	382,342	17.1	2,241,593
1991/92	617,885	29.1	800,184	37.7	442,200	20.8	262,652	12.4	2,122,921
1992/93	452,466	28.8	490,117	31.2	433,002	27.6	194,102	12.4	1,569,687
1993/94	253,543	12.7	517,397	25.9	888,117	44.4	342,469	17.1	2,001,526

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Table 1.—Page 2 of 3.

Season	Lynn Canal/ Upper Stephens Passage ^a		Icy Strait ^b		Frederick Sound/ Lower Stephens Passage ^c		Other ^d		Total (lb)
	lb	% of SE harvest	lb	% of SE harvest	lb	% of SE harvest	lb	% of SE harvest	
1994/95	409,187	16.3	735,200	29.3	1,051,899	42	310,861	12.4	2,507,147
1995/96	314,961	15.6	725,970	35.9	704,529	34.9	274,576	13.6	2,020,036
1996/97	293,328	15.4	673,305	35.4	490,752	25.8	443,434	23.3	1,900,819
1997/98	418,743	15.5	692,620	25.6	517,500	19.2	1,072,459	39.7	2,701,322
1999/00	468,373	27.5	440,239	25.8	536,957	31.5	258,839	15.2	1,704,408
2000/01	412,435	31.8	298,607	23	391,751	30.2	192,887	14.9	1,295,680
2001/02	346,676	35.9	265,940	27.6	228,773	23.7	123,447	12.8	964,836
2002/03	311,273	38.7	226,527	28.2	192,255	23.9	74,179	9.2	804,234
2003/04	237,442	28.5	263,533	31.7	249,000	29.9	82,183	9.9	832,158
2004/05	189,323	23.5	319,875	39.8	224,851	28	69,986	8.7	804,035
2005/06	162,500	18.3	386,736	43.6	280,586	31.7	56,699	6.4	886,521
2006/07	152,729	16.5	363,656	39.2	294,745	31.8	116,770	12.6	927,900
2007/08	135,312	22.4	230,612	38.1	176,516	29.2	62,622	10.3	605,062
2008/09	154,634	25.3	239,294	39.1	140,355	22.9	78,267	12.7	612,550
2009/10	291,627	30.3	296,623	30.8	290,829	30.2	82,602	8.7	961,681
2010/11	227,605	25.5	231,424	26	336,497	37.8	95,818	10.7	891,344
2011/12	255,526	23	304,206	27.4	443,484	40	106,568	9.6	1,109,784
2012/13	269,489	21.7	334,244	26.9	492,846	39.7	145,854	11.7	1,242,433
2013/14	333,198	26.5	259,301	20.6	524,958	41.8	139,282	11.1	1,256,739
2014/15	581,152	40.9	209,969	14.8	528,303	37.2	102,439	7.2	1,421,863
2015/16	414,221	31.7	221,820	17.0	542,007	41.5	128,186	9.8	1,306,416
2016/17	338,123	34.0	204,681	20.6	339,722	34.2	111,088	11.2	993,614
2017/18	316,907	26.4	313,034	26.1	449,164	37.4	120,446	10.0	1,199,551

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Table 1.—Page 3 of 3.

Season	Lynn Canal/ Upper Stephens Passage ^a		Icy Strait ^b		Frederick Sound/ Lower Stephens Passage ^c		Other ^d		Total (lb)
	lb	% of SE harvest	lb	% of SE harvest	lb	% of SE harvest	lb	% of SE harvest	
2018/19	426,169	33.1	361,291	28.1	432,269	33.6	66,362	5.2	1,286,091
2019/20	397,189	32.8	452,072	37.3	293,915	24.2	69,549	5.7	1,212,725

^a Includes all of District 15 and Subdistricts 111-30–111-99.

^b Includes all of District 14.

^c Includes all of District 10, Subdistricts 111-01–111-29, and Subdistricts 108-40–108-60.

^d Includes all other areas of Southeast Alaska.

Table 2.—Biomass estimates, recommended exploitation rates (ER), and guideline harvest levels (GHLs) for 12 surveyed areas, 2017/18–2019/20 seasons. Recommended ERs are 0% of estimated mature male biomass for poor stock health, 5% for below average, 10% for average, 15% for above average, and 20% for healthy. An expansion factor of 66% (34% for non-surveyed areas) was used to determine total regional crab biomass. This expansion factor was based on the percent of commercial catch harvested in surveyed areas from 1980–2000.

Survey area	Mature biomass			Legal biomass			Mature ER			Legal ER			GHL		
	2017/ 18	2018/ 19	2019/ 20	2017/ 18	2018/ 19	2019/ 20	2017/ 18	2018/ 19	2019/ 20	2017/ 18	2018/ 19	2019/ 20	2017/ 18	2018/ 19	2019/ 20
Icy Strait	174,518	243,205	230,121	64,979	107,913	123,395	10%	10%	10%	27%	23%	19%	17,452	24,320	23,012
Glacier	980,834	1,271,018	970,282	349,948	653,287	666,404	10%	15%	15%	28%	29%	22%	98,083	190,653	145,542
Stephens	378,649	488,778	453,729	163,405	232,294	292,024	15%	20%	20%	35%	30%	31%	56,797	97,756	90,746
Thomas	167,652	99,636	171,493	87,212	64,747	63,931	10%	0%	15%	19%	0%	40%	16,765	0	24,294*
Holkham	595,882	625,666	407,785	375,236	489,883	274,275	15%	15%	15%	24%	19%	22%	89,382	93,850	61,168
Seymour	905,715	654,241	551,382	460,061	480,508	334,648	20%	15%	15%	39%	20%	25%	174,823*	98,136	82,707
N. Juneau	210,837	241,762	197,918	118,181	174,291	149,444	20%	15%	15%	36%	21%	20%	42,167	36,264	29,688
Excursion	341,612	374,655	301,756	202,432	200,923	179,686	15%	15%	10%	25%	28%	17%	51,242	56,198	30,176
Pybus	268,487	106,361	35,954	156,650	81,562	23,022	15%	10%	5%	26%	13%	8%	40,273	10,636	1,798
Gambier	129,114	61,625	22,640	73,903	32,308	16,049	15%	10%	0%	26%	19%	0%	19,367	6,162	0
Peril	180,696	133,405	181,424	79,021	54,938	71,383	15%	10%	10%	23%	24%	25%	18,070	13,340	18,142
Lynn	50,738	67,568	62,997	32,745	54,304	43,245	10%	15%	15%	23	19%	22%	7,611	10,135	9,450
Non-surveyed	2,258,802	2,250,140	1,848,096	1,114,671	1,400,160	1,152,655	-	-	-	-	-	-	325,593	328,384	266,927
Total	6,643,536	6,618,060	5,435,577	3,278,444	4,118,118	3,390,161	14%	15%	14%	30%	23%	23%	957,626	956,834	783,650

* Adjusted harvest due to >38% of legal biomass.

Table 3.—Summary of commercially harvested Tanner crab size frequency, weight, and recruit class (recruit and postrecruit) by area from 2017/18–2019/20. Data were collected during dockside sampling.

Area	Season	Number sampled		Carapace width (mm)		Weight (lb)		Recruit Class	
		Boats	Crab	Mean	SD	Mean	SD	% Recruits ^a	% Postrecruits ^b
Icy Strait	2017/18	11	825	149.2	11.2	2.4	0.1	81.5	17.5
	2018/19	8	600	151.7	14.1	2.5	0.1	84.1	14.8
	2019/20	8	599	150.6	11.6	2.4	0.1	82.8	16.5
Lynn Canal/ Stephens Passage	2017/18	25	1,875	153.6	13.2	6.6	2.4	76.5	23.3
	2018/19	24	1,799	153.9	14.3	5.3	2.5	69.6	30.4
	2019/20	18	1,350	151.8	14.4	7.4	2.4	80.1	19.5
Frederick Sound	2017/18	20	1,479	150.1	12.7	2.4	0.2	61.1	38.6
	2018/19	16	1,179	151.4	13.4	2.5	0.2	65.0	34.8
	2019/20	21	1,585	150.9	13.8	2.5	0.2	67.8	31.7

^a Recruits = all new and soft-shell crab ≥ 140 mm and ≤ 164 mm carapace width.

^b Postrecruits = all new and soft-shell crab ≥ 165 mm, and old and very old crab ≥ 140 mm carapace width.

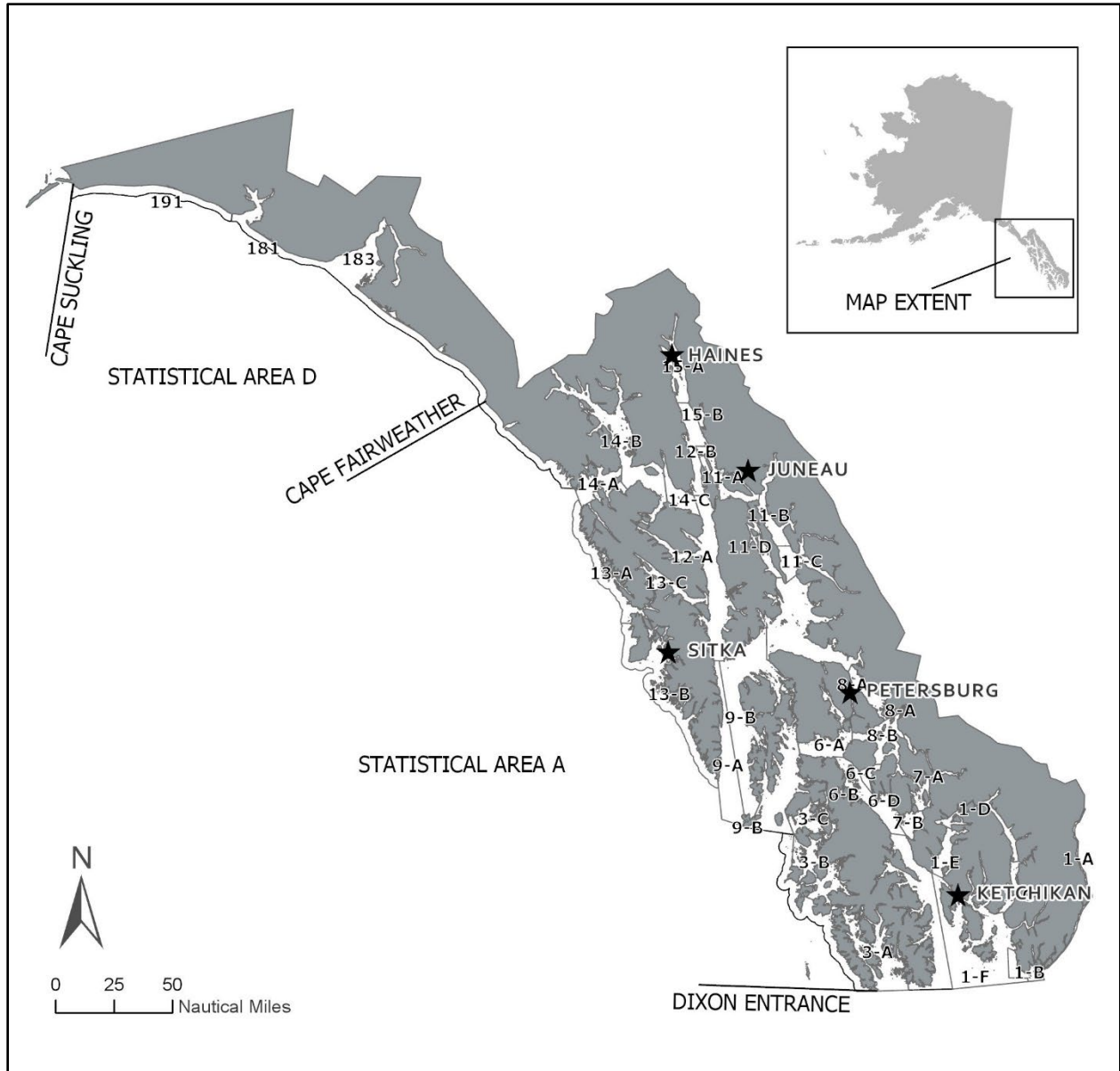


Figure 1.—Registration Area A (Dixon Entrance to Cape Fairweather) with Districts 1-16 and Registration Area D (Cape Fairweather to Cape Suckling) with Districts 181, 183, and 191.

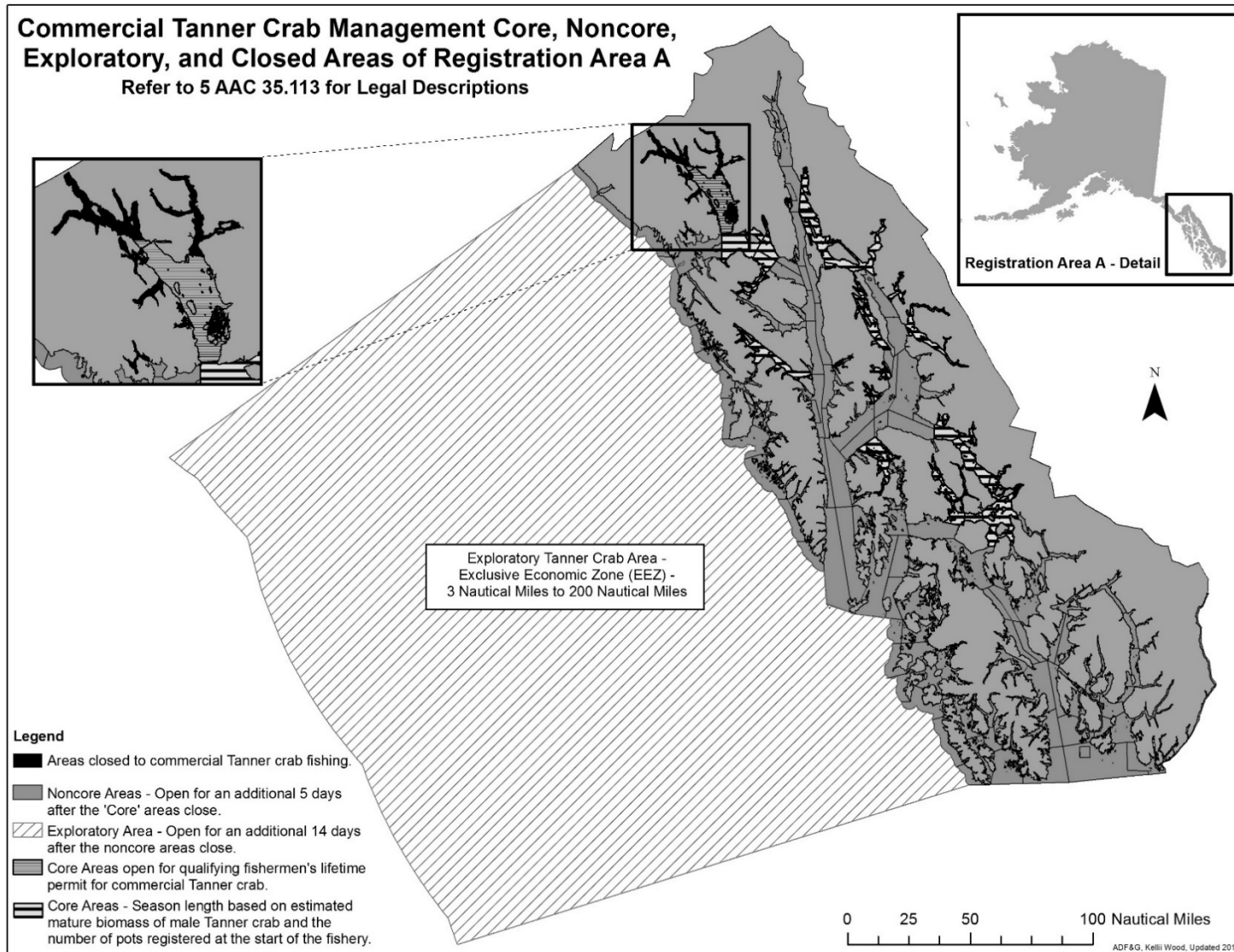


Figure 2.—Map showing major Tanner crab fishing grounds in Southeast Alaska.

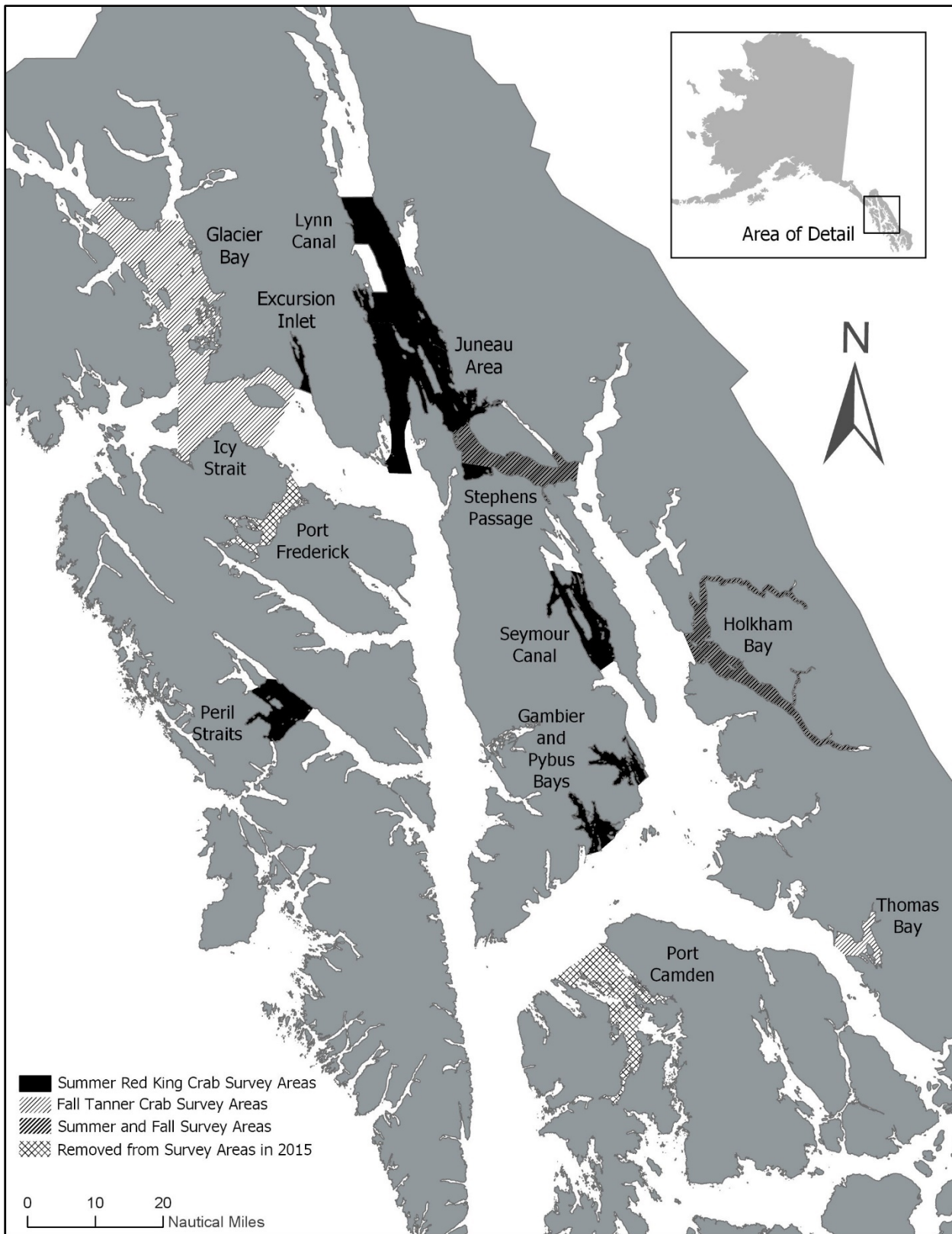


Figure 3.—Summer (red king and Tanner crab) and fall (Tanner crab) survey areas in Southeast Alaska.

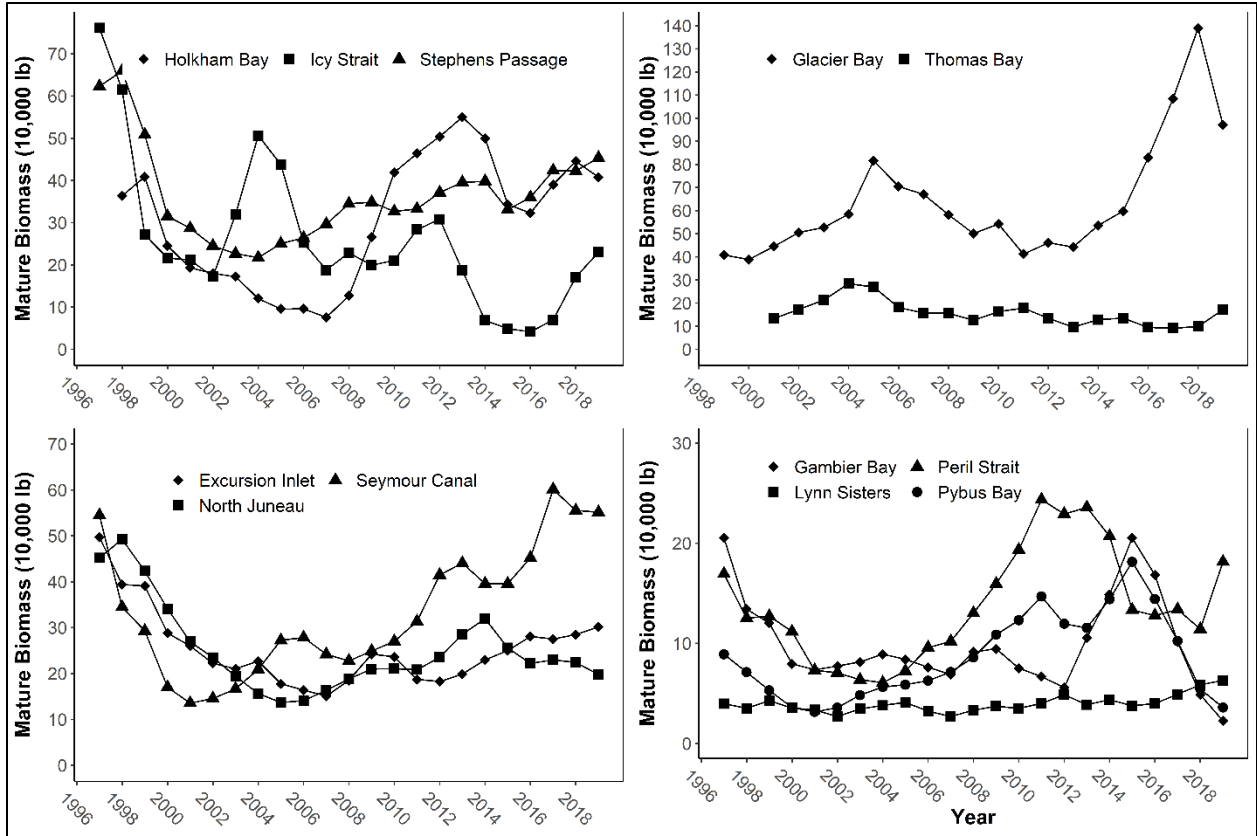


Figure 4.—Tanner crab legal biomass estimates from catch-survey modeling of red king crab and Tanner crab survey data for 14 survey areas from 1997–2019. Note that the biomass scale varies for each graph.

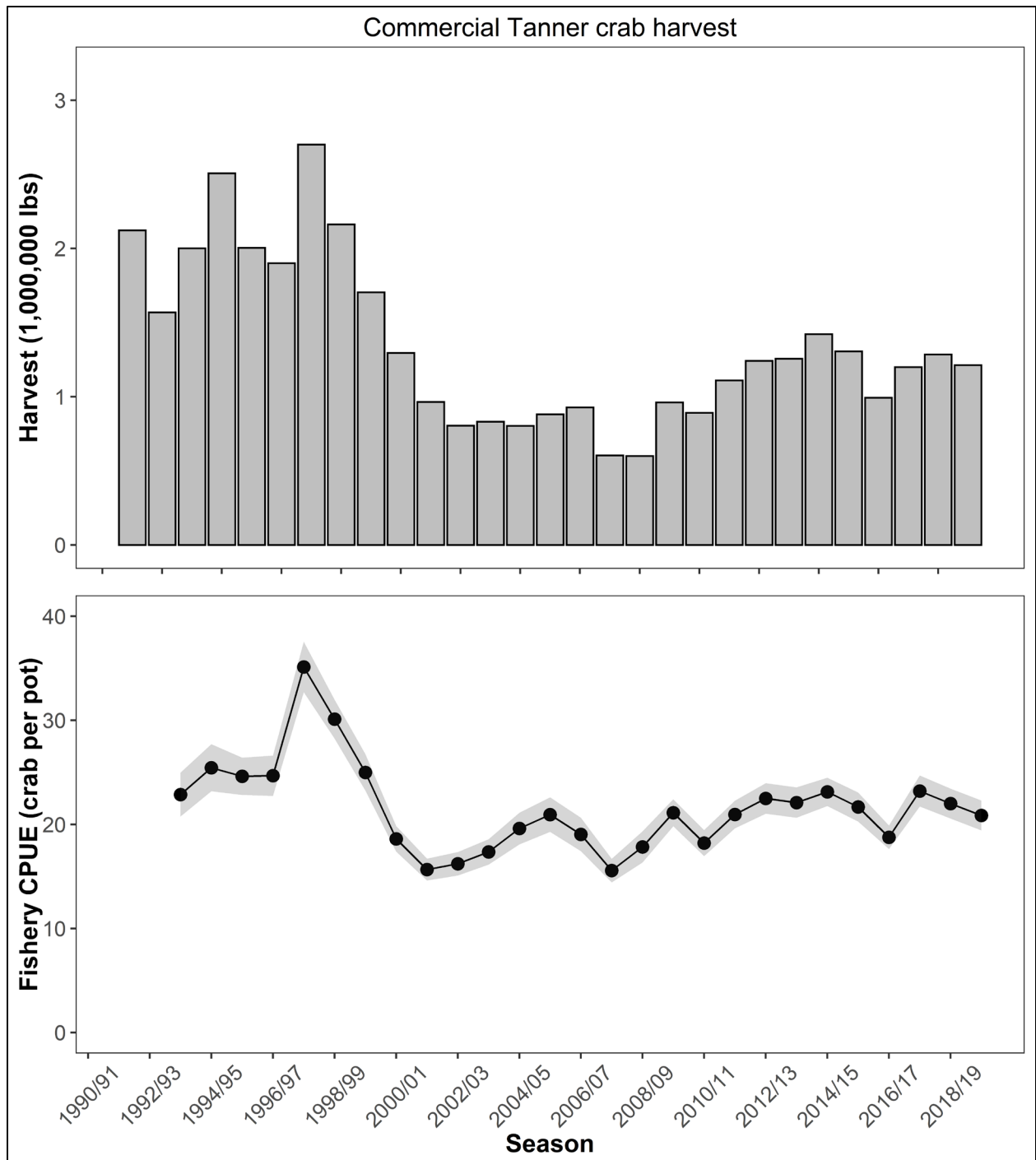


Figure 5.—Commercial Tanner crab harvest (1991/92–2019/20) and standardized fishery CPUE (1993/94–2019/20).