Fishery Management Report No. 21-25

Management Report for the Southeast and Yakutat Dungeness Crab Fisheries, 2017/18–2019/20

by

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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. 21-25

MANAGEMENT REPORT FOR THE SOUTHEAST ALASKA AND YAKUTAT DUNGENESS CRAB FISHERIES, 2017/18–2019/20

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ABSTRACT

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

Dungeness crab harvests in Region I totaled 5,330,101 lb valued at $15.8 million during the last completed season. The average dock price per pound for Dungeness crab during the 2019/20 season was $3.01.

The Dungeness crab fishery in Region I is fully developed. The first commercial harvest of Dungeness crab from Southeast Alaska occurred in the 1930s.

Limited Dungeness crab stock assessment surveys were conducted from 1996 through 1997, and again from 2000 through 2004. Dungeness crab management is by sex, size, and season. In addition to sex, size, and season, a management plan has been implemented for the Southeast Alaska Dungeness crab fishery, mandating Alaska Department of Fish and Game to conduct a full season harvest estimate 2 weeks into the summer season. If this full season harvest estimate falls below thresholds described in the management plan, season length is reduced. Dockside sampling and skipper interviews also are routinely conducted in Southeast Alaska.

Surveys for Yakutat Dungeness crab were conducted in 2004, 2012, and 2013. Yakutat stocks of Dungeness crab are at very low levels and have been designated as collapsed and recovering. The Yakutat Dungeness crab fishery will remain closed until signs of recovery are apparent and until a management and stock assessment plan is developed to provide sustainable harvest.

Keywords: Dungeness crab, *Metacarcinus magister*, Southeast Alaska, Yakutat, fisheries management, crab, Region I, harvest statistics, Alaska Board of Fisheries

CHAPTER 1: SOUTHEAST ALASKA DUNGENESS CRAB FISHERY

INTRODUCTION

Dungeness crab, *Metacarcinus magister*, are members of the highly evolved brachyuran (true crab) infraorder of the subphylum Crustacea. They are commercially significant and widely distributed in coastal waters of the eastern Pacific Ocean from Santa Barbara, California, to the Pribilof Islands, Alaska (Jensen 1995). Dungeness crab are found throughout Southeast Alaska, which is near the northern limit of their range, in areas with mud and sand substrate at depths between 2 and 50 fathoms.

Since 1960, Southeast Alaska (Figure 1.1) has had a seasonal average harvest of approximately 2.75 million lb of Dungeness crab. Ten-year average harvests for the 1970s, 1980s, 1990s, 2000s, and 2010s have been 0.61, 2.45, 3.40, 4.55, and 3.28 million lb, respectively. The 2019/20 season harvest was 5.33 million lb.

The Southeast Alaska commercial Dungeness crab fishery is under limited entry, and there are 275 active permanent and interim Dungeness crab limited entry permits; however, actual participation varies each season. During the most recent 5 seasons (2015/16–2019/20), an average of 198 permit holders have registered and fished (Table 1.1). Most vessels are less than 58 ft overall length; however, they have ranged in size from small skiffs to over 90 ft overall length. Almost all participants use standard, hatbox-shaped pots constructed with steel frames and webbed with stainless steel wire; maximum pot size is 50 inches in diameter and 18 inches high. The maximum legal vessel gear limit is 300 pots per vessel. The fishery also allows for ring nets and diving as legal means to harvest Dungeness crab, although the majority of participants utilize pot gear.

Dungeness crab life history timing is less synchronous than for other commercially important northern crab species. The peak male molt period extends from February through July (G. H. Bishop, J. M. Rumble, and C. Siddon, Alaska Department of Fish and Game [ADF&G], ADF&G Division of Commercial Fisheries, Southeast Alaska Dungeness crab stock assessment survey, 2004, unpublished data; Lehman and Osborn 1970; Shirley and Shirley 1988); this is followed by a female molt period in August and September (G. H. Bishop, J. M. Rumble, and C. Siddon, ADF&G, ADF&G Division of Commercial Fisheries, Southeast Alaska Dungeness crab stock assessment survey, 2004, unpublished data; Shirley and Shirley 1988), which coincides with peak mating timing in late summer through early fall (Shirley and Shirley 1988; Stone and O'Clair 2001) because Dungeness crab females only mate in the soft shell condition (Hartnoll 1969). After molting and mating, females take approximately 1 month to harden, extruding eggs soon thereafter from October through December (Shirley et al. 1987).

Because Dungeness crab females can store sperm for up to 2 years (Jensen et al. 1996), mating is not a prerequisite for oviposition and old-shell females also extrude eggs; however, clutch sizes decline with each successive oviposition without new sperm reserves (Hankin et al. 1989). Dungeness female fecundity increases with body size up to a maximum of about 2.5 million eggs. The high potential fecundity of large females is tempered by a decrease in molt frequency with size, which results in a reduction in relative fecundity (Hankin et al. 1985, 1989). There is evidence for reduced population productivity for this species in Southeast Alaska because it appears that females at this latitude extrude eggs only on a biennial basis (Swiney et al. 2003). As female Dungeness crab grow to a large size, they exhibit assortative mating behavior (i.e., females are mated only by males 1 or more molts larger in body size) (Butler 1960; Shirley and Sturdevant 1988).

The Dungeness crab fishery is managed by sex, size, and season (3-S), with provisions in place that limit participation and effort (limited entry and gear restrictions) and management plan thresholds that limit or close the fishery season(s) if forecasted harvest is not projected to meet those levels. In order to conserve reproductive potential and allow crab to mate at least once prior to harvest, only male crab with a minimum carapace width (CW) of 6.5 inches notch to notch may be harvested (Worton et al. 2013). There are 3 different commercial Dungeness crab fishing seasons in regulation. For Districts 1 and 2, and the portion of Section 13-B not in the Sitka Sound Special Use area, there is a fall/winter season from October 1–February 28. The portion of Section 13-B that is in the Sitka Sound Special Use area and a portion of Whale Passage has a fall season, from October 1–November 30. The remainder of Southeast Alaska has a summer (June 15–August 15) and fall (October 1–November 30) season (Figures 1.1, 1.3, and 1.4). The *Southeastern Alaska Area Dungeness Crab Management Plan* (5 AAC 32.146) directs ADF&G to predict the entire season's harvest by no later than 14 days after the start of the summer season. If the predicted harvest is 1.5 million lb or less, the summer season closes no sooner than 21 days after the season opened, and the fall Dungeness crab fishing season specified in regulation does not open. If the predicted harvest is greater than 1.5 million lb but less than 2.25 million lb, the summer season ends no sooner than 28 days after the season opened with a curtailed fall season of 30 days. If the predicted harvest is greater than 2.25 million lb, the summer and fall seasons will open for entire duration. If ADF&G determines that harvest projections fail to meet this threshold due to soft-shell crab early in the summer Dungeness crab fishing season, ADF&G may open a full fall Dungeness crab fishing season as specified in regulation.

This report describes the Southeast Alaska Dungeness crab fishery history, regulation development, management concerns, research, and summaries of recent seasons. It is intended to provide a comprehensive overview on the Dungeness crab fishery to facilitate promulgation of regulations and it acts as a 2017/18–2019/20 management report.

FISHERY DEVELOPMENT AND HISTORY

The first commercial harvest of Dungeness crab from Southeast Alaska occurred in the 1930s. Harvest statistics prior to 1960 were combined into a single total for much of the Gulf of Alaska, thus harvest information specific to Southeast Alaska is not available. Since 1960, commercial Dungeness crab harvests from Southeast Alaska have averaged 2.75 million lb per season (Table 1.1).

The Dungeness crab fishery has evolved through 4 distinct periods since the early 1960s. From the early 1960s through the early 1980s, participation was low so the need for formal regulations and other restrictions was minimal. The 1960s were characterized by a few larger vessels in a directed fishery harvesting an average of 2.2 million lb per year. This harvest was fueled by high market demand due to low harvests in Washington, Oregon, and California. The principal product was canned crabmeat.

During the 1970s, production in Washington and Oregon rebounded and demand for crab from Southeast Alaska declined. With little or no processor support, commercial fishing participants had to either sell over the dock to the public or make complicated and risky arrangements to airfreight live crab out of Alaska. Only a few dozen small vessels in the 30- to 45-foot range fished, primarily during the summer. Harvests for this period averaged 0.61 million lb by 31 permit holders.

Between the 1981/82 and 1990/91 seasons, the fishery underwent sweeping changes. Declining crab harvests in Pacific coast states and changing markets increased demand for Alaska frozen sections, whole cooked crab, and air-freighted live crab. More processors began purchasing crab and supporting the fishery through the entire summer season. Harvests during the 1980s increased, averaging 2.45 million lb per season, and the numbers of participants increased, averaging 173 permit holders. The fishery grew from a small group of 30- to 45-foot vessels to a larger fleet that included skiff-sized vessels up to 30 ft in length. These changes resulted in a shift from a primary fishery for a relatively small number of single-species participants to a secondary fishery for a larger number of new and often transitory entrants.

Increased participation led to a permit moratorium imposed by the Commercial Fisheries Entry Commission (CFEC) in 1991. During the 4 years of the moratorium, CFEC conducted numerous studies and public meetings to evaluate the need for limited entry into this fishery. Subsequently, CFEC requested that the legislature authorize the use of tiered pot limits to accommodate the large number of qualifying participants while limiting the effort to acceptable levels. In January 1996, the moratorium period ended and a tiered pot limit form of limited entry permits was adopted for implementation by June 15, 1997. The tiered permit system is structured to provide a maximum of 48,750 pots to the fishery. To date, there are 275 active permanent and interim Dungeness crab limited entry permits. Of these limited entry permits, 49 are 300-pot permits, 43 are 225-pot permits, 83 are 150-pot permits, 96 are 75-pot permits, 2 are ring net permits, and 2 are diving gear permits.

REGULATION DEVELOPMENT

FISHING SEASONS AND PERIODS

From the early 1930s through 1955, regulations included a prohibition on the taking of females, a minimum size limit for males, and a closed season on the most important grounds for 2 to 4 months between May 1 and September 1. Available documentation from that period indicates that molting was thought to occur during the summer. The summer closure was generally acceptable to commercial fishing participants because of other fishing opportunities in the salmon and halibut fisheries. The summer closure was repealed in the late 1950s.

From 1960 to 1969 there was no closed season. The first seasonal closures after statehood were adopted in 1970 when portions of Districts 5 and 6 were closed April 1–June 30 (Figure 1.1). In 1975, the first regionwide season was adopted; Dungeness crab could be taken from May 16–March 31, and the District 5 and 6 closures remained in effect. In 1976, the regional open season was changed to June 1–February 28. That regional season remained in effect through 1982; however, the specific closures in Districts 5 and 6 were repealed in 1978. In 1983 and 1984, the regional open season was July 1–February 28, and a shortened season was adopted for part of Sitka Sound. Beginning in 1985, the commercial fishery was open June 15–August 15 and October 1–February 28 because field studies indicated that the major period when females molted and were mated was late August–September. Conclusions of research done later in Southeast Alaska supported those field studies, and other research indicated that peak timing of the female molt and mating period is late summer through early fall (G. H. Bishop, J. M. Rumble, and C. Siddon, ADF&G, ADF&G Division of Commercial Fisheries, Southeast Alaska Dungeness crab stock assessment survey, 2004, unpublished data). The first split season for Districts 1 and 2 was adopted in 1986. In that year, the season for Districts 1 and 2 was changed to October 1–February 28. The season for the northern and central portions of the region remained June 15–August 15 and October

1–February 28. In 1989, in response to increasingly high effort levels and high harvest rates, the season in the northern and central portions of the region was further shortened by 3 months and the fall/winter season was limited to October 1–November 30. Districts 1 and 2 and Section 13-B remained open from October 1–February 28 (Figure 1.1 and 1.3). In 2000, the Alaska Board of Fisheries (BOF) adopted a separate 2-month season of October 1–November 30 for waters of Section 13-B in the Sitka Sound Special Use area to provide additional harvest opportunity for the Sitka subsistence fishery.

The season remained October 1–February 28 in Districts 1 and 2 and a portion of Section 13-B until 2009, when the BOF adopted a proposal that made the commercial Dungeness crab season in Districts 1 and 2 the same as the northern and central portions of the region. That regulation change had a sunset clause that stipulated both Districts 1 and 2 would revert back to a fall/winter season beginning February 29, 2012, unless other action was taken. In 2010, the BOF considered an agenda change request from the Organized Village of Kasaan and revised the season description for District 2, changing it back to a fall/winter season. No action was taken on the sunset clause that remained in place for District 1, so the season in that area reverted back to the fall/winter season in 2012. In 2015, the BOF adopted a change in the start times for the summer, fall, and fall/winter season descriptions from noon to 8:00 AM.

SIZE RESTRICTIONS

From 1924–1935, legal harvest of Dungeness crab was restricted to males over 6.5 inches in greatest width. From 1936–1962, only males over 7 inches in greatest width were legal. Since 1963, the legal size has been 6.5 inches in shoulder width, measured across the carapace immediately anterior to the 10th anterolateral spines. This measuring point is most often used in jurisdictions throughout the range of Dungeness crab, and is used because the large 10th anterolateral spines are often broken or eroded in older-shelled crab. Although size at maturity varies somewhat throughout its range, the 6.5-inch (inside the points) legal size limit in Alaska for the commercial Dungeness crab fishery is currently the largest legal-size limit on the Pacific coast.

GEAR DEFINITIONS AND SPECIFICATIONS

Since 1934, trawls have been prohibited in the Southeast Alaska commercial Dungeness crab fishery. Gear was further limited to pots or ring nets in 1954. A vessel limit of 300 pots or ring nets was implemented in 1963. Diving gear was included as legal gear in 1966. Nearly all of the commercial harvest is currently taken with pots.

Starting in 1963, Dungeness crab pot buoys were required to display the registration number of the vessel fishing the gear. In 1988, the minimum size of buoy markings was set at 1.5 inches in height, in numerals at least ¼-inch wide that contrasted with the color or texture of the buoy.

In 1977, 2 escape rings 4⅜ inches in diameter were required in each pot, and a Dungeness pot was defined by its tunnel eye openings, which individually could not exceed 30 inches in perimeter. In 1978, an escape panel secured by a maximum of 120-thread cotton twine was required. A minimum size for buoy numbers of 1.5 inches high and ¼-inch wide was implemented in 1989. In 1991, the breaking strap or biodegradable twine for the lid retainers was changed from 120-thread to 60-thread. The intent of this change was to minimize untended ghost fishing of lost or derelict pots. In order to facilitate the enforcement of pot limits, identification tags were required to be attached to every buoy connected to a Dungeness crab pot beginning with the 2001/02 season. Dungeness crab pots and ring nets must all be buoyed and marked identically. In 2012, an amended

proposal was carried by the BOF that changed the requirement from buoys that had to be marked identically to buoys of essentially the same color, shape, size, and markings.

Dungeness gear development remained static for many years, with little change in configuration, materials, size, and weight to significantly affect pot efficiency. However, trigger devices that minimize escapement of crab through entrance tunnels have been developed and are being installed on commercial gear, and some commercial fishing participants have begun using larger pots. In order to prevent further increases in pot size, a maximum pot size of 50 inches in diameter was implemented prior to the 2001/02 season. In 2018, the BOF clarified the definition of buoy tags as being issued to the permit holder and not the individual CFEC permit or fishing vessel.

OTHER REGULATORY CHANGES

Vessel registration and hold inspection requirements started in 1974. Southeast Alaska was designated a superexclusive registration area in 1983. Hold inspections were rescinded in 1984. A Dungeness crab management plan became effective beginning with the 2001/02 season. The plan calls for early closure of the season when regional catch is projected to be below 1 of 2 threshold levels. Several changes to the Dungeness crab fishery occurred at the 2009 BOF meeting: the Dungeness crab management plan was modified to allow management flexibility if harvest projections fail to meet the threshold for a full season due to soft-shell crabs early in the summer fishing season; regulations to clarify permit stacking requirements; and closed areas in Chaik Bay and Whale Pass (Figure 1.4) were revoked. In 2015, the BOF carried amended proposals to close waters to commercial Dungeness crab fishing near the communities of Angoon and Hoonah. The BOF also passed an amended proposal to expand the closed waters of the Hollis Anchorage area [5 AAC 32.150(11)] in 2018 (Figure 1.5).

MANAGEMENT CONCERNS

SEASON TIMING

The summer season overlaps with a portion of the male molt period, and legal males are harvested prior to mating, shifting the burden of reproduction onto smaller males. Harvesting legal males prior to reproducing has the potential of creating genetic selection for crab to grow more slowly to avoid harvest (Kruse 1993). The prevalence of soft-shell crab in the catch and harvest during the summer fishery continues to be high in some areas and seasons. This suggests that production is being lost due to handling mortality, which has been documented as being higher for soft-shell Dungeness crab (Kruse et al. 1994).

SPATIAL CONSOLIDATION OF FLEET

Area closures and competition with sea otters have increased spatial consolidation of the commercial fishery. Glacier Bay National Park and Preserve became permanently closed to the commercial Dungeness crab fishery in 1999 and conflict between user groups has been increasing as competitive pressure and gear saturation consolidates commercial gear onto grounds traditionally used by noncommercial fishing parties. This has resulted in commercial closed areas in numerous small areas around many communities in Southeast Alaska, including Juneau, Tenakee Springs, Elfin Cove, Point Baker, Thorne Bay, Gustavus, Ketchikan, Haines, Sitka, Hollis, Angoon, and Hoonah. There are continuing requests to the BOF for additional closed commercial fishery areas.

Sea otter populations have been expanding their range in Southeast Alaska since their reintroduction in 1965. Their expansion has been accompanied by drastic declines in Dungeness crab populations in Districts 3, 4, and 14 (Pitcher and Imamura 1990). Sea otters continue to expand their range into important Dungeness crab fishing grounds in Districts 5, 6, 8, 9, and 10 further consolidating the commercial fishery into less impacted areas.

RESEARCH STUDIES

ADF&G has several sources of ongoing and historical fishery and research information related to the Southeast Dungeness crab fishery and include the following:

- comprehensive fish ticket data (processors are required to submit reports of effort, location, and pounds of harvest for each commercial landing)
- 3 population assessment surveys completed between 1987 and 2004
- onboard observer sampling from the 1998/99 season
- on-the-grounds sampling from the 1999/2000 season
- regular dockside sampling
- molt timing studies

SURVEYS

Icy Strait Survey

In July 1987 and May 1988, ADF&G conducted a survey to provide baseline abundance index to assess the effects of sea otters on Dungeness crab populations in the Icy Strait area (Pitcher and Imamura 1990).

Stikine River Flats Survey

In the spring of 1996 and 1997, ADF&G conducted preseason abundance surveys of the Dungeness crab stocks in the Stikine River Flats area (Statistical Areas 108-40 and 108-41). This stock is a consistently important contributor to the overall Southeast Alaska harvest. Using a random transect experimental survey design and commercially configured pots with smaller mesh, ADF&G collected size, sex, and shell hardness data during late May, prior to the commercial fishery opening on June 15. After the season opened, staff conducted onboard field observations of commercial fishing operations in the same general area. The goal of these initial projects was to develop a method for estimating the prevalence of undersized and legal-sized soft-shell male crab that would be vulnerable to handling by the commercial fleet early in the summer season.

Kittiwake Survey

A Dungeness crab pot survey was conducted from April 2000–June 2004, with the following 4 primary objectives:

1. Investigate the utility of abundance-based management tools by doing the following:
    a. develop pre- and postseason indices of abundance for legal and prerecruit males and determine their utility as predictors of harvest, and
    b. use a ratio estimator (Dawe et al. 1993) to model the results of pre- and postseason surveys and estimate the population size in Stikine Flats, Duncan Canal, Port Camden, Berners Bay, Peril Strait, Tenakee Inlet, and St. James Bay.
2. Describe Dungeness crab life history and ecology by doing the following:

a. describe timing of life history events,
b. describe interannual variation in crab size and shell age composition by sex, and
c. describe species composition of invertebrates and fish captured in Dungeness crab pots.

3. Refine pot survey methods to describe the relationship between Dungeness crab catch by size and sex and soak time in pots with open and closed escape rings.
4. Describe the growth of Dungeness crab in Southeast Alaska.

From 2000–2004, 3,309 commercial pots were set during March/April, June, August/September, and November/December survey periods in 9 survey areas: Stikine Flats, Duncan Canal, Kah Sheets Bay, Port Camden, Berners Bay, Peril Strait, Tenakee Inlet, St. James Bay, and Seymour Canal (Figure 1.2). Not all survey areas were sampled during each survey period and year. Depth-stratified clusters of 3 or 4 pots were set in depths from 5.5 to 73.2 meters. Clusters had alternately open then closed escape rings, and cluster locations were selected using a systematic sampling design with random starts (G. H. Bishop, J. M. Rumble, and C. Siddon, ADF&G, Southeast Alaska Dungeness crab stock assessment survey, 2004, unpublished data).

The surveys produced several important findings:

- June legal CPUE was a useful index of population size only for Duncan Canal; for other survey areas it had little predictive power because crab were either not completely catchable or had not yet molted into the fishery by June. Soft-shell prevalence peaked in March/April through August/September for males and in August/September for females (G. H. Bishop, J. M. Rumble, and C. Siddon, ADF&G, ADF&G Division of Commercial Fisheries, Southeast Alaska Dungeness crab stock assessment survey, 2004, unpublished data).

- Data were modeled using Change-in-Ratio and Index-Removal methods to estimate legal population size, catchability, and exploitation rates (Bishop et al. 2010). Change-in-Ratio population estimation yielded exploitation rates averaging 93% and 99%, respectively, for Stikine Flats and Duncan Canal open escape ring pots, and 83% for both Peril Strait and Tenakee Inlet closed escape ring pots. In Port Camden, St. James Bay, and Berners Bay, low, variable, and even negative exploitation rates were estimated, probably as a result of an inseason recruitment molt, which violates the assumption of a closed population. The Index-Removal method produced exploitation rate estimates that were biased low due to catchability increasing between the 2 survey periods. The variable success of the 2 methods demonstrates a high level of spatial and temporal variability in Dungeness crab life history timing, which makes their assessment very difficult.

- Crab were tagged in 7 areas from 2000–2003. Tag–recapture data was analyzed to determine molt increment and molt probability. The molt increment of 29.9 mm CW was independent of premolt size for the adult male size range considered. Previous work done in Southeast Alaska identified male crab as being functionally mature (observed in mating embraces) at 120 mm CW (Shirley and Sturdevant 1988). The growth increment and molt probability work from the 2000–2003 surveys predicted that functionally mature crab would be under the legal size for over 1 year (Bishop et al. 2007). Thus, the current size limit protects males to reproduce at least once before harvest. Molt probability at the legal size limit of 165 mm CW was 48%, declining to near zero for crab of 172 mm CW.

Although information on the growth of smaller instars is needed, the age at first harvest is probably at least 4 years (Bishop et al. 2007).

DOCKSIDE SAMPLING

Since 1985, commercial Dungeness crab landings have been sampled in the ports of Petersburg, Wrangell, Sitka, Juneau, Ketchikan, and Haines. Goals of the dockside sampling program are to describe the size and shell age composition, average weight, and catch rates of Dungeness crab in the commercial fishery. Port samplers measure the crab, determine shell condition, and check for damage to the carapace and legs (Messmer and Palof 2019). By analyzing these data and knowledge of Dungeness crab growth rates, ADF&G can determine the recruit class composition of the harvest (Tables 1.2 and 1.3).

In order to gain a better understanding of spatial and interannual variability in shell condition related to market limits, shell hardness of delivered and discarded crab was measured with durometers during the 2009/10 and 2010/11 commercial seasons (Bishop 2013).

MOLT TIMING STUDY

ADF&G initiated a molt timing study of Dungeness crab in Southeast Alaska in March 2020 to better understand the window for molt timing of legal males. The purpose of the molt timing pilot study is to use molting hormone (ecdysteroid) levels to assess molt status between March and June for sexually mature males in the Eagle Beach area near Juneau. The findings will be used to determine the feasibility of investigating other areas in Southeast Alaska and may be used to improve the seasons defined in regulation to avoid the sensitive life events of mating and molting and reduce the handling of soft-shell males.

Dungeness crab are captured by divers and pot gear to help ensure that hormone sampling will capture the full range of molt timing for male crab because molting crab do not actively feed and enter crab pots. Specimens are randomly collected from SCUBA divers between depths of 0–20 feet, 21–40 feet, and 41–60 feet. Twice per month, 60 male crab are collected, 10 by dive per depth range and 10 by pot per depth range. Biological data from collected males are recorded and hemolymph is drawn from 60 individual crab (A. Rebert, A. Messmer, and K. Palof, ADF&G Division of Commercial Fisheries Biologists, 2020, unpublished data). Hemolymph is then assayed, under the direction of Sherry Tamone at University of Alaska Southeast, for ecdysteroids by a specific enzyme-linked immunosorbent assay (ELISA) using methods similar to those in Thomton et al. (2006).

RECENT SEASONS

2017/2018 SEASON SUMMARY

ADF&G projected total season harvest based on landings and effort data from the first full week of fishing. The projection indicated that total season harvest would not exceed 2.25 million lb but fell near the lower end of the range described in 5 AAC 32.146(2)(B) (1.5 to 2.25 million lb) at 1.68 million lb. According to the management plan, ADF&G must close the commercial Dungeness crab summer fishing season no sooner than 28 days after the season opens when the projected full season harvest falls within this range, thus the 2017/18 summer was reduced by 3 weeks.

The Dungeness crab management plan also stipulates a 30-day fall fishing season when the full season projection falls between 2.25 million and 1.5 million lb. However, 5 AAC 32.146(3) states that if ADF&G determines that harvest projections fail to meet threshold due to soft-shell crab early in the commercial Dungeness crab summer fishing season, ADF&G may open the commercial Dungeness crab fishery for the full fall/winter fishing season. During the first week of the 2017/18 summer fishing season (landings made June 15–22, 2017), dockside interviews noted a 14% average per landing of soft-shelled legal crab not retained. However, some amount of soft-shelled crab is normally caught in the first week. To determine an average amount of soft-shelled crab caught in the first week, the previous 3-year average of 10% was used as a proxy for a "normal" amount of soft-shelled crab. Because the 14% soft-shelled crab from the 2017/18 season exceeded the 3-year average of 10%, the difference of 4% (24,217 lb) was applied to the first week's harvest to estimate what amount of poundage, in excess of the norm, was not retained. Based on the regression model used to produce the full season harvest estimate, adding this poundage to the total for the first week was not enough to produce a harvest estimate that exceeded the 2.25 million lb threshold in regulation. Adding the additional soft-shelled crab increased the estimate from 1.68 to 1.81 million lb.

ADF&G also examined the total amount of harvest from the first week graded as soft-shelled by the buyers. In the first week of the 2017/18 season, 449 lb were graded as soft regionwide. This amount is far below the recent 3-year average of 2,424 lb. Because market considerations do play into grading from year to year, the decrease in the total amount of harvest from the first week given a soft-shell delivery code by the buyers did not indicate an above average amount of soft-shelled crab encountered by the fleet in the first week of the fishery.

Based on the data from port sampling and fish tickets, ADF&G assessed that soft-shelled crab not retained during the first week of the season were not a contributing factor in failing to meet threshold, unlike the decision made in 2013/14, and therefore a 30-day fall fishing season was established for the entire region (Stratman et al. 2014). Since the management plan was put into regulation in 2000, the 2017/18 season is the second season (along with the 2013/14 season) that the threshold for a normal season described in regulation was not met. The 2017/18 season is the first season with a 30-day fall season since the management plan was implemented.

Districts 8, 13, and 14 had the largest harvests when compared to the other districts (Table 1.4, Figure 1.1). A total of 1,445,293 lb were harvested during the summer fishery (75%). The fall fishery harvest totaled 469,124 lb (25%) for a total harvest of 1,914,143 lb by 193 permit holders, the smallest Dungeness season harvest since the 1989/90 fishery (Table 1.1). Harvest in June and July combined made up 75% of the full season harvest (Table 1.5). Port sampling data show 89.9% recruit class crab, up from the previous season (Table 1.2). For the entire 2017/18 season, 1.1% of the commercial harvest was sampled. Landed crab averaged 2.0 lb (Table 1.3). Strong prices, an average of $3.07 per lb (Table 1.1), and harvest yielded a total fishery value of $5,790,391.

2018/2019 SEASON SUMMARY

The early season predicted harvest for the 2018/19 season was above the Dungeness crab management plan threshold, so the season length was not curtailed. During the 2018/19 fishery, 184 permit holders, the fewest since the 2013/14 season, harvested a total of 4,089,214 lb of Dungeness crab (Table 1.1). The summer fishery made up 74% of the harvest, or 3,007,751 lb, and the remaining 26%, or 1,081,463 lb, was taken during the fall fishery. District 11 was the largest producer when compared to other districts, with 22% of the overall harvest; 18% of the

harvest came from District 8 (Table 1.4). Harvest in June and July combined made up 65% of the full season harvest (Table 1.5). Port sampling data show 90.5% recruit class crab (Table 1.2). Harvested crab sold for an average of $3.08 per lb, the highest average price in the fishery's history (Table 1.1), and averaged 2.0 lb each (Table 1.3). Total exvessel value of the 2018/19 fishery was $12,217,582.

2019/2020 SEASON SUMMARY

The early season predicted harvest for the 2019/2020 season was above the Dungeness crab management plan threshold, so the season length was not shortened. During the 2019/20 fishery, 199 permit holders harvested a total of 5,330,101 lb of Dungeness crab (Table 1.1). The summer fishery made up 79% of the harvest, or 4,205,270 lb, and the remaining 21%, or 1,124,831 lb, was taken during the fall fishery. Districts 8 and 11 were again large producers, with 21% of the overall harvest in each district, followed by District 6, which made up 12% of the total season harvest (Table 1.4). Harvest in June and July combined made up 71% of the full season harvest (Table 1.5). Port sampling data show 93.6% recruit class crab (Table 1.2), the highest since the 2006/07 season. Harvested crab averaged 2.0 lb each (Table 1.3). Strong prices, an average of $3.01 per lb (Table 1.1), and harvest yielded a total exvessel value of $15,812,545; the most lucrative season in Southeast Alaska history.

2020/2021 SEASON SUMMARY

ADF&G projected total season harvest based on landings and effort data from the first full week of the fishery. The projection indicated that total season harvest would exceed the 2.25 million lb regulatory threshold described in 5 AAC 32.146(2)(B). During the 2020/21 summer fishery, 194 permit holders harvested a total of 5,828,844 lb of Dungeness crab, which surpassed all previous full-season harvests except for the 2002/03 fishery (Table 1.1). District 8 was again a large producer with 21% of the summer harvest; 16% of the harvest came from District 10 and 15% of the harvest came from District 11. Harvest in June and July totaled 5,157,488 lb, which is 88% of the entire summer season harvest. The full season harvest is not available, as the season is currently underway. Harvested crab sold for an average of $1.76 per lb, the lowest average price since the 2009/10 season, and averaged 2.0 lb each during the summer fishery (Table 1.1). Summer harvest yielded a total exvessel fishery value of $9,862,105.

CHAPTER 1: TABLES AND FIGURES

Table 1.1–Registration Area A (Southeast Alaska) commercial Dungeness crab fishery catch, effort, and value, 1960 to present.

Season	Number				lb per permit	Pots lifted	CPUE[a]	Average weight	Price per lb
	Permits	Landings	Crab	Pound (lb)					
1960	ND	ND	ND	1,449,405	ND	ND	ND	ND	ND
1961	ND	ND	ND	671,455	ND	ND	ND	ND	ND
1962	ND	ND	ND	2,985,939	ND	ND	ND	ND	ND
1963	ND	ND	ND	3,296,362	ND	ND	ND	ND	ND
1964	ND	ND	ND	3,996,100	ND	ND	ND	ND	ND
1965	ND	ND	ND	2,392,395	ND	ND	ND	ND	ND
1966	ND	ND	ND	1,968,117	ND	ND	ND	ND	ND
1967	ND	ND	ND	2,033,156	ND	ND	ND	ND	ND
1968	ND	ND	ND	1,900,690	ND	ND	ND	ND	ND
1969/70	24	392	501,011	1,149,111	47,880	ND	ND	2.3	ND
1970/71	21	380	349,045	776,617	36,982	ND	ND	2.2	ND
1971/72	22	315	205,359	452,681	20,576	ND	ND	2.2	ND
1972/73	31	316	ND	599,487	19,338	ND	ND	ND	ND
1973/74	41	483	ND	748,519	18,257	ND	ND	ND	ND
1974/75	55	453	ND	715,249	13,005	ND	ND	ND	ND
1975/76	36	344	285,459	611,621	16,989	ND	ND	2.1	ND
1976/77	25	173	225,217	515,378	20,615	ND	ND	2.3	ND
1977/78	12	87	58,046	127,345	10,612	ND	ND	2.2	ND
1978/79	25	208	345,379	754,759	30,190	ND	ND	2.2	ND
1979/80	37	313	371,670	801,753	21,669	ND	ND	2.2	ND
1980/81	26	227	236,630	521,247	20,048	ND	ND	2.2	ND
1981/82	75	749	1,266,271	2,932,427	39,099	ND	ND	2.3	$0.83
1982/83	129	1,298	1,551,520	3,662,112	28,388	ND	ND	2.4	$0.77
1983/84	132	1,536	942,477	2,155,849	16,332	ND	ND	2.3	$1.15
1984/85	183	1,593	847,824	1,843,521	10,074	ND	ND	2.2	$0.90
1985/86	216	2,077	1,059,717	2,316,994	10,727	159,300	2.8	2.2	$1.22
1986/87	224	2,330	1,184,771	2,453,055	10,951	232,328	3.9	2.1	$1.02
1987/88	240	2,745	1,610,707	3,390,832	14,128	278,944	4.6	2.1	$1.08
1988/89	264	2,683	1,517,105	3,321,734	12,582	248,755	4.8	2.2	$0.91
1989/90	245	2,096	875,861	1,918,880	7,832	194,239	3.4	2.2	$1.06
1990/91	243	2,339	1,293,500	2,662,151	10,955	329,916	3.9	2.1	$1.44
1991/92	318	3,386	2,260,678	4,707,106	14,802	462,425	4.2	2.1	$1.21
1992/93	245	2,497	1,424,742	3,095,419	12,634	313,522	3.7	2.2	$0.84
1993/94	198	1,956	1,167,481	2,536,701	12,812	271,474	3.6	2.2	$0.92
1994/95	184	1,787	927,878	1,921,739	10,444	230,595	4.0	2.1	$1.10
1995/96	200	2,737	2,176,200	4,404,519	22,023	460,378	4.2	2.0	$1.62
1996/97	203	2,896	2,406,434	5,005,840	24,659	399,472	4.9	2.1	$0.96
1997/98	232	4,043	1,921,545	4,062,543	17,511	616,608	2.8	2.1	$2.18
1998/99	244	3,134	1,132,885	2,329,499	9,547	481,214	2.2	2.1	$1.47
1999/00	197	2,862	1,611,136	3,280,503	16,652	474,986	2.8	2.0	$1.64

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Table 1.1–Page 2 of 2.

Season	Number				lb per permit	Pots lifted	CPUE	Average weight	Price per lb
	Permits	Landings	Crab	Pound (lb)					
2000/01	199	2,380	1,254,573	2,565,410	12,892	400,616	2.7	2.0	$1.50
2001/02	209	3,059	2,099,643	4,104,128	19,637	539,636	3.9	2.0	$1.73
2002/03	220	3,561	3,512,242	7,332,665	33,330	785,936	4.5	2.1	$1.07
2003/04	209	2,931	2,184,724	4,537,049	21,708	609,085	3.6	2.1	$1.32
2004/05	198	2,412	2,239,892	4,587,631	23,170	564,417	4.0	2.0	$1.36
2005/06	189	2,203	2,039,101	4,205,480	22,251	468,400	4.4	2.1	$1.21
2006/07	171	2,074	2,228,852	4,503,970	26,339	468,426	4.8	2.0	$1.38
2007/08	193	2,841	2,657,986	5,408,355	28,023	647,401	4.2	2.0	$2.13
2008/09	207	2,816	2,351,764	4,731,668	22,858	647,204	3.6	2.0	$2.18
2009/10	195	2,441	1,770,701	3,569,697	18,306	535,292	3.3	2.0	$1.72
2010/11	176	2,208	1,588,622	3,245,265	18,439	445,348	3.6	2.0	$1.78
2011/12	162	2,014	1,252,387	2,594,897	16,018	377,162	3.3	2.1	$2.22
2012/13	160	2,199	1,144,095	2,359,309	14,746	398,172	2.9	2.1	$2.50
2013/14	150	2,224	1,288,148	2,589,872	17,266	393,227	3.3	2.0	$2.49
2014/15	192	3,305	2,504,931	5,063,854	26,374	623,948	4.0	2.0	$2.99
2015/16	205	3,006	1,545,614	3,259,362	15,899	545,458	2.8	2.1	$2.99
2016/17	208	2,544	1,135,953	2,358,645	11,340	464,519	2.4	2.1	$3.04
2017/18	193	1,708	937,701	1,914,417	9,919	343,696	2.7	2.0	$3.07
2018/19	184	2,521	2,070,727	4,089,214	22,224	557,358	3.7	2.0	$3.08
2019/20	199	2,781	2,649,387	5,330,101	26,784	647,634	4.1	2.0	$3.01
5-year average	198	2,512	1,667,876	3,390,348	17,233	511,733	3.1	2.0	$3.03
Overall average [b]	160	1,954	1,421,116	2,746,997	19,330	446,203	3.6	2.1	$1.67

Note: ND = not available.

[a] CPUE values for 1985/1986 through 2009/2010 seasons estimated using only landings with associated pot lift data.

[b] Overall average is calculated using all seasons with available data.

Table 1.2–Summary of commercial Dungeness crab size frequency and shell condition data collected during dockside sampling in Registration Area A, 1975/76 to present.

	Number sampled		Carapace width (mm)		Recruitment	
Season	Boats	Crab	Average	Range	% Recruit[a]	% Postrecruit[b]
1975/76	19	1,930	180.4	154–217	75.9	19.8
1976/77	3	304	177.5	159–204	76.2	20.5
1977/78	6	624	178.7	159–211	47.0	50.0
1978/79	11	1,130	180.0	161–213	75.1	24.0
1979/80	4	422	181.3	160–217	78.2	21.5
1980/81	5	447	179.8	161–207	83.2	16.1
1981/82	12	1,263	182.6	160–215	66.0	33.9
1982/83	9	849	187.2	164–218	63.5	36.2
1983/84	11	1,205	185.7	159–225	65.8	33.2
1984/85	3	303	175.9	164–205	88.4	10.6
1985/86	26	2,650	177.7	157–228	87.1	9.9
1986/87	29	2,872	177.3	156–228	75.8	19.7
1987/88	63	6,226	178.5	160–213	76.1	21.3
1988/89	81	7,595	182.1	157–225	65.9	32.0
1989/90	75	7,123	181.0	157–220	61.1	36.1
1990/91	166	16,399	174.9	156–223	83.8	11.3
1991/92	172	16,897	178.6	153–230	85.5	12.0
1992/93	146	14,262	180.2	157–215	77.2	21.0
1993/94	81	7,628	181.8	155–226	77.9	20.7
1994/95	79	7,832	176.2	160–222	84.1	12.2
1995/96	136	13,621	175.6	158–228	89.0	8.7
1996/97	222	11,196	178.5	154–215	80.9	16.7
1997/98	200	10,263	179.2	156–220	80.1	17.5
1998/99	196	10,145	176.9	101–216	74.0	22.0
1999/00	262	13,257	176.2	110–212	76.8	19.2
2000/01	338	16,913	176.9	87–213	81.7	14.9
2001/02	494	24,704	174.7	153–219	87.6	6.3
2002/03	424	21,331	178.9	140–225	89.2	8.6
2003/04	425	21,590	178.5	93–224	85.8	11.5
2004/05	433	21,876	178.0	140–215	88.7	8.0
2005/06	397	19,910	177.8	90–233	90.2	6.8
2006/07	455	22,771	176.8	157–230	93.7	4.1
2007/08	400	20,948	177.4	123–229	88.9	8.1
2008/09	354	18,926	177.7	160–225	89.3	7.8
2009/10	376	20,214	177.1	140–223	88.5	8.3
2010/11	354	18,912	178.8	159–216	89.6	8.2
2011/12	366	20,012	178.4	93–219	86.9	9.9
2012/13	346	18,614	177.9	154–219	87.6	9.1
2013/14	292	16,133	175.4	157–219	88.5	7.3
2014/15	163	10,405	177.3	153–216	85.5	12.0
2015/16	177	10,787	178.9	158–228	82.4	15.4
2016/17	140	8,413	177.6	161–227	86.8	10.2
2017/18	112	6,745	175.9	148–225	89.9	7.0
2018/19	141	7,535	175.3	155–211	90.5	6.5
2019/20	95	5,509	176.4	161–205	93.6	4.5

[a] Recruit = all new and soft-shell crab ≥165 mm and ≤194 mm carapace width excluding spines.

[b] Postrecruit = all new and soft-shell crab >194 mm and old- and very old-shell crab ≥165 mm carapace width.

Table 1.3–Dungeness crab catch rate and weights in Registration Area A, 1975/76 to present. Data were collected during dockside sampling and interviews.

	Number					Weight (lb)		Estimated no.	Percent
Season	Boats interviewed	Pots lifted	Crab captured	Average no./pot	Range no./pot	Average	Range	crab harvested[b]	harvest sampled[c]
1975/76	*	*	*	*	*	*	*	*	*
1976/77	*	*	*	*	*	*	*	*	*
1977/78	*	*	*	*	*	*	*	*	*
1978/79	5	ND	ND	ND	ND	2.2	2.0–2.5	343,072	0.3
1979/80	*	*	*	*	*	*	*	*	*
1980/81	*	*	*	*	*	*	*	*	*
1981/82	*	*	*	*	*	*	*	*	*
1982/83	4	2,475	13,000	5.3	4.3–7.3	2.7	2.7–2.7	1,356,337	0.1
1983/84	7	1,680	1,540	0.9	2.6–6.3	2.3	2.0–2.7	937,325	0.1
1984/85	*	*	*	*	*	*	*	*	*
1985/86	23	675	4,881	7.2	4.6–14.4	2.1	1.7–2.6	1,103,330	0.2
1986/87	28	3,888	20,603	5.3	2.7–11.5	2.0	1.7–2.3	1,226,528	0.2
1987/88	61	9,597	44,812	4.7	1.1–11.6	2.1	1.7–2.6	1,614,682	0.4
1988/89	81	16,342	86,143	5.3	0.4–15.0	2.3	1.6–2.6	1,444,232	0.5
1989/90	113	20,681	68,537	3.3	0.2– 9.6	2.1	1.6–2.7	913,752	0.8
1990/91	166	40,802	173,431	4.3	0.5–11.3	2.0	1.6–2.2	1,331,076	1.2
1991/92	177	54,269	270,611	5.0	1.0–13.9	2.1	1.7–2.6	2,241,479	0.8
1992/93	146	34,288	152,641	4.5	0.9–14.0	2.2	1.9–2.7	1,407,009	1.0
1993/94	81	16,616	59,540	3.6	0.6–12.5	2.3	1.7–2.8	1,102,913	0.7
1994/95	79	17,448	62,640	3.6	0.8–8.6	2.0	1.8–2.6	960,870	0.8
1995/96	136	40,967	231,165	5.6	0.3–18.7	2.0	1.7–2.3	2,202,260	0.6
1996/97	222	54,835	303,170	5.5	0.6–26.5	2.1	1.7–2.8	2,383,733	0.5
1997/98	195	52,778	151,957	2.9	0.7–10.0	2.1	1.3–2.9	1,934,544	0.5
1998/99	194	49,340	144,884	2.9	0.6–35.3	2.1	1.7–2.5	1,109,285	0.9
1999/00	261	66,992	254,327	3.8	0.5–32.3	2.0	1.7–2.3	1,640,252	0.8
2000/01	339	99,052	322,024	3.3	0.2–8.8	2.1	1.3–4.9	1,221,624	1.4
2001/02	494	160,978	743,736	4.6	0.8–18.8	2.0	1.5–2.5	2,052,064	1.2
2002/03	423	160,698	761,474	4.7	0.1–53.3	2.1	1.7–6.3	3,491,745	0.6
2003/04	422	143,519	606,003	4.2	0.1–15.7	2.1	1.5–6.2	2,160,500	1.0
2004/05	433	181,955	725,892	4.0	0.1–18.1	2.1	1.8–2.5	2,184,586	1.0
2005/06	395	129,471	618,833	4.8	0.6–14.5	2.1	1.7–2.8	2,002,610	1.0
2006/07	455	144,864	759,336	5.2	1.0–19.7	2.0	1.7–2.4	2,251,985	1.0
2007/08	400	136,926	606,900	4.4	0.7–16.8	2.0	1.7–2.5	2,704,178	0.8
2008/09	353	130,617	513,144	3.9	0.5–27.5	2.1	1.8–2.6	2,253,175	0.8
2009/10	376	139,095	486,999	3.5	0.5–14.6	2.0	1.7–2.4	1,784,849	1.1
2010/11	354	109,371	396,471	3.6	0.7–14.3	2.1	1.4–2.5	1,545,364	1.2
2011/12	365	103,796	355,477	3.4	0.7–12.4	2.1	1.6–2.7	1,235,665	1.6
2012/13	346	101,231	299,359	3.0	0.7–14.4	2.1	1.6–2.7	1,123,480	1.7
2013/14	293	83,685	352,878	4.2	0.5–15.8	2.0	1.5–4.8	1,295,011	1.2
2014/15	163	65,762	300,282	4.6	0.9–30.5	2.0	1.4–2.6	2,531,927	0.4
2015/16	177	55,026	198,676	3.6	0.5–12.4	2.1	1.7–2.8	1,552,077	0.7
2016/17	140	48,885	138,936	2.8	0.5–12.1	2.1	1.8–3.0	1,123,640	0.7
2017/18	112	40,259	126,535	3.2	0.4–11.1	2.0	1.7–2.6	937,295	1.1
2018/19	141	44,085	173,614	4.2	0.2–32.5	2.0	1.6–2.4	2,070,443	0.4
2019/20	95	30,408	153,898	5.1	0.8–20.4	2.0	1.7–2.4	2,497,532	0.2

Note: ND = not available; * = data confidential because fewer than 3 permits fished.

[a] Includes data collected that could not be assigned to a fishing area.

[b] Calculated by dividing fish ticket weight data from Table 1.1 by dockside sampling data on average weight per crab.

[c] Calculated by dividing number of crab sampled for size frequency by estimated number of crab caught.

Table 1.4–Catch and effort by district for the commercial Dungeness crab fishery in Registration Area A, 2013/14 season to present.

District	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020
1	127,484	173,501	155,735	130,508	67,673	85,718	95,221
2	83,072	132,368	54,909	74,477	76,087	70,125	98,241
3	*	*	*	*	*	*	*
4	0	*	*	0	0	*	0
5	*	43,932	2,599	*	0	*	*
6	359,841	743,498	391,520	272,295	204,242	535,418	632,713
7	164,471	279,524	144,961	147,310	129,598	183,572	245,332
8	447,570	1,175,973	716,317	583,958	437,281	730,854	1,117,565
9	184,663	586,610	232,350	117,392	16,412	84,114	97,122
10	265,740	516,160	312,331	165,182	49,574	343,576	516,843
11	127,911	204,842	515,626	217,783	205,892	909,634	1,097,562
12	152,450	277,935	151,509	200,946	121,841	295,991	467,690
13	300,425	446,825	193,533	77,578	224,554	328,055	257,692
14	182,022	214,284	120,610	103,776	220,241	340,300	219,757
15	162,435	265,572	262,883	261,035	147,570	178,626	480,210
16[a]	0	0	0	0	*	0	0
Total	2,589,872	5,063,854	3,259,362	2,358,645	1,914,417	4,089,214	5,330,101

Note: * = data confidential, fewer than 3 permits fished.

[a] District 16 reopened to commercial fishing in 2009.

Table 1.5–Registration Area A (Southeast Alaska) commercial Dungeness crab fishery catch by month from 1969/70 season to present in pounds.

Season	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
1969/70	210,941	106,248	47,305	14,167	5,008	7,084	8,068	21,348	84,909	201,026	217,524	225,483	1,149,111
1970/71	122,623	68,644	35,867	9,312	5,567	*	*	11,123	37,045	168,485	150,383	157,067	776,617
1971/72	88,861	63,283	23,306	10,912	6,955	1,755	2,183	7,366	27,392	43,563	97,816	79,289	452,681
1972/73	83,561	49,466	31,516	16,746	3,532	*	*	4,237	30,461	38,606	167,156	169,569	599,487
1973/74	87,311	71,607	27,469	8,764	3,459	4,745	9,869	16,884	40,893	142,395	205,799	129,324	748,519
1974/75	84,977	53,947	27,885	26,478	6,298	13,717	18,056	24,762	21,464	135,529	167,131	135,005	715,249
1975/76	82,751	49,676	25,868	11,725	6,855	3,005	9,886	18,101	35,906	110,226	136,819	120,803	611,621
1976/77	46,068	32,006	13,826	11,070	4,128	*	0	*	0	105,864	206,112	89,889	515,378
1977/78	31,376	15,915	24,956	6,291	*	7,997	0	0	0	*	*	29,570	127,345
1978/79	104,639	70,406	43,321	23,033	18,229	*	*	0	0	126,420	206,929	152,721	754,759
1979/80	137,494	75,079	52,076	30,098	*	*	0	0	0	165,728	184,630	137,043	801,753
1980/81	69,865	36,342	30,249	15,064	*	*	0	0	0	62,684	166,140	122,220	521,247
1981/82	427,076	292,859	164,235	67,699	28,413	34,251	0	0	0	460,619	896,944	560,331	2,932,427
1982/83	450,388	218,577	144,551	83,744	16,250	22,883	0	0	0	941,641	1,048,742	735,336	3,662,112
1983/84	267,566	146,550	84,479	45,845	30,897	14,702	0	0	0	775,324	453,526	336,960	2,155,849
1984/85	279,568	157,009	137,374	59,151	27,024	15,466	0	0	0	0	677,982	489,947	1,843,521
1985/86	*	380,060	178,215	55,702	29,746	*	0	0	0	362,973	849,615	440,463	2,316,994
1986/87	0	455,224	274,451	100,322	57,950	48,885	0	0	0	272,989	796,367	446,867	2,453,055
1987/88	0	479,320	280,735	109,622	63,054	*	*	0	0	572,329	1,185,935	639,662	3,390,832
1988/89	0	312,008	178,232	43,786	17,382	19,950	0	0	0	775,398	1,401,800	573,178	3,321,734
1989/90	0	207,015	96,004	15,179	*	*	0	0	0	500,788	820,896	267,394	1,918,880
1990/91	0	499,302	281,647	8,551	1,053	2,778	*	0	0	582,141	925,769	360,416	2,662,151
1991/92	0	717,506	324,070	17,086	7,561	4,422	0	0	0	987,389	1,821,479	827,593	4,707,106
1992/93	0	177,194	101,101	12,403	*	*	*	0	0	935,175	1,360,389	503,792	3,095,419
1993/94	0	232,813	116,882	11,727	4,734	5,806	0	0	0	660,473	1,106,117	398,149	2,536,701
1994/95	0	242,047	97,299	38,076	*	*	0	0	0	523,740	716,277	302,939	1,921,739
1995/96	0	627,671	229,009	35,131	16,780	25,555	0	0	0	1,193,222	1,630,576	646,575	4,404,519
1996/97	0	686,308	314,634	35,442	19,408	30,821	0	0	0	1,197,906	1,925,600	795,721	5,005,840
1997/98	0	524,626	219,601	65,279	64,055	37,457	0	0	0	1,128,616	1,568,198	454,711	4,062,543
1998/99	0	383,335	178,943	33,544	19,080	5,345	0	0	0	853,216	672,988	183,048	2,329,499

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Table 1.5–Page 2 of 2.

Season	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
1999/00	0	370,194	166,974	23,788	12,290	2,317	0	0	0	1,331,925	1,050,893	322,122	3,280,503
2000/01	0	299,645	136,807	7,524	9,692	2,846	0	0	0	975,841	884,852	248,203	2,565,410
2001/02	0	693,816	263,849	35,115	14,127	1,777	0	0	0	1,541,443	1,166,262	387,739	4,104,128
2002/03	0	977,240	355,447	36,871	21,451	4,800	0	0	0	2,169,951	2,885,891	881,014	7,332,665
2003/04	0	836,212	290,595	34,967	15,949	12,550	0	0	0	1,628,596	1,339,496	378,684	4,537,049
2004/05	0	607,852	234,475	36,010	7,408	11,352	0	0	0	1,829,607	1,454,980	405,947	4,587,631
2005/06	0	720,388	238,024	26,301	13,107	2,470	0	0	0	1,785,128	1,084,237	335,825	4,205,480
2006/07	0	783,691	204,913	14,046	2,704	1,665	0	0	0	1,741,957	1,254,440	500,554	4,503,970
2007/08	0	1,357,627	415,923	30,735	5,695	1,327	0	0	0	1,204,153	1,504,129	888,766	5,408,355
2008/09	0	801,375	168,098	4,620	*	*	0	0	0	1,546,315	1,645,744	563,497	4,731,668
2009/10	0	739,398	210,216	0	0	0	0	0	0	1,101,310	1,112,933	405,840	3,569,697
2010/11	0	453,422	114,467	*	*	0	0	0	0	1,431,374	1,008,528	232,935	3,245,265
2011/12	0	444,606	116,091	*	*	0	0	0	0	968,601	813,612	251,227	2,594,897
2012/13	0	416,132	90,183	6,712	*	*	0	0	0	996,658	657,716	189,958	2,359,309
2013/14	0	768,734	232,607	5,743	*	*	0	0	0	821,825	649,475	109,346	2,590,022
2014/15	0	777,452	199,238	17,248	*	*	0	0	0	2,117,601	1,555,974	388,225	5,063,854
2015/16	0	442,237	111,003	5,239	7,250	4,784	0	0	0	1,591,523	894,198	203,128	3,259,362
2016/17	0	340,299	47,967	7,172	*	*	0	0	0	1,295,651	507,407	130,898	2,358,645
2017/18	0	460,244	8,880	0	0	0	0	0	0	996,185	449,108	0	1,914,417
2018/19	0	884,069	192,703	2,402	895	1,394	0	0	0	1,534,757	1,121,143	351,851	4,089,214
2019/20	0	891,083	216,181	10,409	*	*	0	0	0	2,287,152	1,473,083	445,035	5,330,101

Note: * = data confidential, fewer than 3 permits fished.

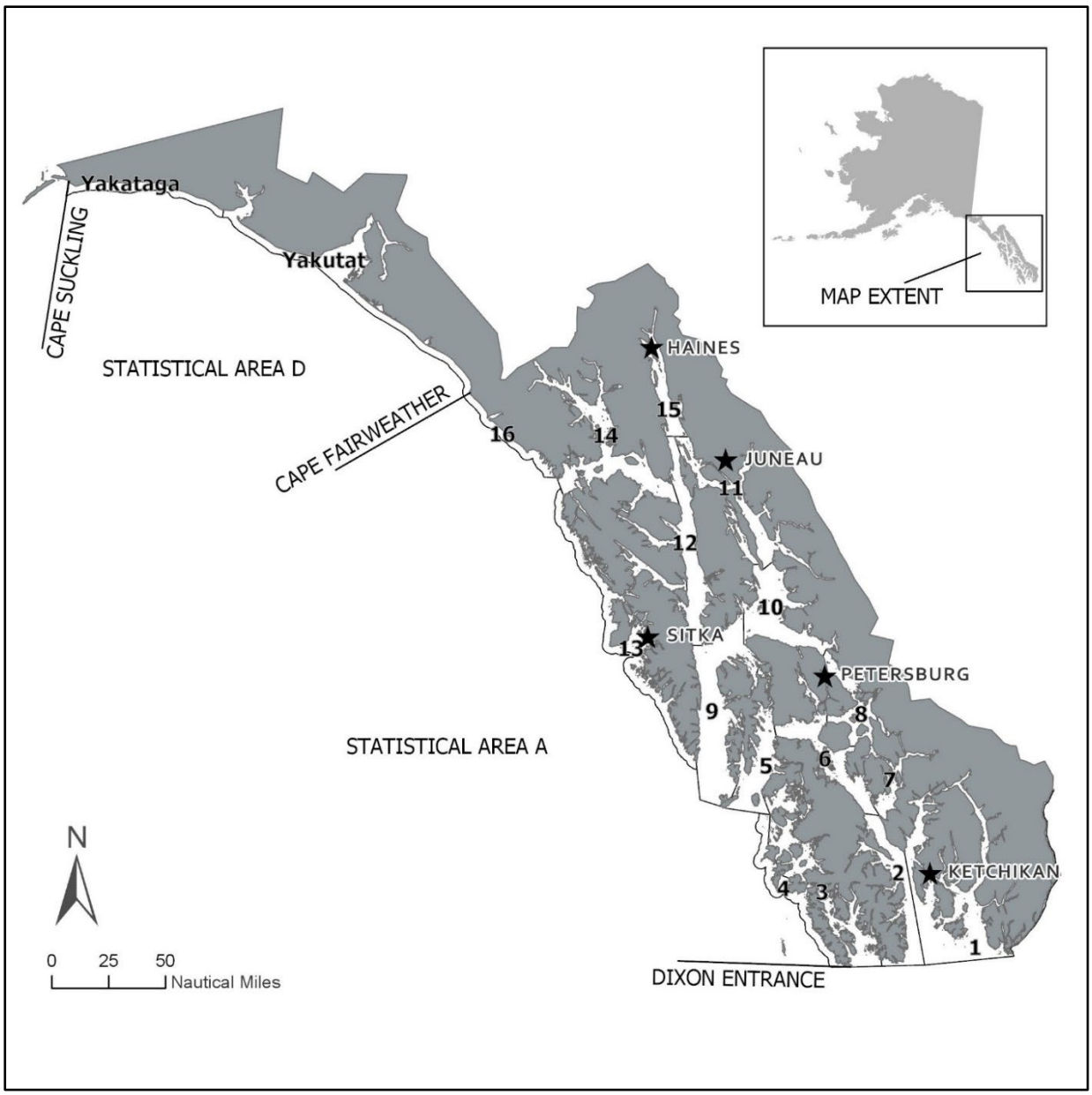

Figure 1.1–Registration Area A (Southeast Alaska) and Registration Area D (Yakutat).

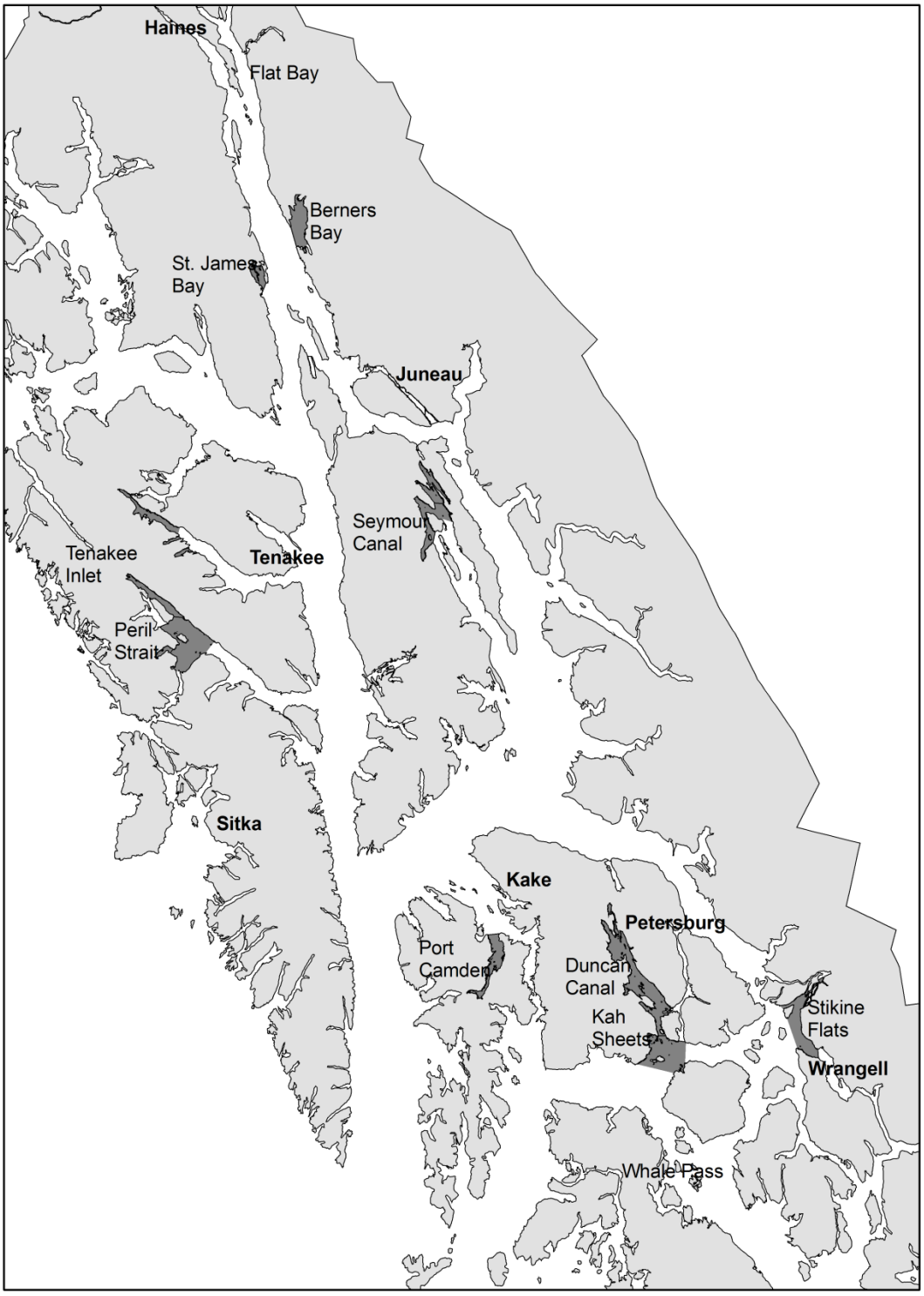

Figure 1.2–Dungeness crab survey locations in Southeast Alaska, 1987–2004.

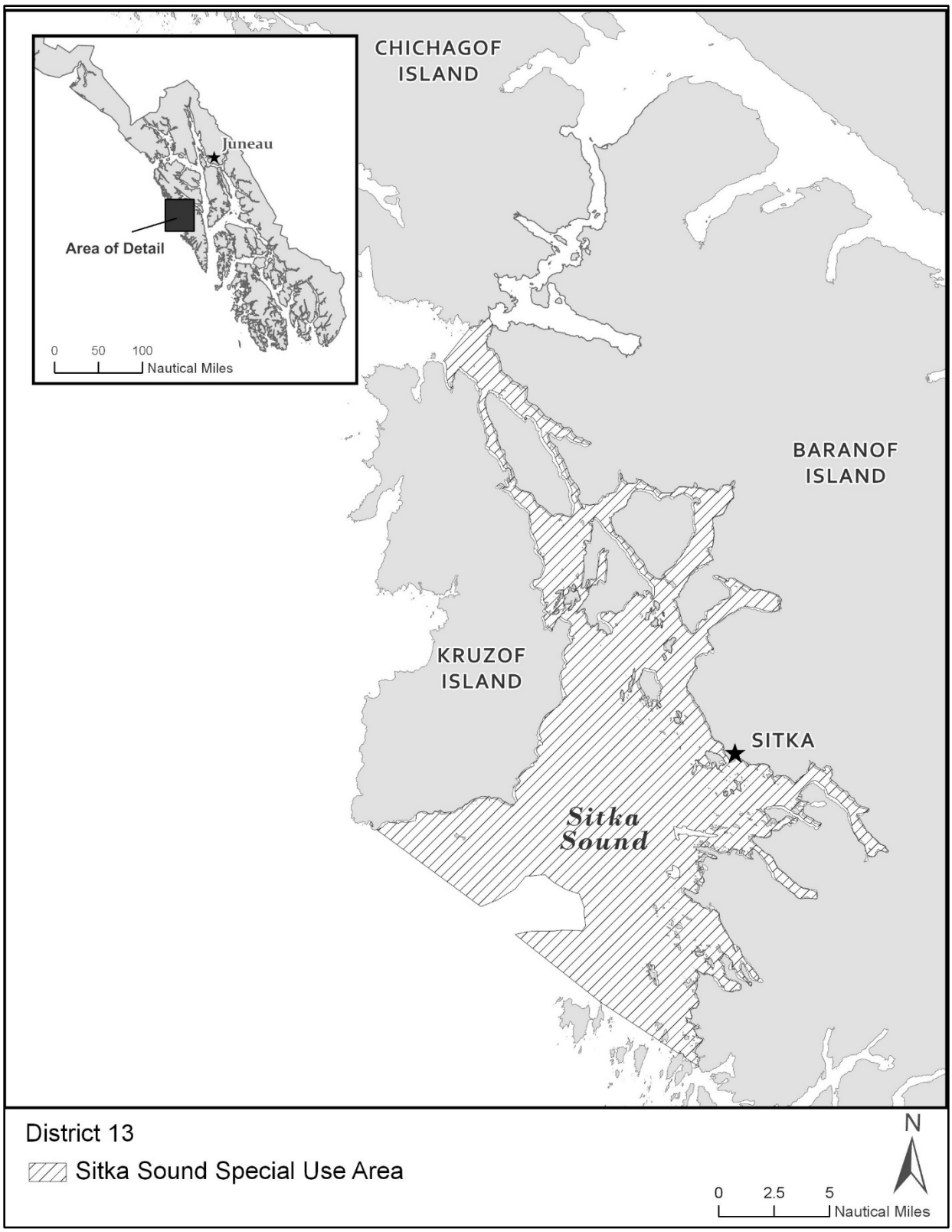

Figure 1.3–Commercial Dungeness crab fishing in Sitka Sound Special Use Area within District 13.

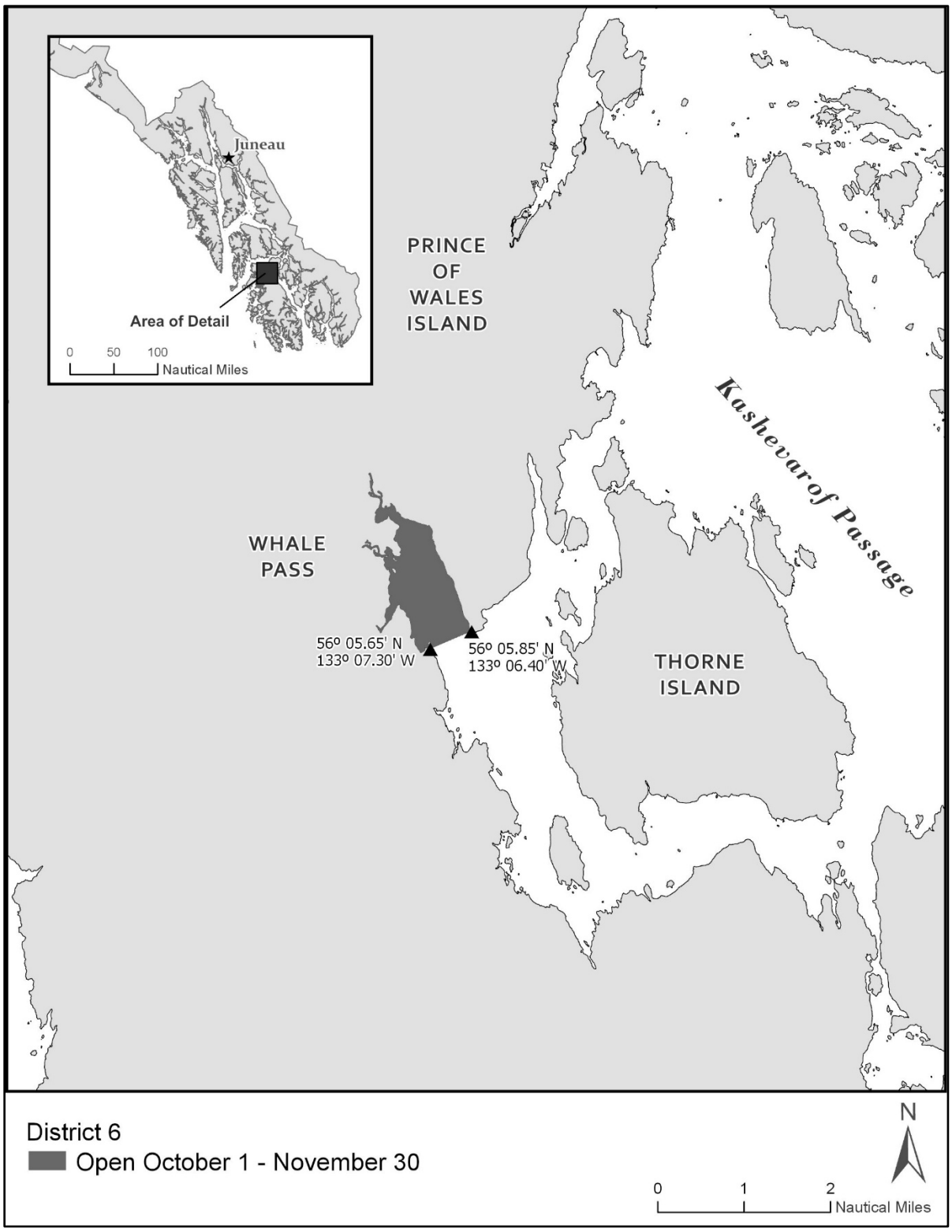

Figure 1.4–Commercial Dungeness crab fishing areas within Whale Passage.

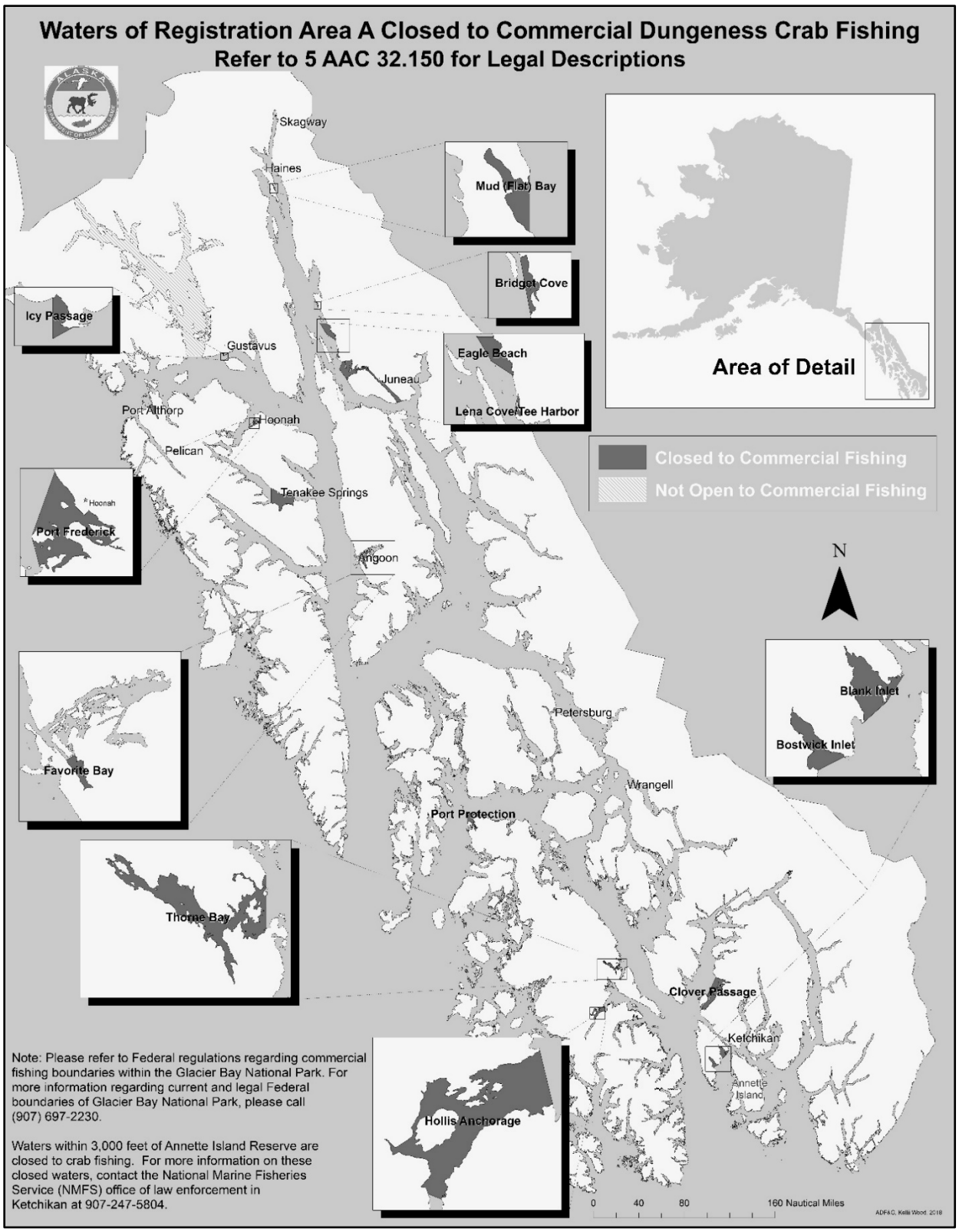

Figure 1.5–Waters of Registration Area A closed to commercial Dungeness crab fishing.

CHAPTER 2: YAKUTAT DUNGENESS CRAB FISHERY

INTRODUCTION

The Registration Area D (Yakutat) Dungeness crab fishery is managed by sex, size, and season (3-S) with gear limited to no more than 60 pots per vessel. In order to conserve reproductive potential, only male crab with a minimum CW of 6.5 inches notch to notch may be harvested. The season is from May 15–July 14 and November 1–February 28. Although the Yakutat Dungeness crab fishery is classified as an open entry fishery, Yakutat is a superexclusive registration area for Dungeness crab; a vessel registered to fish in this area cannot register or fish in any other area in Alaska during the same calendar year.

Fishing grounds in Yakutat are near to the northern limit of Dungeness crab distribution. Within Yakutat waters, Dungeness crab are widely distributed but tend to concentrate off ocean beaches in 2–10 fathoms. Some of the most productive summer fishing occurs in the shore break of exposed beaches. Although the fishery extends along the entire coast, much of the total harvest is taken from 4 or 5 distinct, localized fishing grounds. During the 40 seasons from 1960/61 to 1999/00, Yakutat produced a long-term average harvest of about 1.37 million lb per season, but a downward trend began in 1992/93 (Table 2.1). Historically, the product was marketed as canned or frozen meat, sections, and whole cooked or live crab. In later years, the majority of the harvest took place in May and June (Table 2.2), and whole cooked or live crab entered the summer tourist markets in Washington, Oregon, and California.

The Yakutat Dungeness crab fishery was closed beginning with the 2000/01 season. Fish ticket and dockside sampling data provided the first indications of low stock abundance, and the 1997/98, 1998/99, and 1999/00 fishing seasons were closed early. Dungeness crab surveys to evaluate stock status in Yakutat were conducted in 2004, 2012, and 2013. These surveys showed no evidence of stock recovery. The Yakutat area Dungeness crab fishery will remain closed until stock status improves and a management and research program designed to provide sustained yields is implemented.

Anyone with a permit and license could register a vessel to crab in this area if the fishery were open. Historically, as many as 67 permits fished annually in the Yakutat area (Table 2.1). For 3 seasons preceding the closure of the fishery, an average of 23 permits were fished. Most participating vessels are 50 ft overall length or larger, with some vessels up to 90 ft in overall length. Almost all fishery participants have used standard, hatbox-shaped pots constructed with steel frames and webbed with stainless steel wire.

This chapter describes Yakutat Dungeness crab fishery development and history, regulation development, management concerns, and research studies. It is intended to provide a comprehensive overview on the Yakutat area Dungeness crab fishery to facilitate promulgation of regulations and is a summary of fishery activities during the 2017/18 to 2019/20 period.

FISHERY DEVELOPMENT AND HISTORY

Through much of its history from the mid-1920s to the mid-1960s, Southeast Alaska and Yakutat were managed as a single unit. Prior to the 1960s, harvests from much of the Gulf of Alaska were combined into a single total; Yakutat contributions were significant, but the exact percentages are unavailable. The fishery can be divided into 3 distinct periods: 1960s–1970s, 1980s, and 1990s.

In the 1960s and the 1970s, participation was low and harvests were relatively stable (Table 2.1), averaging 1.13 million lb per season in the 1960s and 1.26 million lb per season in the 1970s. At

that time, demand for Dungeness crab from Yakutat was generally inversely related to the availability of crab from Washington, Oregon, and California, and highly dependent on the willingness of 1 or 2 major processors to purchase crab during the summer. The fishery was market driven.

In the 1980s, effort and harvest generally increased (Table 2.1). Harvest in the 1980s averaged 2.18 million lb. The 1980s saw the largest individual season harvests in the history of the fishery, with 5.16 million lb taken in the 1982/83 season and 3.49 million lb taken in the 1988/89 season (Table 2.1). Because the preferred product form changed from frozen or canned meat to air-freighted live crab, there was increasing interest from processors to handle Dungeness crab. For many permit holders from the Pacific Northwest, the Yakutat summer fishery was attractive because fisheries were closed during the summer in WA and OR. The rising demand in the early 1980s coincided with the entry of a large recruit class into the fishery and a decline in harvests from Washington, Oregon, and California. The recruit year class supported increasing fishing effort through the next 2 seasons and set the pattern for development of the fishery, which is driven by stock abundance.

In the 1990s, harvest and effort gradually declined each season. Fish ticket and dockside sampling data provided the first indications of low stock abundance, and the 1997/98, 1998/99, and 1999/00 fishing seasons were closed early. In the 1999/00 season, 10 permits fished for a harvest of less than 66,000 lb (Table 2.1). The fishery was closed beginning in the 2000/01 season and has remained closed since.

REGULATION DEVELOPMENT

The documented regulatory history of the Yakutat Area Dungeness crab fishery started in 1924. Most management jurisdictions within the range of this species employ passive management measures such as size limits, restricting harvest to males, and specifying a season that avoids known sensitive molting and mating periods. In Yakutat, this management triad, called 3-S management (size, sex, and season), is compromised somewhat because the summer season overlaps with a portion of time males are molting. The current May 15–July 14 and November 1–February 28 season description is a compromise developed over many years to avoid the major molts to the extent possible, while maximizing economic returns. There are few alternatives to a summer season in Yakutat because the most productive grounds are exposed to extreme weather conditions in the winter.

Traditional 3-S management has been used for many decades to manage Dungeness crab fisheries from California to Kodiak. Farther north, Kodiak, Chignik, and the Alaska Peninsula District (Registration Area J) are all open access fisheries and do not have pot limits but do require superexclusive vessel registration (Richardson et al. 2020). However, concerns remain regarding the 3-S efficacy in intensive, highly competitive, open access fisheries. Further work in Yakutat is needed to structure a harvest strategy to protect weak stock segments or soft-shell crab while optimizing exploitation rates and product quality. ADF&G will reopen the Yakutat commercial Dungeness crab fishery when fishery independent survey data show stock recovery and additional management measures are implemented.

FISHING SEASONS AND PERIODS

For most years and seasons before 1975/76, the fishery was open all year. The accounting period started on January 1 and ended on December 31. In 1975, following 8 consecutive years of harvests

between 1 and 2 million lb and a rapid rise in the number of fishing vessels, the season was shortened to May 16–February 28, 1976. It was then closed in the summer by emergency order because large numbers of soft-shell crab were observed in the landed harvest. The 1976/77 season started on June 1, with a scheduled closure on February 28, 1977. The season opening and closing dates remained the same through the 1981/82 season, although several intervening seasons were closed by emergency order when large numbers of soft-shell crab were sampled at the dock. The season changed again in 1982 to May 1 through February 28, 1983. Each season from 1982/83 through 1984/85 was closed by emergency order at some point in the summer due to increasing numbers of soft-shelled crab in the landed harvest. In 1985, a split season was implemented from May 1–July 14, and November 1–February 28, 1986. Management of the summer fishery focused on avoiding major male molts, which frequently start on the western grounds around Icy Bay and move eastward through the summer. The summer season was generally tailored to start after the major molt on the western grounds and end before the major molt in the Yakutat Bay stocks. By 1986, it was evident that the May 1 opening was too early, and the season was shortened to start on May 15. For each season since, the summer segment of the season has started on May 15 and ended on July 14, and the winter segment has started on November 1 and ended on February 28. The timing of the winter segment was intended to provide a fishery for local residents fishing in Yakutat Bay.

Although there were no specific proposals addressing Yakutat stock status before the BOF in 1997, the BOF directed ADF&G to take steps to conserve the Yakutat Area Dungeness crab stock. In the first 3 weeks of the 1997/98 season, a large portion of the harvest was recruit size crab and low abundance was observed, which is indicative of poor stock condition. An emergency order closure was issued for June 13, 1997, to foster recovery of the stock. The winter portion of the fishery was closed to allow an accrual of benefits from the summer closure; however, the 1998/99 fishery indicated further recruitment failure and overall low stock abundance. On June 9, 1998, the fishery was closed early for the second consecutive season, and on June 15, 1999, the fishery was closed by emergency order for a third season. In 2000, the BOF designated the Yakutat Area Dungeness crab fishery as a collapsed and recovering fishery and the fishery has been closed since that time.

SIZE RESTRICTIONS

From 1924 to 1935, the legal size of male crab was 6.5 inches in greatest width of carapace or "tip to tip" width. This changed in 1936 to 7 inches and remained unchanged until 1963, when the measurement was redefined as 6.5 inches in width, measured immediately anterior to the 10th anterolateral spines. This was essentially the equivalent of a 7-inch total shell width measurement but more consistent because damage to the tips of the 10th anterolateral spines is common, particularly in older-shell crab. This measurement standard, termed "shoulder width" or "notch to notch" width, has been in effect since then.

GEAR RESTRICTIONS

In 1934, trawls were prohibited. Only pots or ring nets were allowed from 1954 to 1965. A gear limit of 300 pots or ring nets was implemented in 1963. In 1966, diving gear was legalized. The legal limit for pots and ring nets was raised to 600 pots in 1968. In 1995 the legal limit for pots was reduced to 400. Two escape rings with a minimum inside diameter of 4⅜ inches were first required in 1976. The intent of escape rings is to permit the escape of undersized males and females, which are usually smaller than legal males. In 1977, a Dungeness pot was defined as a pot with tunnel eye openings that individually do not exceed 30 inches in perimeter. A

biodegradable natural-fiber breaking strap for the pot tiedown has been required since 1978. Originally specified for a maximum of 120-count thread, it was reduced in 1990 to 30-count thread, and then increased in 1991 to 60-count thread. In 2012, the pot limit was reduced substantially from 400 to 60 pots per vessel.

OTHER REGULATIONS

Registration and hold inspections were required starting in 1974. In midsummer 1983, Yakutat was designated a superexclusive registration area, and vessels registering to fish in the Yakutat Area were prohibited from fishing in any other area in Alaska for the calendar year. The hold inspection requirement was repealed in 1984, although registration was still required. In the same year, the area between Sitkagi Bluffs and Cape Yakataga, the western half of the Yakutat fishing district, was designated a nonexclusive area. The partial nonexclusive area was difficult to enforce, so this and other problems led to redesignation of the entire Yakutat fishing district as a superexclusive registration area in 1985. In 1986, Yakutat was designated as Registration Area D, distinct and separate from Southeast Alaska (Registration Area A).

MANAGEMENT CONCERNS

The Yakutat Dungeness crab fishery was designated as collapsed in 2000. Although ADF&G has not established a policy on the reopening of collapsed fisheries, this process will probably be stepwise. The first step is to demonstrate stock recovery through a fishery independent survey.

Once recovery is demonstrated, full reopening of the fishery must be contingent upon funding of a management and research program designed to ensure sustained yields. This could include a pot survey, inseason dockside sampling based in Yakutat, and a management program with associated biometric support, if necessary. Concerns with potential fishing effort in the open access fishery in Yakutat remain. However, these concerns have been alleviated somewhat by the substantial pot reduction from 400 to 60 that occurred in 2012.

RESEARCH STUDIES

In addition to comprehensive fish ticket reporting (by regulation, processors are required to submit reports of effort, location, and pounds of harvest for each commercial landing), sporadic surveys, and dockside sampling have been conducted for the Yakutat Dungeness crab fishery.

SURVEYS

Surveys of Yakutat Dungeness crab grounds were conducted in 2004, 2012, and 2013 by contracting commercial fishery participants. The primary objective of these surveys was to determine the catch rate of legal male Dungeness crab simulating commercial fishing methods. Secondary objectives were to collect size and sex data from Dungeness crab captured using standard ADF&G survey sampling protocols, and to quantify shell hardness in male crab.

In order to simulate commercial fishing methods, the survey contractor selection criteria stipulated that the captain must have experience commercial fishing for Dungeness crab in the Yakutat area. The contractor was required to simulate commercial fishing techniques as close as possible, so pot locations and soak times were not predetermined, but pot pulls were required to be distributed by subdistrict approximately proportional to the historical harvest distribution.

In 2004, the contractor set 605 pots in 5 statistical areas: 181-10, 181-40, 181-50, 181-60, and 183-10. An ADF&G biologist onboard enumerated and sampled the catch and recorded pot locations. A total of 53 legal male crab were captured (Table 2.3).

In 2012, a contracted survey was repeated. The contractor set 600 pots in late May/early June in the same 5 statistical areas sampled in 2004. Two ADF&G biologists sampled the catch and recorded pot locations. Durometers were used to quantify shell hardness of male crab. A total of 188 legal male and 446 sublegal crab were captured (Table 2.3). Most sublegal males were prerecruit class crab.

In 2013, another contracted survey occurred. The contractor set 600 pots in late-May/early-June in the same 5 statistical areas sampled in 2012. Like the previous year, 2 ADF&G biologists sampled the catch, took shell hardness readings, and recorded pot locations. The distribution of pots within the 5 statistical areas was very similar to the previous year's survey. Only 21 legal male crab were caught (Table 2.3).

ADF&G attempted to contract a survey in 2014 but did not receive any bids. Funding for the Yakutat Dungeness survey was eliminated from the 2015 fiscal year budget and to date has not been restored.

DOCKSIDE SAMPLING

Sporadic dockside sampling of the landed harvest in Yakutat was conducted from the 1975/76 season until the fishery closed in 1999 (Tables 2.4 and 2.5). Goals of dockside sampling are to describe the size and shell age composition, average weight, and catch rates of Dungeness crab in the commercial fishery. Port samplers measure the crab, determine shell condition, and check for damage to the carapace and legs. From these data and knowledge of crab growth, ADF&G can determine the recruit or year-class composition of the harvest. For the Yakutat fishery, the wide range of landing ports (as far away as Cordova) and very sporadic deliveries make it difficult to schedule dockside sampling of deliveries.

CHAPTER 2: TABLES

Table 2.1–Registration Area D (Yakutat) commercial Dungeness crab fishery catch, effort, and value, 1960 to present.

Year/Season	Number				Pound (lb) per permit	Pots lifted	CPUE	Average weight
	Permits	Landings	Crab	Pound (lb)				
1960	ND	ND	ND	543,762	ND	ND	ND	ND
1961	ND	ND	ND	1,023,545	ND	ND	ND	ND
1962	ND	ND	ND	937,051	ND	ND	ND	ND
1963	ND	ND	ND	1,383,298	ND	ND	ND	ND
1964	ND	ND	ND	637,140	ND	ND	ND	ND
1965	ND	ND	ND	910,278	ND	ND	ND	ND
1966	ND	ND	ND	528,060	ND	ND	ND	ND
1967	ND	ND	ND	2,031,460	ND	ND	ND	ND
1968	ND	ND	ND	2,096,119	ND	ND	ND	ND
1969/70	11	107	522,840	1,223,240	111,204	ND	ND	2.3
1970/71	10	83	661,629	1,508,561	150,856	ND	ND	2.3
1971/72	7	88	524,208	1,212,198	173,171	ND	ND	2.3
1972/73	9	85	NA	1,992,574	221,397	ND	ND	ND
1973/74	27	236	NA	2,347,752	86,954	ND	ND	ND
1974/75	22	154	NA	1,031,573	46,890	ND	ND	ND
1975/76	17	113	264,426	579,908	34,112	ND	ND	2.2
1976/77	7	32	230,886	537,543	76,792	ND	ND	2.3
1977/78	3	12	54,449	131,052	43,684	ND	ND	2.4
1978/79	12	122	796,823	1,799,403	149,950	ND	ND	2.3
1979/80	21	87	613,725	1,436,923	68,425	ND	ND	2.3
1980/81	10	73	411,293	895,220	89,522	ND	ND	2.2
1981/82	28	169	1,323,791	3,228,301	115,296	ND	ND	2.4
1982/83	35	346	2,046,436	5,160,135	147,432	ND	ND	2.5
1983/84	67	511	1,110,413	2,666,383	39,797	ND	ND	2.4
1984/85	39	236	325,420	774,828	19,867	ND	ND	2.4
1985/86	32	175	172,166	371,237	11,601	66,258	2.6	2.2
1986/87	22	116	363,764	755,912	34,360	49,248	7.4	2.1
1987/88	28	220	1,257,033	2,725,040	97,323	135,919	9.2	2.2
1988/89	32	253	1,549,275	3,494,368	109,199	186,574	8.3	2.3
1989/90	29	227	712,424	1,701,859	58,685	124,857	5.7	2.4
1990/91	36	327	867,031	2,101,676	58,380	177,984	4.9	2.4
1991/92	67	506	1,133,583	2,853,322	42,587	252,606	4.5	2.5
1992/93	49	265	541,961	1,392,700	28,422	176,345	3.1	2.6
1993/94	44	253	352,151	815,969	18,545	119,496	2.9	2.3
1994/95	47	251	393,371	915,523	19,479	108,923	3.6	2.3
1995/96	46	277	239,602	557,528	12,120	95,419	2.5	2.3
1996/97	27	155	111,930	244,825	9,068	42,362	2.6	2.2
1997/98	30	87	74,810	156,072	5,202	34,177	2.2	2.1
1998/99	29	92	62,525	121,478	4,189	26,178	2.4	1.9
1999/00	10	52	31,966	65,386	6,539	14,630	2.2	2.0
2000/01–2019/20[a]	0	0	0	0	0	0	0	0

Note: ND = not available.

[a] Fishery closed by emergency order.

Table 2.2–Registration Area D (Yakutat) commercial Dungeness crab fishery catch by month from 1969/70 to present in pounds.

Season	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
1969/70	0	0	0	0	0	0	0	0	103,529	254,663	528,992	336,056	1,223,240
1970/71	*	0	0	0	0	0	0	0	*	386,645	426,131	511,856	1,508,561
1971/72	0	0	0	0	0	0	0	0	*	407,771	572,408	223,406	1,212,198
1972/73	*	0	0	0	0	0	0	0	*	653,684	842,083	392,705	1,992,574
1973/74	80,860	0	0	0	0	*	0	*	205,354	679,692	1,079,498	195,187	2,259,469
1974/75	37,430	*	0	0	0	0	0	*	140,999	475,964	213,265	113,346	1,031,573
1975/76	0	0	0	0	0	0	0	*	80,190	239,468	251,345	*	579,908
1976/77	0	0	0	0	0	0	0	0	0	136,024	238,516	163,003	537,543
1977/78	*	*	*	*	0	0	0	0	0	0	0	33,705	131,052
1978/79	0	0	0	0	0	0	0	0	0	738,083	816,293	245,027	1,799,403
1979/80	0	0	0	0	0	0	0	0	0	840,102	563,873	32,948	1,436,923
1980/81	*	*	0	*	*	*	0	0	0	404,436	328,334	141,180	895,220
1981/82	*	0	0	0	0	0	0	0	0	2,467,710	634,913	111,793	3,228,301
1982/83	0	0	0	0	0	0	0	0	0	3,092,078	1,857,371	210,686	516,135
1983/84	183,798	55,867	*	5,572	*	2,961	0	0	970,737	1,197,775	201,830	42,667	2,666,383
1984/85	0	0	0	0	0	0	0	0	404,286	316,460	54,082	0	774,828
1985/86	0	0	*	*	*	*	0	0	158,232	160,459	49,203	0	371,237
1986/87	0	0	24,944	16,582	*	*	0	0	195,237	393,867	122,987	0	755,912
1987/88	0	0	41,755	44,308	8,474	22,478	*	0	846,605	1,279,970	474,553	0	2,725,040
1988/89	0	0	*	14,467	*	0	0	0	1,003,658	1,856,524	590,290	0	3,494,368
1989/90	0	0	0	*	*	*	0	0	647,224	860,857	191,351	0	1,701,859
1990/91	0	0	49,133	25,628	27,968	12,897	*	0	668,300	1,057,943	256,446	0	2,101,676
1991/92	0	0	22,941	18,802	8,056	9,274	0	0	866,372	1,598,073	329,804	0	2,853,322
1992/93	0	0	0	5,222	4,423	*	*	0	665,462	655,327	59,021	0	1,392,700
1993/94	0	0	28,254	14,015	4,705	2,531	0	0	434,904	299,740	31,820	0	815,969
1994/95	0	0	109,603	27,329	*	*	0	0	333,656	426,246	17,786	0	915,523
1995/96	0	0	46,059	7,427	*	*	0	0	263,382	209,841	27,832	0	557,528
1996/97	0	0	*	*	*	*	0	0	109,390	94,113	24,818	0	244,825
1997/98	0	0	0	0	0	0	0	0	102,905	53,167	0	0	156,072
1998/99	0	0	0	0	0	0	0	0	93,632	27,846	0	0	121,478
1999/00	0	0	0	0	0	0	0	0	47,727	17,659	0	0	65,386
2000/01–2019/20[a]	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: * = data confidential, fewer than 3 permits fished.

[a] Fishery closed by emergency order.

Table 2.3–Number of pots sampled and number of crab caught in the 2004, 2012, and 2013 surveys of commercial Dungeness crab grounds in Yakutat, Registration Area D.

	Number of pots		Number of crab in sampled pots			
Years surveyed	Set	Sampled	Sublegal males	Legal males	Females	Legal males per pot
2004	605	425	31	53	33	0.12
2012	600	600	446	188	155	0.31
2013	600	599	147	21	76	0.04

Table 2.4–Summary of commercial Dungeness crab size frequency and shell condition data collected during dockside sampling in Registration Area D, 1975/76 to 1999/00.

	Number sampled		Carapace width (mm)		Recruitment	
Season	Boats	Crab	Average	Range	% Recruit[a]	% Postrecruit[b]
1975/76	12	1,500	180.1	157–210	81.1	18.9
1976/77	*	*	*	*	*	*
1977/78	*	*	*	*	*	*
1978/79	27	4,503	183.9	156–221	75.4	24.6
1979/80	4	605	187.4	166–221	67.8	32.2
1980/81	*	*	*	*	*	*
1981/82	11	1,215	182.2	160–218	84.7	15.3
1982/83	16	1,695	186.3	158–222	74.8	25.2
1983/84	27	2,491	193.9	163–227	44.3	55.7
1984/85	41	4,191	190.7	162–233	51.1	48.9
1985/86	61	6,526	180.1	156–226	70.2	29.8
1986/87	29	3,545	176.0	158–225	70.2	29.8
1987/88	33	4,726	182.6	159–224	74.7	25.3
1988/89	46	5,448	184.3	153–222	66.0	34.0
1989/90	17	1,702	185.2	159–223	60.2	39.8
1990/91	19	1,901	183.8	161–217	75.7	24.3
1991/92	26	2,596	185.2	157–220	68.3	31.7
1992/93	9	1,013	185.3	163–221	61.1	38.9
1993/94	17	1,758	179.7	158–220	77.3	22.7
1994/95	9	1,023	178.4	161–215	87.3	12.7
1995/96	16	1,675	175.3	157–210	90.0	10.0
1996/97	16	2,134	177.0	155–209	85.5	14.5
1997/98	21	3,114	176.2	159–207	92.6	7.4
1998/99	17	1,072	176.8	161–207	38.1	61.9
1999/00	16	1,435	174.0	159–204	87.0	13.0

Note: * = data confidential, fewer than 3 permits fished.

[a] Recruit = all new and soft-shell crab ≥165 mm and ≤194 mm carapace width excluding spines.

[b] Postrecruit = all new- and soft-shell crab >194 mm and old and very old-shell crab ≥165 mm carapace width.

Table 2.5–Dungeness crab catch rate and weights in Registration Area D, 1977/78 to 1999/00. Data were collected during dockside sampling and interviews[a].

Season	Number			Average no./pot	Range no./pot	Weight (lb)		Estimated no. crab harvested[b]	Percent harvest sampled[c]
	Boats interviewed	Pots lifted	Crab captured			Average	Range		
1977/78	*	*	*	*	*	*	*	*	*
1978/79	22	10,830	105,020	9.7	6.2–15.7	2.5	2.0–3.0	731,465	0.62
1979/80	3	ND	ND	ND	ND	2.5	2.4–2.8	574,769	0.11
1980/81	*	*	*	*	*	*	*	*	*
1981/82	7	ND	ND	ND	ND	2.3	2.0–2.5	1,409,738	0.09
1982/83	14	440	ND	ND	ND	2.4	1.9–2.7	2,141,135	0.08
1983/84	27	1,850	17,085	9.2	8.3–13.1	2.7	1.9–3.0	1,006,182	0.25
1984/85	37	3,945	6,680	1.7	0.9–2.5	2.6	2.1–3.0	299,161	1.40
1985/86	59	22,883	28,997	1.3	0.3–9.2	2.2	1.8–2.5	172,668	3.78
1986/87	20	7,710	47,226	6.1	3.5–9.2	2.1	1.9–2.5	366,948	0.97
1987/88	31	13,465	65,176	4.8	3.0–11.7	2.2	1.9–2.5	1,244,311	0.38
1988/89	44	43,351	283,640	6.5	3.9–23.0	2.4	2.1–2.7	1,468,222	0.37
1989/90	17	13,639	71,125	5.2	2.8–9.6	2.4	2.2–2.6	709,108	0.24
1990/91	19	19,575	99,912	5.1	2.3–10.3	2.4	2.1–2.6	890,489	0.21
1991/92	26	14,939	75,621	5.1	1.3–18.7	2.5	2.2–2.7	1,164,621	0.22
1992/93	9	3,180	13,416	4.2	1.8–6.5	2.5	2.1–2.8	559,317	0.18
1993/94	17	17,905	50,118	2.8	0.8–4.6	2.2	2.0–2.5	365,905	0.48
1994/95	9	8,200	26,400	3.2	1.6–7.5	2.3	2.0–2.5	405,099	0.25
1995/96	16	8,460	22,143	2.6	0.5–4.8	2.0	1.8–2.4	277,377	0.60
1996/97	15	9,575	20,421	2.1	0.6–6.2	2.0	1.8–2.3	124,911	1.71
1997/98	20	20,563	49,828	2.4	0.8–4.6	2.1	1.9–2.4	75,397	4.13
1998/99	16	7,075	14,215	2.0	1.2–3.0	2.1	1.8–2.3	58,123	1.84
1999/00	16	13,182	27,796	2.1	6.6–2.0	2.0	1.7–3.5	32,210	4.46

Note: ND = no data available; * = data confidential, fewer than 3 permits fished.

[a] Includes data collected that could not be assigned to a fishing area.

[b] Calculated by dividing fish ticket weight data from Table 2.1 by dockside sampling average weight per crab data.

[c] Calculated by dividing number of crab sampled for size frequency by estimated number of crab caught.

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