Fishery Management Report No. 20-05

2018 Annual Management Report Norton Sound, Port Clarence, and Arctic, Kotzebue Areas

by

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

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

FISHERY MANAGEMENT REPORT NO. 20-05

2018 ANNUAL MANAGEMENT REPORT NORTON SOUND, PORT CLARENCE, AND ARCTIC, KOTZEBUE AREAS

by
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ABSTRACT

This report provides information about the 2018 commercial and subsistence fisheries of Norton Sound, Port Clarence, Arctic, and Kotzebue management areas of the Arctic, Yukon, and Kuskokwim (AYK) Region of the Alaska Department of Fish and Game, Division of Commercial Fisheries. The management areas consist of all waters from Point Romanof north of the Yukon River and west of 141 degrees W longitude and those waters draining into the Bering Sea north of Yukon River; the Chukchi Sea, Beaufort Sea and Arctic Ocean. Commercial and subsistence fisheries target 5 species of salmon (Chinook *Oncorhynchus tshawytscha,* sockeye *O. nerka*, chum *O. keta*, coho *O. kisutch*, and pink *O. gorbuscha* salmon), Pacific herring *Clupea pallasii*, red king crab *Paralithodes camtschaticus*, and miscellaneous species such as inconnu (sheefish) *Stenodus leucichthys*, whitefish *Coregonus laurettae*, Dolly Varden *Salvelinus malma*, and saffron cod *Eleginus gracilis.*

Key words: Chinook salmon *Oncorhynchus tshawytscha,* chum salmon *Oncorhynchus keta*, coho salmon *Oncorhynchus kisutch,* pink salmon *Oncorhynchus gorbuscha,* sockeye (red) salmon *Oncorhynchus nerka,* red king crab *Paralithodes camtschaticus*, Pacific herring *Clupea pallasii*, inconnu (sheefish) *Stenodus leucichthys*, whitefish *Coregonus laurettae, Coregonus pidschian, Coregonus sardinella, Coregonus nasus,* Dolly Varden *Salvelinus malma*, saffron cod *Eleginus gracilis,* subsistence, commercial fishery, management, escapement, Norton Sound, Port Clarence, Kotzebue Sound, Arctic, Annual Management Report (AMR), Fishery Management Report (FMR).

INTRODUCTION

This report summarizes the 2018 season and historical information concerning management of the commercial and subsistence fisheries of Norton Sound–Port Clarence, Arctic–Kotzebue management areas of the Arctic, Yukon, and Kuskokwim (AYK) Region. Data from select management and research projects are included in this report. A more complete documentation of project results is presented in separate biannual project reports. Most of the historical harvest and escapement information in this report goes back to 1990. For information prior to 1990 see Menard et al. 2013.

Data presented in this report supersede information found in previous management reports (e.g., Menard et al. 2018). An attempt has been made to correct errors present in earlier reports and previously unreported data were included. Current year catch data presented were derived from seasonal field data.

This report is organized into the following major sections:

1) Management Area Overviews
2) Salmon Fisheries
3) Pacific Herring Fisheries
4) King Crab Fisheries
5) Miscellaneous Species

Tabular data have been separated into 2 categories to facilitate use of this report: 1) Tables 1–15 present annual data, and 2) Appendices generally present historical comparisons.

SECTION 1: MANAGEMENT AREA OVERVIEWS

BOUNDARIES

Norton Sound–Port Clarence Area and Arctic–Kotzebue Area include all waters from Point Romanof in southern Norton Sound and St. Lawrence Island and west of 141 degrees W longitude, to the U.S.–Canada border (Figure 1). This area encompasses over 100,000 mi^2 and has a coastline exceeding that of California, Oregon, and Washington combined. For crab management the southern boundary is Cape Romanzof.

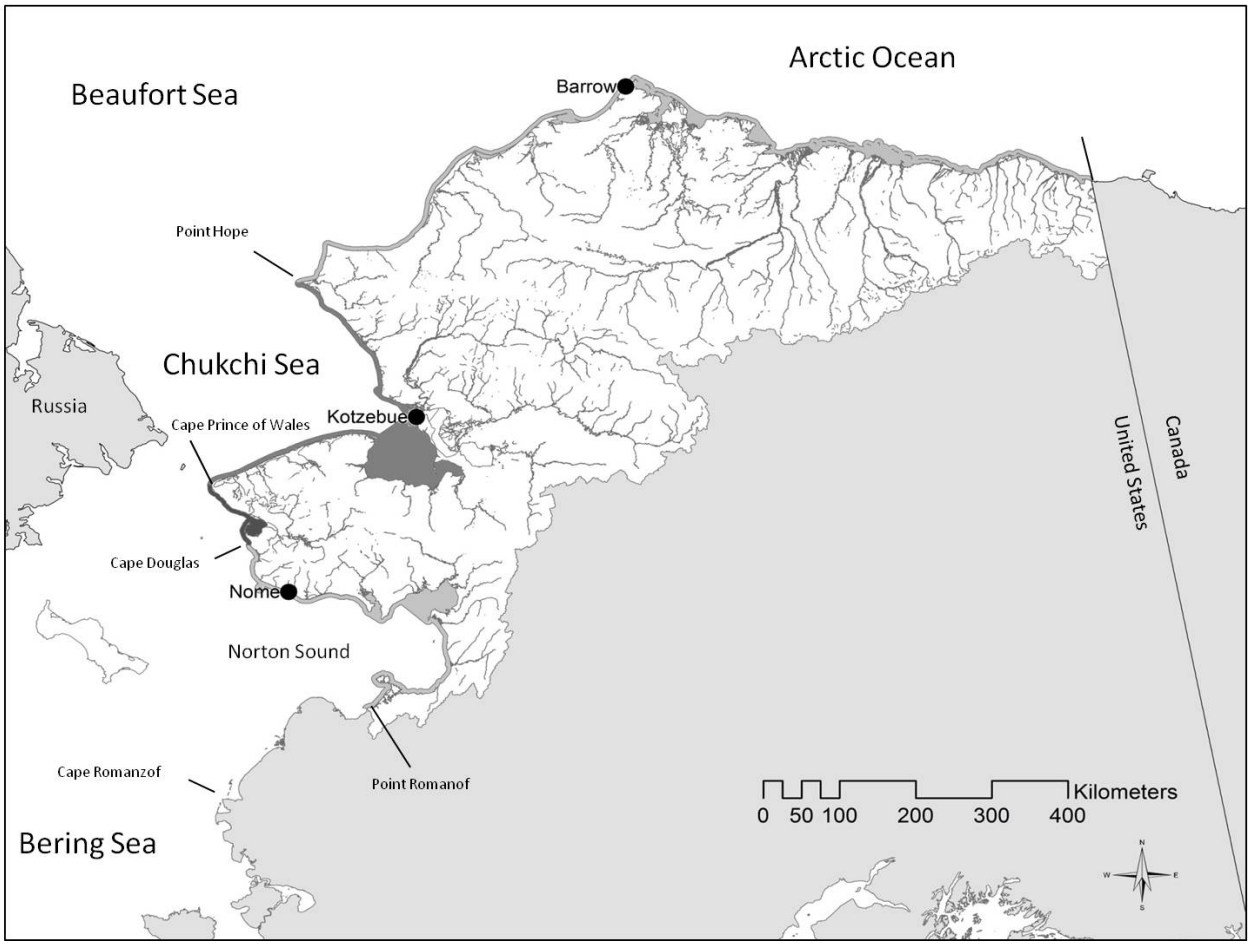

Figure 1.–Norton Sound, Port Clarence, Kotzebue Sound, and Arctic management districts.

SALMON OVERVIEW

There are 5 species of Pacific salmon indigenous to the area; however, chum *Oncorhynchus keta* and pink salmon *O. gorbuscha* historically are the most abundant. Chum and Chinook (king) salmon *O. tshawytscha* are found as far north as Barrow, but they are less common north of the Kotzebue Sound drainages. The northernmost large concentrations of chum salmon are found within Kotzebue Sound drainages, but large numbers of Chinook and coho *O. kisutch* salmon are not found north of Norton Sound. Small sockeye (red) salmon *O. nerka* populations exist within a few Southern Seward Peninsula drainages. Pink salmon have been observed by aerial survey in increasing numbers in rivers north of Point Hope to Barrow. Small numbers of chum, pink, sockeye, and Chinook salmon have been reported by subsistence fishermen along the Arctic coast.

COMMERCIAL SALMON FISHERY

In 1959 and 1960, Alaska Department of Fish and Game (ADF&G) biologists conducted resource inventories that indicated harvestable surpluses of salmon were available in several river systems of Norton Sound, Port Clarence, and Kotzebue Districts. Historically, ADF&G has supported liberalizing various regulations by encouraging processors to explore and develop new fishing grounds since statehood. As a result, commercial salmon fishing activity grew significantly in the region and enabled some residents to obtain cash income.

Currently, most commercial fishermen and many buying station workers are resident Alaska Natives (Yupik, Inupiat, and Siberian Yupik). Commercial fishermen operate set gillnets from outboard powered skiffs, and all commercial caught salmon are harvested in coastal marine waters.

There is no commercial salmon fishery in the Arctic District.

SUBSISTENCE SALMON FISHERY

There are approximately 23,000 people in the area, the majority of who are Alaska Natives, residing in more than 40 small villages scattered along the coast and major river systems. Nearly all residents are dependent to varying degrees on fish and game resources for their livelihoods.

Subsistence fishermen operate gillnets or seines in the main rivers and to a lesser extent in coastal marine waters to harvest salmon. Beach seines are used to catch schooling or spawning salmon and other species of fish. The major portion of fish taken during summer months is air-dried or smoked for later consumption by residents or occasionally their dogs.

Historical subsistence harvest information is discontinuous. Prior to 1960, subsistence data are either incomplete or entirely lacking. From the early 1960s until 1982, ADF&G conducted annual household surveys in communities with major salmon fisheries. In 1983, budgetary restrictions made it impossible to conduct surveys in each Norton Sound village, and surveys in many areas were suspended until 1994, when ADF&G initiated a new annual postseason household subsistence salmon harvest survey program. This program was also cut after the 2003 season in Norton Sound and after 2004 in Kotzebue Sound due to budget constraints. However, expansion of subsistence salmon permits in 2004 to Port Clarence District (affecting the communities of Teller and Brevig Mission), and Norton Sound Subdistricts 2 and 3 (affecting the communities of Council, White Mountain, Golovin, and Moses Point/Elim) has resulted in fewer

household surveys because subsistence harvests for those communities are now reported through subsistence permits.

Also, in 2004, the Division of Commercial Fisheries began doing subsistence salmon household surveys annually in Shaktoolik and Unalakleet (and in Koyuk starting in 2008) and in other southern Norton Sound villages periodically. Surveyors attempt to contact all households. ADF&G staff members use a community household list and each year update any new households and delete those no longer there. Salmon survey data are expanded to include those households that usually fish but ADF&G was unable to contact.

Prior to the fishing season, ADF&G personnel usually make at least 1 visit to each village to issue subsistence salmon fishing permits. Fishermen can also call the Nome office toll free, and a permit will be mailed or faxed when possible. Village residents can mail completed permits to the Nome office postage free. Attempts are made to contact, by phone or letter, all permit holders who did not return their household permit. Also, trips to villages are made postseason by ADF&G personnel to collect permits and discuss the fishing season.

In 2008, a cooperative project (among ADF&G Divisions of Commercial Fisheries, Habitat, and Subsistence; and North Slope Borough Department of Wildlife Management and Planning) was initiated to assess Pacific salmon resources in the Arctic District. Components of the project included: 1) documenting subsistence salmon fishing patterns such as species targeted, fishing gear and methods, harvest timing, local salmon abundance and run timing, historical knowledge, and observations of spawning locations; 2) conducting aerial surveys to document adult salmon distribution inriver systems and determine which rivers could be used as index areas for future monitoring; and 3) acquiring age, sex, and length (ASL) information and genetic samples for salmon. Funding for the project ended after the 2013 season.

SPORT SALMON FISHERY

Sport salmon harvests occur throughout all areas of Norton Sound (Appendices A14–A17). However, in northern Norton Sound from Bald Head near Elim to Point Hope in the Kotzebue area, a fishing pole is legal subsistence gear, and catches are often reported as subsistence harvests. More detailed description of sport fish harvest is reported in the 2015 fishery management report for sport fisheries in the Northwest/North Slope management area (Scanlon 2017).

SALMON MANAGEMENT

The Division of Commercial Fisheries of ADF&G is responsible for management of commercial and subsistence fisheries in this vast area. Permanent full-time staff assigned to this area during 2018 consisted of an Area Management Biologist, an Assistant Area Management Biologist, a Research Biologist, and a Fish and Game Program Technician stationed in the Nome office. In addition, seasonal assistance in conducting various management and research activities was provided by 20 seasonal biologists and technicians in Norton Sound, Port Clarence, and Kotzebue Sound. Biologists from regional staff provided additional assistance. In 2018, interns funded by Norton Sound Economic Development Corporation (NSEDC) were utilized as fisheries technicians at some projects. There are 6 cooperative projects staffed by NSEDC and 2 projects jointly operated by NSEDC and ADF&G in Norton Sound that supplemented salmon escapement monitoring activities of area staff.

The main objective of ADF&G's program is to manage commercial and subsistence salmon fisheries on a sustained yield basis. Field projects are conducted to provide information about salmon abundance, migration, and stock composition (Appendix G2).

Management of salmon fisheries is complicated by insufficient comparative catch and return information and difficulties in obtaining accurate escapement data. Management difficulties are compounded by the need to provide not only for adequate escapements but also for the needs of several different user groups. Alaska law requires subsistence users to receive priority over other users of fish and wildlife resources. If subsistence harvest increases, commercial fishing and sport fishing may be restricted.

The cornerstone regulation that governs commercial salmon harvest in all districts is the scheduled weekly fishing period. Commercial salmon fishing regulations allow for variable fishing periods per week during the open season depending on area and season differences. ADF&G attempts to distribute fishing effort throughout the entire return to avoid harvesting only particular segments of the run. Occasionally, fishing time is increased or decreased by emergency order. Managers issue emergency orders depending upon fishing conditions and strength of runs or spawning escapements, as determined by evaluation of available run timing and abundance indicators (Appendix G7). Weekly fishery reports with fishery status and schedules are broadcast during the fishing season over radio stations KICY and KNOM in Nome, and fishery news articles are published in the *Nome Nugget* and *Arctic Sounder*.

NORTON SOUND SALMON OVERVIEW

DISTRICT BOUNDARIES

Norton Sound Salmon District consists of all waters between Cape Douglas in the north and Point Romanof in the south. The district is divided into 6 subdistricts and corresponding statistical areas: Subdistrict 1, Nome (333-10); Subdistrict 2, Golovin (333-20); Subdistrict 3, Elim (333-31, 32, 33); Subdistrict 4, Norton Bay (333-40); Subdistrict 5, Shaktoolik (333-50); and Subdistrict 6, Unalakleet (333-60). The subdistrict and statistical area boundaries were established to facilitate management of individual salmon stocks, and each subdistrict contains at least 1 major salmon-producing stream (Figure 2).

All commercial salmon fishing in the district is by set gillnets in marine waters; however, fishing effort is usually concentrated near river mouths. Commercial fishing typically begins in June and targets Chinook salmon if enough run strength exists. Emphasis switches to chum salmon in July, and the coho salmon fishery begins the fourth week of July and closes in September. Pink salmon are much more abundant in even-numbered year returns. A pink salmon directed fishery may coincide with or may be scheduled to alternate periods with the historical chum salmon directed fishery.

Salmon management changed significantly beginning in the mid-1990s because of limited market conditions and marginal returns of several salmon stocks within the district; however, rebounding salmon returns in the mid-2000s resulted in renewed buyer interest. There was no commercial interest in pink salmon from 2000 to 2006 but beginning in 2007 there was some commercial fishing to harvest a small portion of the pink salmon run. Also, since 2007 there has been renewed buyer interest in Golovin and Elim subdistricts and since 2008 in Norton Bay Subdistrict. Commercial fishery managers use estimates of run strength from escapement counting projects, test fisheries, aerial surveys, and commercial fishing catch per unit effort

(CPUE). Nome Subdistrict is managed intensively for subsistence use: Tier II chum salmon subsistence permits, registration permits, closed waters, fishing period length restrictions, gear limits, and harvest limits are all tools that can be employed during the season to provide for escapement needs and to maximize subsistence opportunity.

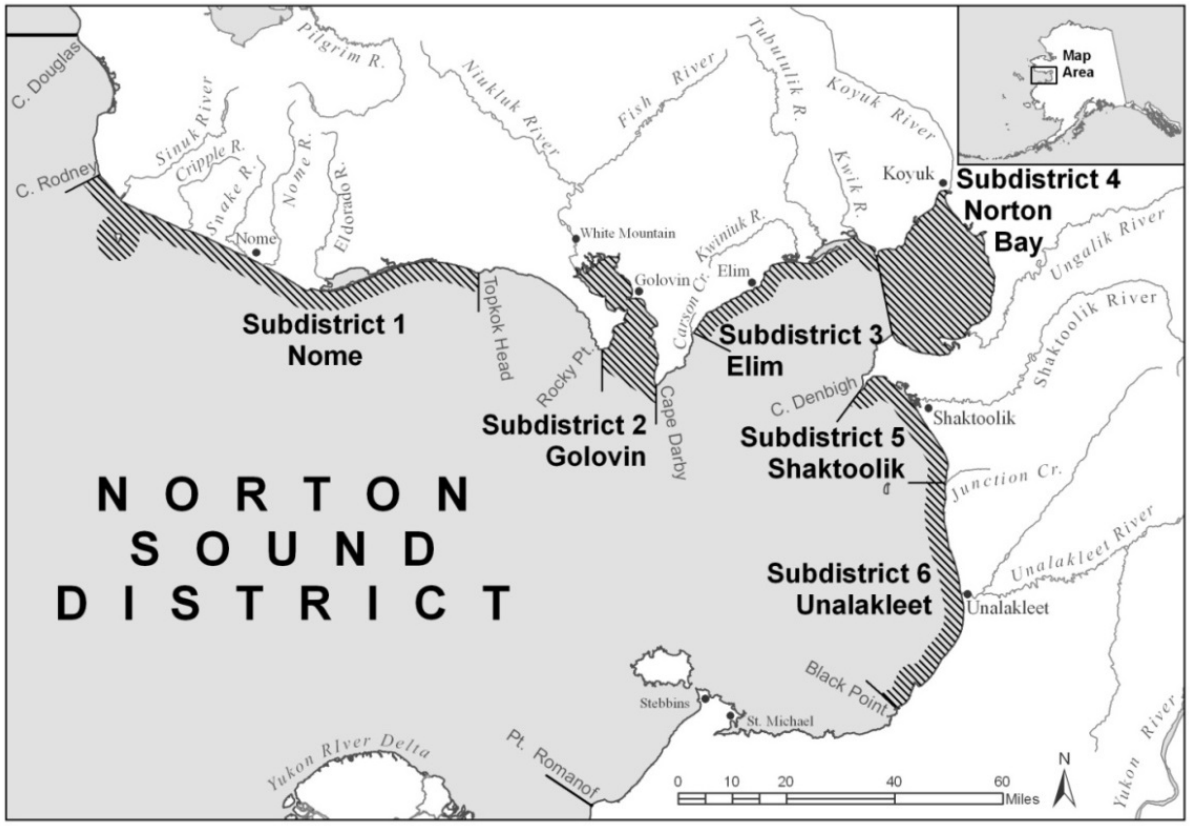

Figure 2.–Norton Sound commercial salmon fishing subdistricts.

HISTORICAL FISHERY USE

Archeological evidence dating back 2,000 years indicates fishing has been a part of life for Norton Sound residents for many centuries (Bockstoce 1979). The largest precontact settlements on the Bering Strait Islands and the western Seward Peninsula were located where marine mammals were the primary subsistence resource. The rest of the region's population lived in small groups scattered along the coast, often moving seasonally to access fish and wildlife resources (Thomas 1982). During summer months, residents would usually disperse in groups composed of 1 or 2 families and set up camps near the mouths of streams. Harvest levels of fish on any 1 stream were relatively small because of low concentrations of people who caught only what their families and 1 or 2 dogs needed through the winter (Thomas 1982).

A large-scale fur trade was developed by the Russians in the late 1800s and continued after the American purchase (Magdanz and Punguk 1981). These activities and support for hundreds of commercial whalers and trade ships caused trading to increase in the region around 1848 (Ray 1975). Increased competition for walrus, caribou, and other species from outsiders may have increased the importance of salmon to area residents (Magdanz and Punguk 1981). In the late 1890s, gold was discovered on the Seward Peninsula and boom towns sprang up and

thousands of new immigrants flocked to the region. Commerce and the establishment of missions drew people to central year-round communities.

Mining affected fish populations significantly. Nearly every stream on the Seward Peninsula has had some sort of mining operation, ranging from simple gold panning or sluice boxes to hydraulic giants or bucket-line dredges. One example of extensive impact is the Solomon River, which is only 30 miles long but had 13 dredges working at a time. Another obvious impact was the large number of people who came to live in the region between 1900 and 1930. Communities like Nome, which had a population of 30,000, and Council, which had 10,000 residents, did not exist before gold was discovered.

In the late nineteenth century, the size of dog teams increased from 2 or 3 to as many as 10 to 20. At about the same time, wooden boats began to replace kayaks (Thomas 1982). Consequently, the demand for dried fish to feed the dog teams increased with the development of better means to harvest fish. Winter transportation throughout the region consisted of hired dog teams and drivers who carried mail or freight along the coast and across the state to the ice-free port at Seward. Dried fish, primarily chum and pink salmon, became a major barter item in response to the increased demand for dog food (Thomas 1982).

Residents spent most of their summers catching and drying large amounts of salmon, some of which they kept for themselves; the rest they bartered or sold to mining camps, roadhouses, and trading posts or stores. For example, the Haycock mining camp on the Koyuk River bought about 2 tons of dried fish each year. Roadhouses were located at Golovin, Walla Walla, Moses Point, Isaac's Point, Ungalik, Robertvale, Foothills (south of Shaktoolik), Egavik, and other locations. Dried fish was bought in units of bundles (50 dried fish tied together) at a typical price of $0.10 per pound from the fishermen. One elder in the area thought fishermen retained more fish for their own use, which may have averaged 5 to 10 bundles per household, compared to the amount sold (Thomas 1982).

The number of people gradually decreased over the next 20 years after the gold rush and the gold deposits were worked out. The number of dog teams diminished by the mid-1930s when mail planes and mechanical tractors were introduced, and the last dog-team mail contract ended in 1962 at Savoonga. However, local stores continued to trade and barter in dry fish at Shaktoolik, St. Michael, Unalakleet, and Golovin. An example of quantity was the 8 x 20 x 40-foot cache at the Shaktoolik store filled to the top with dry fish. One elder said the stores would buy the fish for $0.06 per pound and then sell them for $0.10 per pound or their equivalent in groceries and supplies (Thomas 1982). By the early 1960s, commercial salmon fishing developed into a source of summer cash and snow machines were replacing the need for dog teams. The use of dry fish to feed dogs decreased and cash became more available for exchange at stores.

COMMERCIAL FISHERY OVERVIEW

Commercial salmon fishing in Norton Sound District began in Shaktoolik and Unalakleet Subdistricts in 1961. Most early interest involved Chinook and coho salmon flown in dressed condition to Anchorage for further processing. A single U.S. freezer ship purchased and processed chum and pink salmon during 1961. In 1962, 2 floating cannery ships operated in the district and commercial fishing was extended into Norton Bay, Moses Point, and Golovin. The peak in salmon canning operations occurred in 1963.

Since then, markets have been sporadic, and some subdistricts have often been unable to attract buyers for entire seasons. A joint venture between KEG (Koyuk–Elim–Golovin) Fisheries and NPL Alaska, Inc. operated from 1984 until midseason in 1988. Two Japanese freezer ships were permitted to buy directly from domestic fishermen limited to salmon caught in the internal waters of Golovnin and Norton Bays. The most consistent markets are at Shaktoolik and Unalakleet, and onshore processing occurs at Unalakleet (Appendix G3).

The commercial salmon fishing season usually opens by emergency order between June 8 and July 1 but depends on run timing within each subdistrict. The season closes by regulation on August 31 in Subdistricts 1, 2, and 3, and on September 7 in Subdistricts 4, 5, and 6 (with possible extensions set by emergency order), but processors often terminated their operations before regulatory closure dates in the past. However, during recent years Norton Sound Seafood Products (NSSP) has remained operational until the regulatory fishing season closure. Commercial fishing periods are set by emergency order. No commercial salmon fishing periods occurred in the Nome Subdistrict from 1997 to 2012 because of regulatory restrictions on chum salmon, lack of buyer interest, or weak runs. Beginning in 2013, limited commercial fishing has occurred for chum and pink salmon, and for coho salmon beginning in 2016 (Appendix A6).

Commercial fishing gear is restricted to gillnets. However, regulations adopted in 2016 allow for the use of seine gear in Shaktoolik and Unalakleet Subdistricts. A maximum aggregate length of 100 fathoms is allowed for each fisherman and there are no depth restrictions. However, mesh size is often restricted to try to direct harvest toward a specific species of salmon. Fishing periods restricted to 6.0-inch and smaller mesh gillnets are used to target chum and coho salmon. Most gillnets fished are 5.875-inch stretched mesh. In Unalakleet and Shaktoolik Subdistricts, 8.25-inch stretched mesh gillnets are commonly used if there are Chinook salmon fishing periods in June through early July. During years when large pink salmon runs occur and there is a buyer, ADF&G establishes fishing periods allowing only 4.5-inch mesh or less to be used. These special small-mesh periods are an attempt to target pink salmon while reducing harvest of larger sized salmon species.

COMMERCIAL FISHERY MANAGEMENT

Norton Sound District is managed on comparative commercial catch data, escapements, and weather conditions. A combination of factors is considered before managers issue emergency orders affecting seasons, fishing periods, allowable mesh size, and fishing areas.

Aerial surveys are used to monitor escapements in most Norton Sound streams. Weather conditions, time of day, type of aircraft, water and bottom conditions, date of survey, and efficiency of surveyor and pilot must be considered when making interannual aerial survey comparisons. Counting towers and weirs are a more consistent and accurate method of obtaining escapement information and have been utilized on several river systems in Norton Sound. In 2018, there were 5 counting towers and 7 weirs in operation (Figure 3) including a combination sonar/tower project on the Shaktoolik River, but the project was still in development and was not used for inseason management.

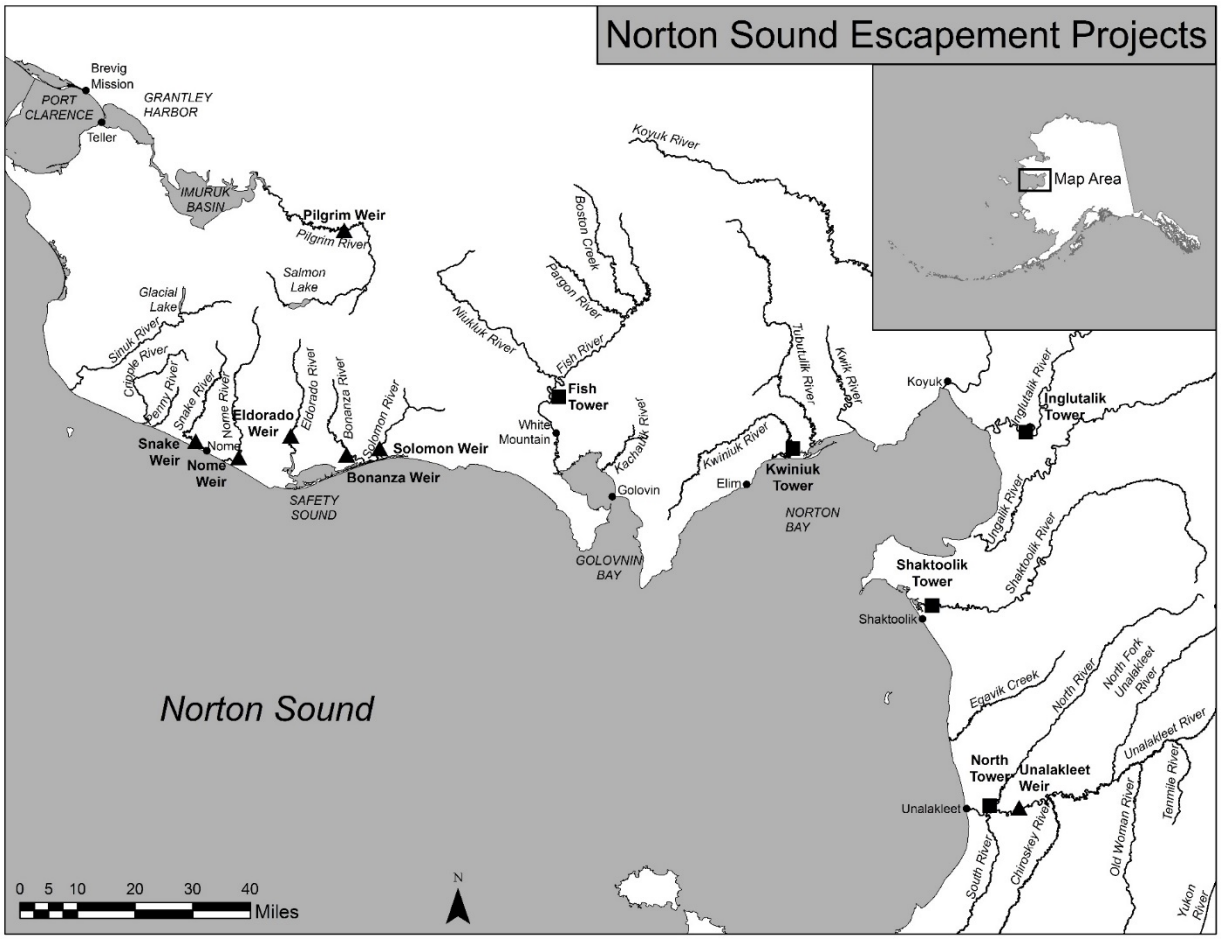

Figure 3.–Norton Sound escapement projects.

Early inseason management emphasis is on Chinook salmon switching to chum salmon around July 1, and then gradually shifting to coho salmon during the fourth week in July. Pink salmon are abundant during even-numbered years, but often no buyer is available for this species except as incidentally caught fish when there are other salmon directed fisheries. Coho salmon catches have been increasing in recent years surpassing even the high levels seen in Norton Sound in the mid-2000s, with average catch for the last 5 years exceeding 164,000 fish (Appendix A14). Chum salmon catches have been rebounding in recent years to the best catches since the 1980s, and average catch for the last 6 years, excluding 2016, exceeded 155,000 fish. Management actions have consisted of a series of emergency orders that open and close fishing seasons and periods and establish gillnet mesh size specifications.

Little or no commercial salmon harvest has occurred in Nome and Norton Bay Subdistricts since the early 1980s. Nome Subdistrict had very depressed chum salmon stocks that, until the mid-2000s, required closure or severe restrictions of the subsistence fishery. However, salmon runs have improved greatly with record runs of pink and coho salmon in the mid-2000s and the best chum salmon runs in recent years since the 1980s. Nome Subdistrict had been unable to attract a buyer for pink and coho salmon until recently and was closed to commercial chum salmon fishing by regulation until 2013. The Norton Bay Subdistrict often had healthy stocks, but it had been unable to attract markets willing to operate in this remote area until recently.

Since 2008, improving market conditions resulted in NSSP bringing more tenders to the subdistrict, and commercial salmon fishing has resumed in Norton Bay.

Commercial fisheries in Golovin and Elim Subdistricts have targeted chum salmon in June and most of July, pink salmon in June and July during even-numbered years, and coho salmon in late July and August. Commercial chum salmon harvests began to drop dramatically since the mid-1980s. Poor chum salmon runs resulted in restrictive management actions during the late 1990s and early 2000s, but in the mid-2000s there was little market interest even as runs began to rebound. However, continued improving chum salmon runs in the late 2000s in Norton Sound have sparked renewed buyer interest in the northern subdistricts.

Both Shaktoolik and Unalakleet Subdistricts, which share a common boundary, consistently attract commercial markets due to larger volumes of fish and better transportation services. Management actions typically encompass both subdistricts because salmon tend to intermingle, and harvest in 1 subdistrict affects the movement of fish in the adjacent subdistrict. Results from ADF&G's test net in Unalakleet River (Kent 2010), North River tower counts, and subsistence fishermen interviews in Unalakleet had been used to set early fishing periods in both subdistricts. However, the test net project was discontinued in 2013. Commercial fishing is typically allowed after Chinook salmon have been observed in increasing numbers in subsistence fishing nets and ADF&G is confident the midpoint of the Chinook salmon escapement goal range of 1,200–2,600 fish will be reached at the North River counting tower; otherwise, no commercial gillnet fishing periods are allowed for any species until after June 30. Radiotelemetry projects in the Unalakleet River drainage have shown that a large percentage of the Chinook salmon run spawns in the North River compared to chum and coho salmon (Estensen et al. 2005; Estensen and Hamazaki 2007; Joy et al. 2005; Joy and Reed 2006, 2007; Wuttig 1998 and 1999). Aerial surveys are only useful for late-season escapement assessment because of the long travel time between the fishing and spawning grounds.

SUBSISTENCE FISHERY OVERVIEW

Norton Sound District subsistence salmon harvest surveys have been conducted sporadically since statehood. From 1994 through 2003, ADF&G conducted an annual subsistence postseason salmon harvest assessment effort in northwest Alaska to provide more extensive, complete, and reliable salmon harvest estimates than had previously existed. These household subsistence harvest surveys were primarily funded by ADF&G Division of Commercial Fisheries and were conducted by the Division of Subsistence during the fall in 8 villages (Brevig Mission, Teller, Golovin, White Mountain, Elim, Koyuk, Shaktoolik, and Unalakleet). In 2004, surveys were replaced by permits in northern Norton Sound. Over the last 10 years in Norton Sound Subdistricts 1–6 (2008–2017), the average subsistence harvest was over 64,000 salmon, and the majority was pink salmon (Appendix A14).

Two goals of the postseason household subsistence survey are to collect harvest data to estimate subsistence salmon catch by species and community, and to compile information on gear types, participation rates, sharing, use of salmon for dog food, and household size (Appendices G4–G6).

In 2004, ADF&G's subsistence salmon harvest assessment program changed substantially when household surveys were discontinued in most communities because the household subsistence permit system was expanded from Nome Subdistrict to include Port Clarence District (affecting the communities of Teller and Brevig Mission) and Norton Sound Subdistricts 2 and 3 (affecting the communities of Council, White Mountain, Golovin, and Elim). Thereafter, subsistence

salmon harvest for those communities are reported totals from subsistence permits, and household surveys have not been necessary. Permits issued at the Nome office, and by ADF&G personnel in the field, identify gear restrictions, bag limits, subsistence zones (for Subdistrict 1, Salmon Lake and Pilgrim River only), location and access descriptions, and subsistence regulations for each location or body of water. In addition, the permit contains a catch calendar for household members to record gear type used, area fished, and catch in numbers by species for each day fished. If subsistence fishermen reach their harvest limit in 1 river, they can fish in other rivers until they reach the limit in those rivers. Subsistence permits are important to management because they identify users, fishing effort, harvests, and catch limits.

In Subdistrict 1 (Nome), low salmon stock levels combined with a large concentration of users has required subsistence fishing permits since 1975. By regulation, permits with catch calendars are issued to each requesting household listing all Nome Subdistrict fishing locations, catch limits, and gear restrictions. After the fishing season, households are required to return the completed permit to ADF&G, whether they fished or not. Due to the subsistence permit program, all subsistence salmon catches from Norton Sound Subdistrict 1 have been determined from returned permits since 1975. However, not all fishermen obtained or returned permits from 1975 to 2003, and the data were not expanded for unreturned permits because the assumption was that those permit holders did not fish. Beginning in 2004, stricter enforcement of regulations including fines for failure to return a permit resulted in at least 98% of all permits issued being returned, and for the last 7 years nearly all subsistence salmon permits issued have been returned or households have reported catches in person, by telephone, or by email.

Norton Bay, Shaktoolik, and Unalakleet Subdistricts have continued to be surveyed postseason by household interviews. Additionally, daily surveys of Unalakleet River and ocean subsistence fishermen were conducted annually after fishing periods during the Chinook salmon run from 1985 to 2012. Although total harvests by subsistence fishermen were not documented inseason, effort and catch information were used to judge timing and magnitude of the Chinook salmon run. These surveys were discontinued in 2012 because major reductions in subsistence fishing time and gear restrictions limited the utility of the data inseason. The directed Chinook salmon commercial fishery has not occurred since 2005 and can only be opened once it becomes apparent subsistence needs will be met and escapement goals will be achieved as indexed by North River counting tower and Unalakleet River mainstem weir counts.

Beginning in 2007, regulations allowed cash sales of up to $200 worth of subsistence-taken finfish per household, per year, in the Norton Sound–Port Clarence Area, and starting in 2013 the amount allowed was raised to $500. From 2007 to 2012, 5 or fewer customary trade finfish permits were issued per year, but more recently (2013–2017), due to ADF&G's increased efforts to remind residents about the permit requirement when selling subsistence-caught finfish, an average of 17 customary trade permits were issued per year in Norton Sound District. Total annual sales have never exceeded $2,300 (Appendix A34).

HISTORICAL REGULATORY AND MANAGEMENT ACTIONS IN NORTON SOUND SUBDISTRICTS

Nome Subdistrict (Subdistrict 1) has been the focus of most regulatory actions within the Norton Sound District since the 1970s. Although pink salmon are usually the most abundant species of salmon in Nome Subdistrict streams, the commercial fishery primarily targeted chum salmon during the 1970s. Relatively large chum salmon catches in this subdistrict in conjunction with

weak local abundance implied that the fishery may have harvested non-local stocks. A 1978–1979 Norton Sound stock separation study (Gaudet and Schaefer 1982) showed that some salmon tagged near Nome were recaptured in fisheries from Golovin (Subdistrict 2) to Kotzebue. To provide for spawning requirements and to provide for an important subsistence fishery that targets local stocks, a commercial harvest guideline of 5,000–15,000 chum salmon was adopted as a regulation.

The Alaska Board of Fisheries (BOF), in response to an advisory committee petition, directed ADF&G to manage the Nome Subdistrict commercial fishery for optimal chum salmon escapement after poor chum salmon escapements during the 1982 and 1983 seasons. During 1984 fall BOF meetings, directives in practice that season became regulation. In response to public and advisory committee proposals, the following commercial fishery restrictions were adopted as regulations:

1) Salmon may be taken commercially only from July 1 through August 31.
2) Fishing periods were restricted to two 24-hour periods per week.
3) Waters west of Cape Nome were closed to commercial salmon fishing to allow for rebuilding of river stocks that supported the historical subsistence effort.

ADF&G was directed to allow a harvest at the lower end of the guideline harvest range (GHR) of 5,000 to 15,000 chum salmon, as stipulated in regulation 5 AAC 04.360. In addition to these restrictions, a proposal to restrict sport fishery in Nome and Snake rivers was adopted in 1984 that allowed "a bag and possession limit of 15 salmon, other than Chinook salmon, of which only 5 could be chum and coho salmon, in combination."

Subsistence permit limits in Nome and Snake rivers were restricted to 20 chum and 20 coho salmon. The remainder of the permit limit could be filled with salmon other than chum or coho salmon.

Even with these restrictive regulations in place, chum salmon escapement goals were difficult to attain. The 1987 fishing season experienced poor returns of both chum and pink salmon to Nome Subdistrict streams. Numerous management actions were made to curtail commercial fishing activities, and later, sport, personal use, and subsistence fishing were restricted. Even with such drastic fishery restrictions, escapement goals for chum salmon were not attained during 1987 in Nome, Eldorado, Flambeau, Bonanza, Snake, and Solomon rivers. In response to this continuing trend of decreasing chum and pink salmon returns to Nome Subdistrict, several new regulations were adopted by BOF in 1987 restricting gillnet length and mesh size in the subsistence fishery. Beach seine use in specific waters in the subsistence fishery was also eliminated.

Beginning in 1991, no subsistence chum salmon harvests were allowed until escapement goals were likely to be met or conservative management actions were judged to be no longer effective. Regulation changes in 1992 affected the use of beach seines for subsistence fishing in Nome Subdistrict. Managers were given authority to allow subsistence harvest of chum or pink salmon by beach seine if escapement needs were likely to be met. In the past, beach seines were viewed as an overly effective means to harvest fish. However, since 1999, beach seines were used to harvest abundant species and allow live release of other species experiencing depressed runs.

In 1999, the BOF concluded that the previous management plan did not provide adequate opportunity for all subsistence salmon users to supply their annual needs for chum salmon. Therefore, Nome Subdistrict was designated a Tier II subsistence chum salmon permit fishery

during a special BOF meeting held in Nome, March 1999. Under Tier II, permits are dispensed to individuals prioritized by fishing history and dependence and were based on projected harvestable surplus. As a result, ADF&G allowed 20 individuals who scored highest on the Tier II application process in 1999 to subsistence fish. The intent was to allow Tier II permit holders priority over other subsistence users if only a small harvestable surplus of chum salmon returned. If the run was assessed to be strong, then the subsistence fishery would open to all Alaska residents who obtained a Tier I permit, and individual harvests would be restricted to prescribed bag limits. In addition, BOF established "closed waters" areas where no subsistence salmon fishing would be allowed at any time, to protect chum salmon on the spawning grounds, and placed existing chum salmon aerial survey escapement goals for 6 Nome Subdistrict streams into regulation. In 1999, due to poor chum salmon returns, ADF&G closed even the Tier II fishery, and in 2000, only 10 Tier II permits were issued.

During a BOF work session in September 2000, several Norton Sound District chum salmon stocks were determined to be stocks of concern based on the *Policy for the Management of Sustainable Salmon Fisheries*. Chum salmon in Nome Subdistrict were determined to be a stock of management concern, and chum salmon in Golovin and Elim Subdistricts were determined to be a stock of yield concern.

Based upon the stock of concern determinations, BOF made several changes to regulations for management of Norton Sound salmon. In January 2001, BOF repealed the existing biological escapement goals (BEG) in regulation and adopted optimal escapement goals (OEG) for chum salmon for 5 Norton Sound rivers. In the past, escapement goals were expressed as aerial survey counts of salmon. Aerial surveys do not count all salmon present but serve as an index to compare current and previous surveys. The new OEGs are in actual number of fish and based on allocative factors considered by the BOF and ADF&G escapement goal analyses (Clark 2001). Except for Kwiniuk and Tubutulik rivers, that factor in additional chum salmon needed to provide for inriver subsistence use, the OEGs are the same as ADF&G established sustainable escapement goals (SEG). BOF established OEGs, by subdistrict, are as follows:

Nome Subdistrict (Subdistrict 1)

Snake River: 1,600–2,500 chum salmon
Nome River: 2,900–4,300 chum salmon
Eldorado River: 6,000–9,200 chum salmon

Elim Subdistrict (Subdistrict 3)

Kwiniuk River: 11,500–23,000 chum salmon
Tubutulik River: 9,200–18,400 chum salmon

A chum salmon management plan for Nome Subdistrict (Subdistrict 1) and a salmon management plan for Golovin and Elim Subdistricts (Subdistricts 2 and 3) were adopted by BOF. Commercial chum salmon fishing in Nome Subdistrict was closed and the fishery was not to be reopened again until the abundance of chum salmon has a harvestable surplus large enough to meet subsistence needs for 4 consecutive years. Consequently, commercial chum salmon fishing remained closed until 2013.

ADF&G was given authority to establish subsistence gillnet mesh size restriction of 4.5 inch or less by emergency order when necessary to conserve chum salmon in Subdistricts 1, 2, and 3. Also, the Cripple and Penny rivers were closed to subsistence fishing for chum salmon.

In addition, BOF expanded legal gear for the subsistence fishery to include a line attached to a rod or pole, from Cape Espenburg on the northern Seward Peninsula along the coast to Bald Head (between Elim and Koyuk). Bald Head is the boundary between Subdistricts 3 and 4. Therefore, west of Cape Espenburg in the Kotzebue District, in Port Clarence District, and in Norton Sound District from Cape Douglas to Bald Head, hook and line became legal subsistence gear. Although hook and line can be used for subsistence fishing, sport fish methods and means requirements still apply to harvesting of fish (for example, no snagging of fish is allowed). Sport fish bag and possession limits, by species, as specified in regulation 5 AAC 70.022 also apply, except when fishing through ice or in the Nome Subdistrict subsistence areas designated for each river. However, fishermen cannot combine sport fish bag and possession limits with subsistence harvest permit limits.

In 2001, chum salmon runs began to improve in Nome Subdistrict and additional permits were issued in the Tier II chum salmon fishery. Beginning in 2004, BOF expanded the salmon subsistence permit requirement for the Norton Sound area to include all marine waters, and fresh waters flowing into marine waters from Cape Prince of Wales to Bald Head. This regulation required salmon permits to be issued in Brevig Mission, Teller, White Mountain, Golovin, and Elim in addition to Nome.

Improving chum salmon runs in Nome Subdistrict resulted in Tier II chum salmon fishery restrictions being suspended beginning in 2006. A permit is still required for subsistence salmon fishing, but there is no longer a Tier II fishery that restricts participation in subsistence fishing. In 2007, the BOF upgraded Nome Subdistrict from a management concern to a yield concern. The yield concern status was reaffirmed for Golovin and Elim Subdistricts, and all 3 subdistricts continued to be stocks of yield concern by BOF designation at 2010 and 2013 BOF regulatory meetings. However, the BOF allowed commercial chum salmon fishing beginning in 2013 in Nome Subdistrict and liberalized subsistence fishing restrictions during chum salmon season. Specifically, this included expanding subsistence fishing time in the marine waters east of Cape Nome to 7 days a week and allowing the use of beach seines during the scheduled freshwater gillnet periods throughout the Nome Subdistrict from June 15 through August 15. Starting in 2016, the BOF dropped yield concern status for Nome Subdistrict chum salmon stocks and further increased subsistence fishing time in fresh waters from 4 days to 5 days a week and in marine waters west of Cape Nome from 3 days to 5 days a week. Golovin and Elim Subdistricts retained yield concern status for chum salmon.

Regulatory actions were also undertaken in other subdistricts. Subdistricts 5 and 6 Chinook salmon were designated a stock of yield concern in 2004, and BOF continued this designation in 2007, 2010, 2013, and 2016. To increase Chinook salmon escapements, BOF also adopted a more conservative *Subdistricts 5 and 6 King Salmon Management Plan* (5 AAC 04.395) that was first implemented during the 2007 season. Under the new plan, commercial fishing directed at Chinook salmon can only occur if the midpoint of the North River tower SEG range is projected to be reached. Additionally, the plan directs ADF&G to provide escapement windows by restricting subsistence gillnet fishing for salmon from mid-June to mid-July to two 48-hour fishing periods a week in marine waters, and two 36-hour fishing periods a week in Unalakleet River. Subsistence fishing time can only be liberalized if ADF&G projects that the lower end of the SEG range for North River Chinook salmon passage will be achieved; otherwise, ADF&G is directed to close the Chinook salmon fishery.

In 2013 Chinook salmon escapements from the Unalakleet River mainstem and its major tributary, North River were the lowest ever recorded at less than 700 fish each (Appendices A30 and A31). Subsistence Chinook salmon harvests in Subdistricts 5 and 6 were also the lowest recorded since survey methods were standardized in 1994 at less than 500 fish each (Appendices A10 and A11). The following 2 years, the subsistence fishing seasons began with unprecedented closures to subsistence salmon fishing with the intended result that Chinook salmon escapements dramatically improved and did reach the North River counting tower escapement goal range of 1,200–2,600 Chinook salmon counted. However, in 2016 and 2017, even with similarly strict subsistence restrictions in place, the Chinook salmon runs were again very weak. In 2018, the Chinook salmon run met the escapement goal for the first time since 2015, but no commercial fishing targeting Chinook salmon was allowed.

PORT CLARENCE SALMON OVERVIEW

DISTRICT BOUNDARIES

Port Clarence District encompasses all waters from Cape Douglas north to Cape Prince of Wales including Salmon Lake and Pilgrim River drainages (Figure 4). Salmon, saffron cod *Eleginus gracilis*, whitefish, and herring *Clupea pallasii* are the major subsistence species.

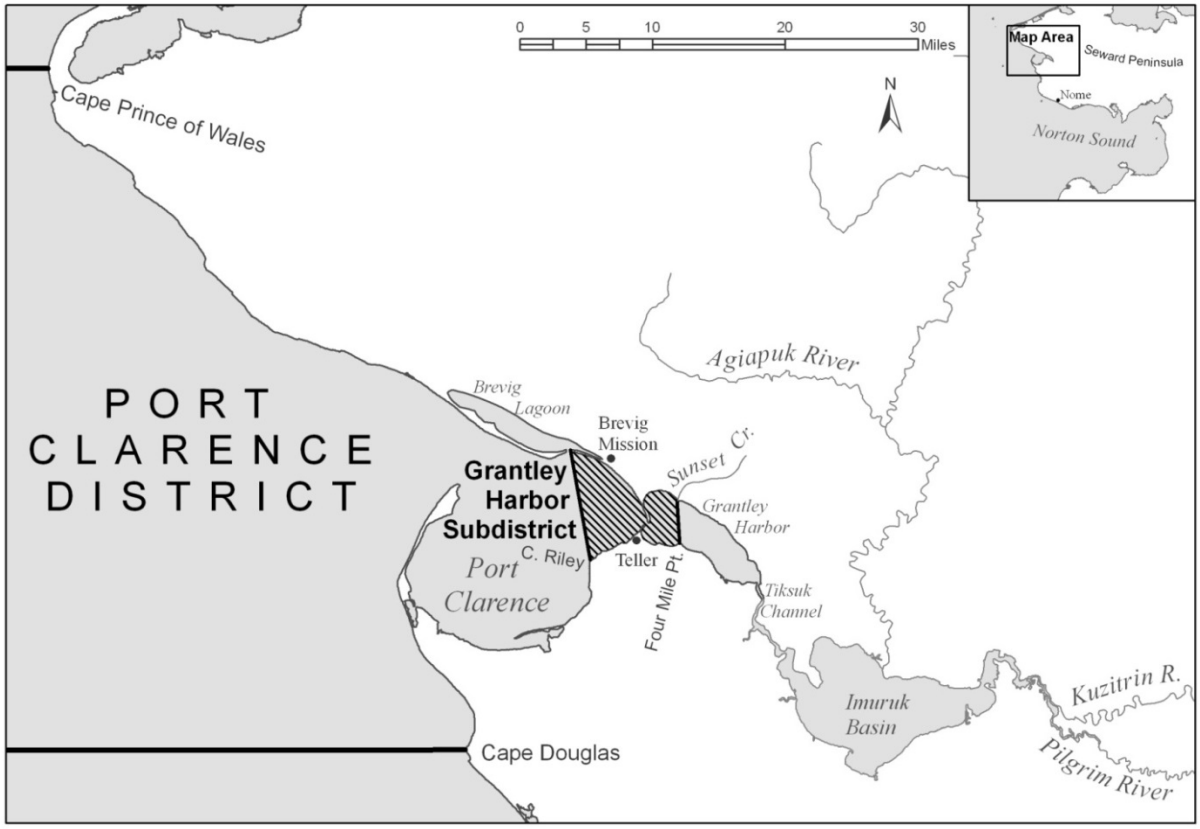

Figure 4.–Port Clarence District.

Note: Cross-hatched area on map shows location where commercial salmon fishing may be opened.

COMMERCIAL FISHERY OVERVIEW

In contrast to Norton Sound District, commercial fishing has been limited in Port Clarence District. In 1966, a commercial salmon fishery was established in the Grantley Harbor/Tuksuk Channel area of the Port Clarence District, but the fishery that year yielded less than 2,300 combined chum, pink, and sockeye salmon (ADF&G 1967). It was closed later that same season, due to small salmon runs and concerns from residents about impacts to area subsistence salmon fisheries and had remained closed until relatively recently. In the mid-2000s, there were large increases in sockeye salmon runs as well as positive results from an ADF&G test fishery in 2006. Consequently, in 2007, the BOF reestablished by regulation a Port Clarence District commercial salmon fishery. The BOF also established an inriver run goal of at least 30,000 sockeye salmon as a trigger point to allow a commercial fishery. The 2007 fishery harvest was 1,152 sockeye salmon, and 3,183 chum salmon, whereas the 2008 fishery harvest was 89 sockeye salmon, 256 chum salmon, and 910 pink salmon (Menard et al. 2010). The 2008 commercial fishery was closed when the inriver goal of 30,000 sockeye salmon for Pilgrim River was projected to fall short. The commercial fishery has remained closed since 2009 because the inriver run goal of 30,000 sockeye salmon had not been achieved through 2014. In 2015, a surge of sockeye during the second half of July resulted in an escapement of just over 36,000 fish past the Pilgrim River weir and the possibility of a commercial fishery, but there was no buyer interest. Although there was the possibility of commercial fishing the last 3 years there was still no buyer interest.

SUBSISTENCE FISHERY OVERVIEW

Salmon Lake, which empties into the Pilgrim River in the Port Clarence District, along with Glacial Lake in the northwestern portion of the Nome Subdistrict, supports the northernmost sockeye salmon populations of significant size in North America. Subsistence harvests of sockeye salmon in the Sinuk River, which drains Glacial Lake, have historically been low due to difficulties navigating this shallow, boulder-laden river. In contrast, sockeye salmon harvests in the Pilgrim River are much higher because it is more easily traveled and several beach seining and set gillnet fishing locations are accessible via the Kougarok Road (Nome–Taylor Highway) emanating from Nome. A traditional subsistence salmon fishery has probably occurred within this district for centuries; however, subsistence fishing has only been reported at Salmon Lake since the 1930s and monitored at the upper Pilgrim River since 1962. Data collected by ADF&G personnel showed most fishermen of Brevig Mission fish northern and northeastern sections of Port Clarence District, and Teller fishermen utilize Grantley Harbor and Tuksuk Channel. Interviews with residents indicated substantial fishing effort within Agiapuk River.

Beginning in 2007, regulations allowed for cash sales of up to $200 worth of subsistence-taken finfish per household, per year, in the Norton Sound–Port Clarence Area, and starting in 2013 the amount allowed was raised to $500. From 2007 to 2012, at most, 1 customary trade finfish permit was issued in Port Clarence District, but more recently, due to ADF&G's increased efforts to remind residents about the permit requirement when selling subsistence-caught finfish, an average of 8 customary trade permits were issued. Total annual sales have never exceeded $2,300 (Appendix A34).

Village subsistence surveys were conducted annually by the Division of Commercial Fisheries until 1983 (Menard et al. 2013). The Division of Subsistence conducted a partial survey of Brevig Mission in 1989 and conducted full-scale household surveys of both Brevig Mission and

Teller from 1994 to 2003. Since expansion of the subsistence salmon permit program in 2004, subsistence salmon harvests for residents of both villages have been determined from reported totals on permits.

Salmon Lake and Pilgrim River stocks have been fished by Nome residents in addition to residents of Brevig Mission and Teller for quite some time. To conserve declining sockeye salmon stocks, BOF adopted a regulation in 1972 to close Salmon Lake and its tributaries to subsistence salmon fishing from July 15 through August 31. However, because Pilgrim River is accessible from the road system (Figure 5), there has been increased fishing effort from Nome area residents due to increased fishing restrictions in Nome Subdistrict beginning in the 1990s, and more so in the mid-2000s when there were record runs of sockeye salmon to Salmon Lake. In 2003, the first year of the good salmon runs, there were 100 permits issued. Over the next 5 years, the average number of permits issued was 217 (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome). For comparison, in 2002 only 25 permits were issued, and a counting tower in operation that year at the same location as the present-day weir estimated less than 4,000 sockeye salmon passing (Appendix B2). Number of permits issued dropped from 255 in 2008 to 133 in 2011, probably due to subsistence fishing closures on Pilgrim River, but since then, even though numerous fishing restrictions have been eliminated in Nome Subdistrict, there continues to be increasingly heavy fishing effort at Pilgrim River. The average number of permits issued from 2012 to 2015 was 273, compared to the record number of 506 issued in 2016 (Menard et al. 2017), followed by 489 in 2017 and 498 in 2018. A major contributing factor was that, due to indications of a good run, fishing limits for Pilgrim River has been waived early in the season for the last 4 years, including 2018.

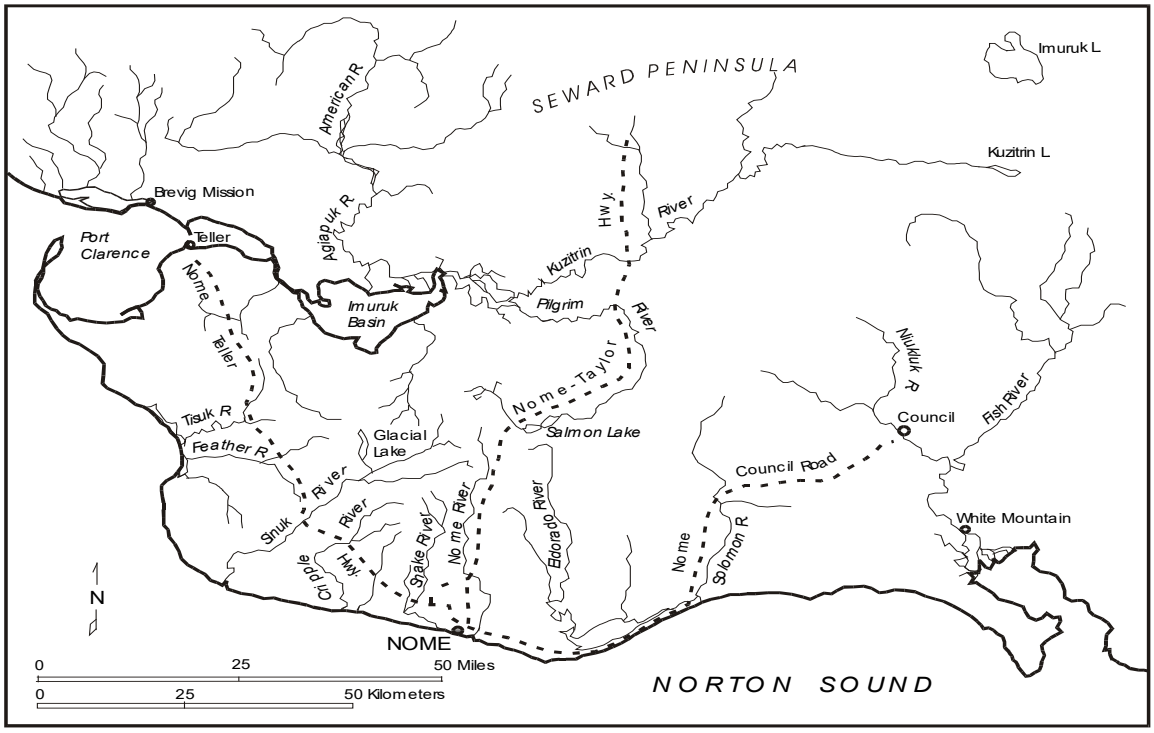

Figure 5.–Seward Peninsula with road-accessible waters.

From 1997 to 2001, ADF&G conducted a fertilization program at Salmon Lake, partially funded by NSEDC and the BLM to restore sockeye salmon to historical levels by applying liquid

fertilizer. However, ADF&G could not determine whether the method was effective and suspended fertilization in 2001. After impressive 2003 sockeye salmon returns, the project was reevaluated, and fertilizer was applied at a reduced rate in 2004, stopped again in 2005 and 2006, restarted in 2007 by NSEDC, and has continued in subsequent years at a reduced amount from the earlier years (Appendix B4).

KOTZEBUE SALMON OVERVIEW

DISTRICT BOUNDARIES

Kotzebue District encompasses all waters from Point Hope to Cape Prince of Wales, including those waters draining into the Chukchi Sea (Figure 6). Salmon, saffron cod, whitefish, and herring are major subsistence species.

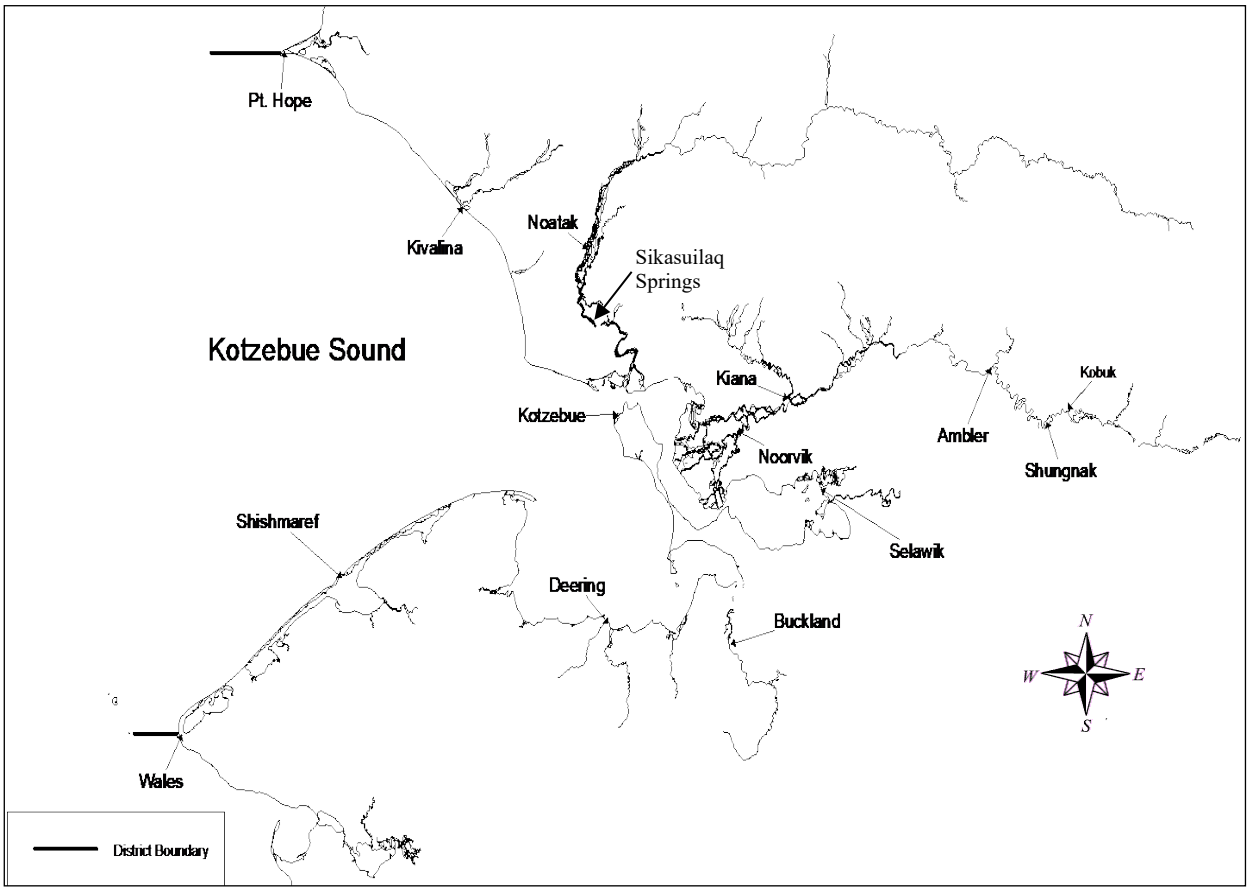

Figure 6.–Kotzebue District, villages and subsistence fishing area.

COMMERCIAL FISHERY OVERVIEW

Kotzebue District supports the northernmost commercial salmon fishery in Alaska. The district is divided into 3 subdistricts. Subdistrict 1 has 6 statistical areas where commercial salmon fishing may occur (Figure 7).

The commercial fishery under state management opened in 1962. Salmon harvests consist primarily of chum salmon, although limited amounts of Dolly Varden; sheefish; whitefish; and Chinook, sockeye, pink, and coho salmon are harvested during the fishery.

In the Kotzebue fishery, gear is limited to setnets with an aggregate of no more than 150 fathoms per permit holder. Fishermen generally operate with an end on or near shore and with all 3 shackles connected. Fishermen also set in deeper channels in the mudflats farther out from shore. Most gear used in the district is 5.875-inch or 6.0-inch stretch mesh gillnet.

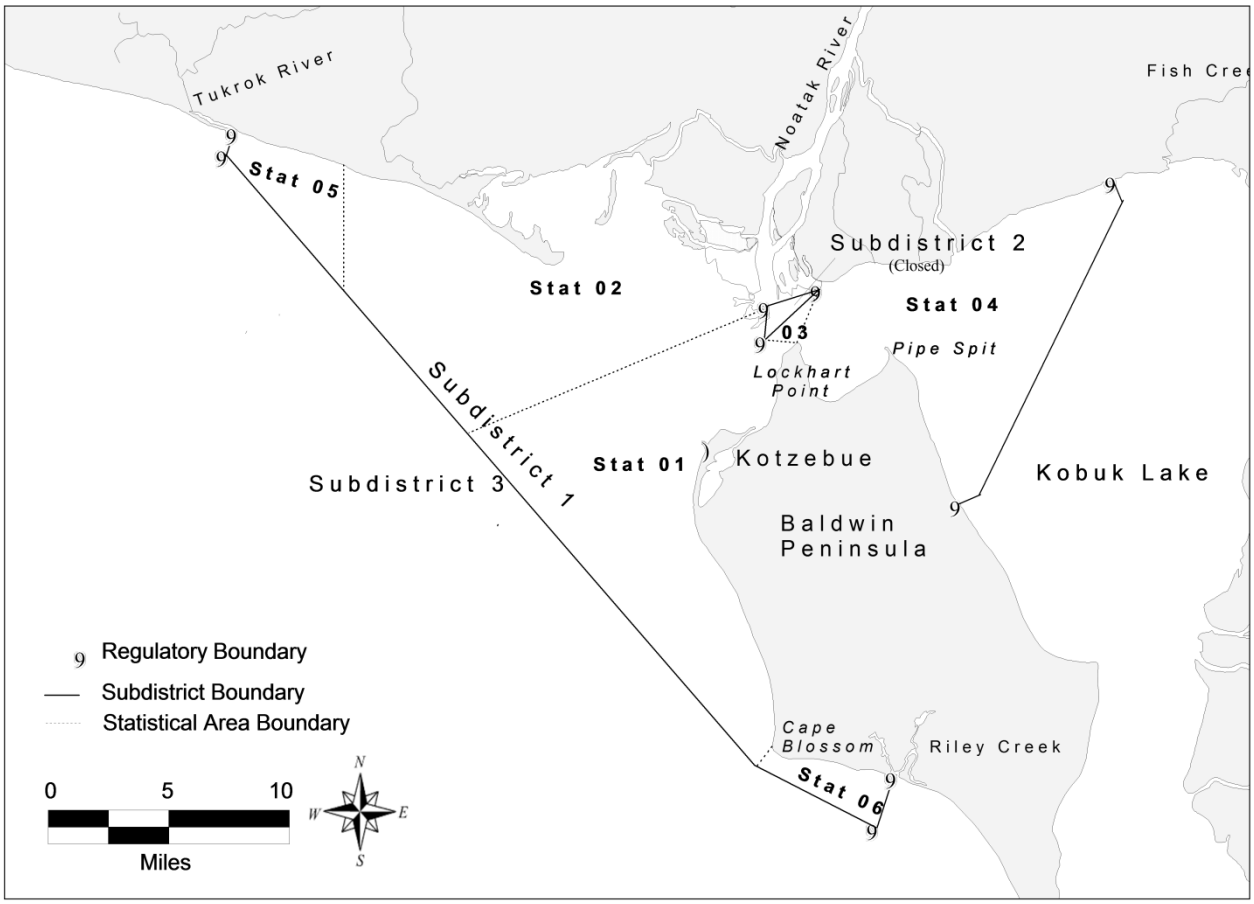

Figure 7.–Kotzebue Sound commercial salmon fishing subdistricts and statistical areas.

The earliest documented sales of salmon in Kotzebue District were in 1909 when Lockhart's store purchased 21,906 pounds of salmon from residents and resold it at $0.05 per pound. Of those sales, 21,366 pounds were sold to gold miners on the Kobuk River drainage and 540 pounds were sold to a company in Seattle. A commercial fishery occurred from 1914 to 1918. Salmon were canned, and the bulk of the harvest is assumed to have been sold to miners who worked in the Upper Kobuk River drainage. The next organized commercial fishery began under state management in 1962 and continues to the present. The current fishery became fully developed in the mid-1970s. In 1987, the fisheries managers' new program emphasized attaining escapement goals. Before 1987, harvests were proportional to total return. Since 1995, poor market conditions and limited buyer capacity have caused harvests to fall short of their potential. The fishery bottomed out in 2002 and 2003 when no major buyer came to Kotzebue and began to slowly rebound in 2004 when 1 major buyer returned and slowly increased their capacity over a

decade. This buyer remained the only major buyer for 10 years, but in 2014, 2 additional major buyers purchased fish (Menard et al. 2015). Though only 1 major buyer, Copper River Seafoods, returned in 2015 and 2016, there were again 3 buyers in 2017 and 2018 (Appendix G3), but 1 buyer only bought limited quantities the last few weeks of the season.

In 1981, a chum salmon hatchery was established at Sikasuilaq Springs, a tributary of Noatak River. The hatchery was closed in 1995 due to lack of funding support. At peak production in 1992, the hatchery incubated 11,100,000 eggs. An estimated peak adult hatchery return of 90,000 chum salmon occurred in 1997. The estimated contribution to the commercial fishery was unknown.

SUBSISTENCE FISHERY OVERVIEW

Subsistence salmon fishing in Kotzebue Sound District continues to be important, but fish abundance and fishing activities vary from community to community. Along the Noatak and Kobuk rivers where chum salmon runs are strong, household subsistence activities in middle and late summer revolve around catching, drying, and storing salmon. In southern Kotzebue Sound, fewer salmon are taken for subsistence because of low availability. Some fishermen base their fishing effort out of their village, whereas others move seasonally to fish camps where they stay for several days to several weeks. The predominant species in the district is chum salmon, although small numbers of other salmon species are present.

Historical subsistence surveys for the Kotzebue area have been less complete than for Norton Sound and Port Clarence Districts. However, expanded documented surveys from 1995 to 2001 resulted in an estimated total subsistence salmon harvest for the Kotzebue Sound area to be 74,000 annually (Appendix C4). During these years, ADF&G Division of Subsistence (DOS) conducted annual household subsistence salmon surveys in select Kotzebue Sound District communities, including surveying the town of Kotzebue using mail-in postcards. Due to budget constraints these surveys were discontinued in 2005 but were restarted in 2012–2014, when comprehensive subsistence fish harvest data were again collected from 6 to 9 Kotzebue area villages by DOS. From 2012 to 2014, total subsistence chum salmon reported caught ranged from 27,000 to 42,000 fish, more than in 2003 and 2004, the last 2 years that the same 6 villages were surveyed (Appendices C4 and C5). Subsistence chum salmon harvest per household averaged 66 to 85 salmon for Kobuk River villages during the years 2012–2014 (Appendix C6). The town of Kotzebue, which had not been surveyed since 2001, was last surveyed from June 2014 to May 2015. No subsistence surveys have been conducted in the district since then.

ARCTIC SALMON OVERVIEW

DISTRICT BOUNDARIES

The Arctic District includes all waters of Alaska north of the latitude of the westernmost tip of Point Hope and west of 141 degrees W longitude, including those waters draining into the Chukchi Sea, Beaufort Sea, and Arctic Ocean (Figure 8).

SUBSISTENCE FISHERY OVERVIEW

There are no commercial salmon fisheries in the Arctic District. Small numbers of chum, pink, and Chinook salmon have been reported by subsistence fishermen along the Arctic coast; pink salmon are the most numerous followed by chum salmon. Salmon are caught in gillnets as an incidental species when subsistence fishermen are targeting other non-salmon finfish. In October

2012, a fisherman caught 2 sockeye salmon in Ikroavik Lake, approximately 5 miles south of Barrow, subsistence fishing with gillnets under the ice targeting least cisco *Coregonus sardinella* (data on file with ADF&G Division of Commercial Fisheries, Barrow). There are no reliable reports of coho salmon being caught.

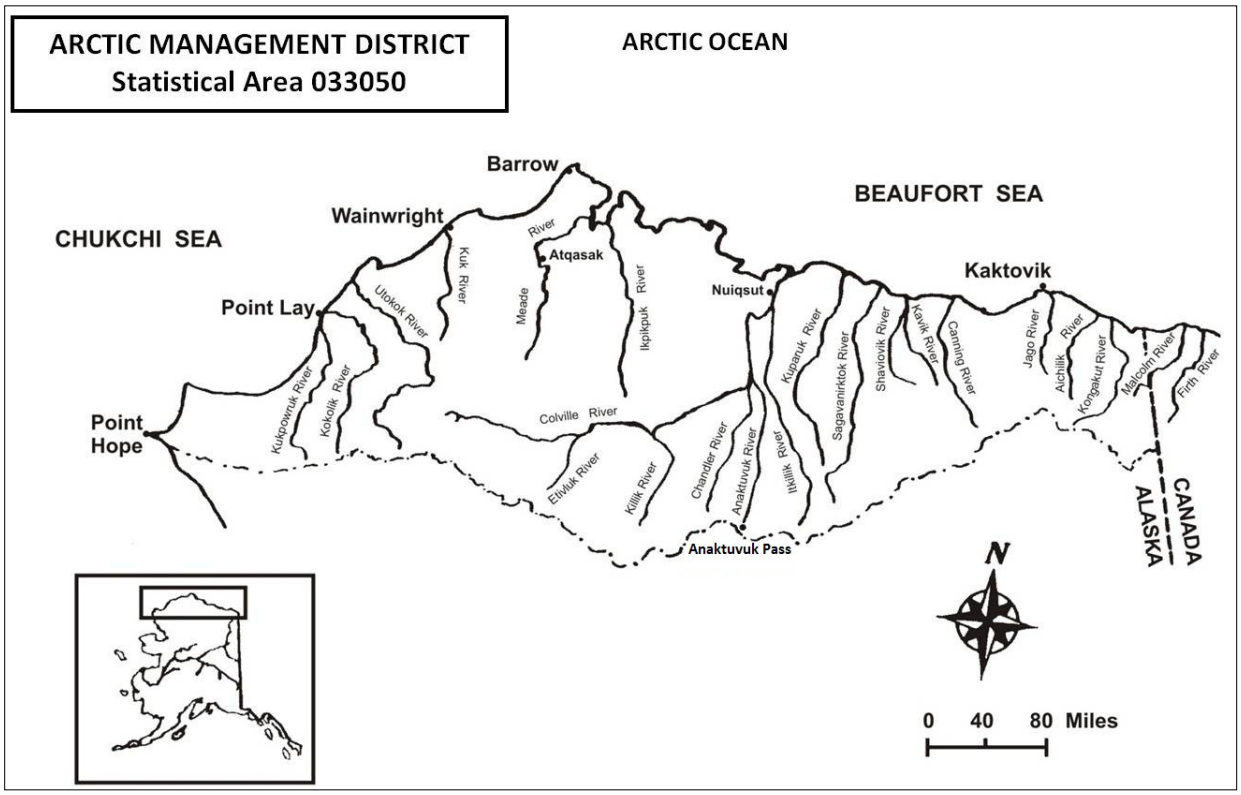

Figure 8.–Arctic management district.

PACIFIC HERRING OVERVIEW

DISTRICT BOUNDARIES

Pacific herring *Clupea pallasii* are present in Norton Sound, Port Clarence, Kotzebue Sound, and Arctic Districts. Norton Sound Herring District consists of all state waters between the latitude of the westernmost tip of Cape Douglas and the latitude of Point Romanof (Figure 9). Port Clarence Herring District consists of all Alaska waters between the latitude of Cape Douglas and the latitude of Cape Prince of Wales. Kotzebue Sound Herring District consists of all Alaska waters between the latitude of Cape Prince of Wales and the latitude of Point Hope. The Arctic District does not have herring district boundaries in regulation.

SPAWNING AREAS AND TIMING

Arrival of herring on the spawning grounds is greatly influenced by climate and oceanic conditions, particularly the extent of the Bering Sea ice pack. Most herring spawning populations appear near the eastern Bering Sea coast immediately after ice breakup between mid-May and mid-June. Spawning progresses in a northerly direction and may continue into July or August along portions of the Seward Peninsula or within the Chukchi Sea.

The largest abundance of herring in the AYK Region is in Norton Sound District. Primary spawning areas are from Stuart Island to Tolstoi Point. When sea ice has remained into June, spawning has been more extensive along Cape Denbigh and locations along the northern shore of Norton Sound between Bald Head and Bluff. Additional northerly spawning areas have been more difficult to identify because of small herring stock sizes and limited investigations. Likely spawning areas include Imuruk Basin in Port Clarence District, and Shishmaref Inlet, Deering–Kiwalik coast, and Hotham Inlet in Kotzebue District. Although subsistence herring catches have been reported in the Arctic District near Barrow, there is no information available on spawning areas.

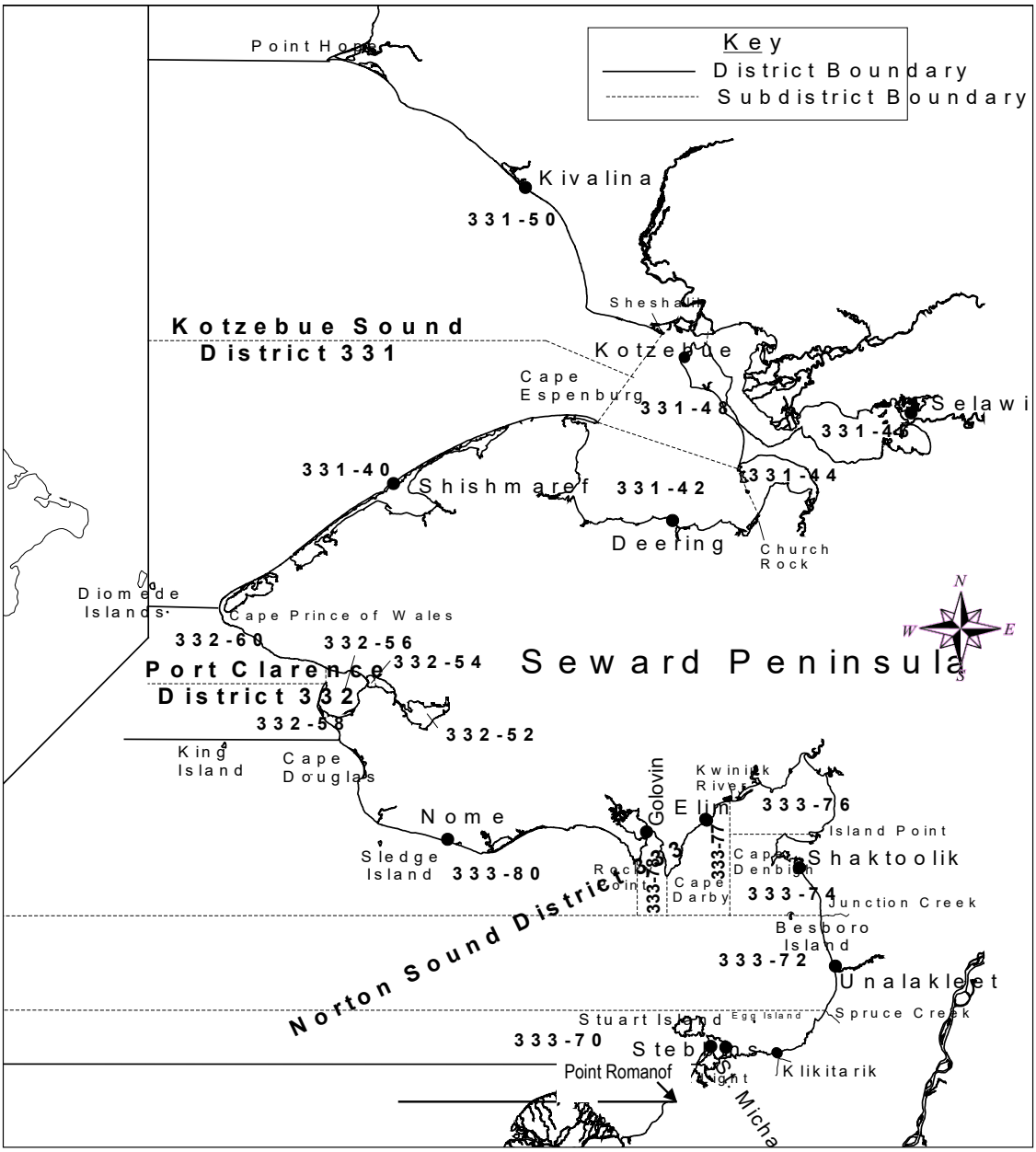

Figure 9.–Commercial herring districts and statistical areas of Norton Sound, Port Clarence, and Kotzebue Sound.

NORTON SOUND PACIFIC HERRING OVERVIEW

COMMERCIAL FISHERY OVERVIEW

Sac Roe

The earliest American commercial effort on Bering Sea herring apparently took place in the early part of the 1900s near Golovin in Norton Sound. Domestic commercial fishing resumed for "spring herring" in Norton Sound in 1964 near Unalakleet and continued sporadically until 1979. Between 1964 and 1978, the fishery averaged about 10 short tons[1] of herring annually for sac roe extraction. In 1979, a domestic herring fishery for sac roe began on a larger scale in Norton Sound when 1,292 short tons of herring were taken by 63 fishermen (13 purse seiners, 50 gillnetters). Purse seiners took 70% of the total catch (Menard et al. 2013).

After the 1979 season, BOF adopted a public proposal that made gillnets and beach seines the only legal commercial herring fishing gear within Norton Sound. A purse seine fishery could only be opened if the gillnet fleet could not take the allowable harvest. The regulation attempted to encourage local fishermen to participate in this developing fishery.

During the 1980 season, 294 gillnet fishermen harvested 2,452 short tons of herring (Menard et al. 2013). Because gillnet fishermen demonstrated they can take the available harvest, a regulation was passed in 1981 to prohibit any purse seine gear within Norton Sound District.

Before the 1984 season, harvest by beach seine fishermen was negligible, but in 1984, 10 beach seine fishermen harvested 327 short tons. In 1984, BOF set a beach seine gear limit of 100 fathoms and limited harvest to "not exceed 10% of the total herring sac roe harvest projections as published by the ADF&G." During the fall 1987 BOF meetings, beach seine gear was further restricted to a limit of 75 fathoms. Beach seine harvests from 1985 to 2000 were only about 8% of total reported harvest, and since 1998, little market interest has existed for herring caught with beach seines because of the smaller average size of herring captured.

As with most developing fisheries, fishing effort and harvest increased with each season. In 1984, Norton Sound became a superexclusive herring fishing district to slow growth and bolster local involvement, but it had limited success. The 1987 herring sac roe gillnet harvest was 3,759 short tons and had the highest level of fishing effort on record (Menard et al. 2013). This effort was more than twice the average from 1980 through 1986, yet Norton Sound area residents accounted for only about a third of both the effort and total harvest. Then, in 1987 after a public proposal adopted at the fall BOF meeting, the Commercial Fisheries Entry Commission (CFEC) changed Norton Sound Herring District to Limited Entry status with a maximum number of 301 gillnet and 4 beach seine permits. Beginning in 1988, a moratorium was placed on Norton Sound and no new entrants were allowed into the sac roe herring fishery.

No harvest occurred in 1992 due to very late ice breakup, but both gillnet and beach seine fisheries continued, and more than 200 fishermen participated until 1998. The 1995 gillnet harvest of 6,033 short tons was the largest on record, and the 1993 beach seine harvest of 742 short tons was the largest harvest on record by this gear type. Combined dollar value for both the beach seine and gillnet fisheries peaked in 1996 at $4.5 million (Appendix D2).

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[1] The Alaska Board of Fisheries requires that inseason catch and aerial survey biomass estimates be calculated and reported in short tons. The English short ton = 2,000 lb or 907.2 kg. The metric tonne (1,000 kg or 2,205 lb) = tons/1.1023.

Since 1997, poor market conditions have been the primary influence on the level of commercial harvest. There has been no harvest by beach seine since 2000. Number of fishermen has decreased from 122 in 1999 to an average of 13 for the last 5 years. From 1999 to present, the number of buyers has steadily declined, from 4 to 1, and no sac roe buyers were present in 2004 and 2007–2009. Even when there was a buyer, sometimes only bait was purchased, as happened in 4 out of the last 5 years. In 2012 and since 2013, there has been no sac roe fishery either due to ocean ice blocking tenders or preventing deliveries, or lack of market interest. One bright spot was the high recovery of over 13% roe in 2010, 2011, and 2013, but the last year that a sac roe fishery occurred, in 2013, less than 500 short tons of sac roe herring was harvested (Appendix D1).

Spawn-on-Kelp

A small-scale spawn-on-kelp *Fucus* sp. fishery existed in Norton Sound from 1977 to 1984. Harvests during the 1977–1984 periods ranged from less than 1 ton (1977) to approximately 47 tons (1981). During the 1984 season, 1 ton of *Macrocystis* kelp imported into Norton Sound resulted in a harvest of approximately 3 tons of product (Menard et al. 2013). In response to a public proposal, BOF closed all spawn-on-kelp fisheries in Norton Sound before the start of the 1985 season.

The 1998 herring market was known to be poor before the southernmost fisheries opened. An experimental herring spawn-on-*Macrocystis*-kelp fishery was approved by BOF to operate in Norton Sound during the 1998 season. The commissioner approved emergency regulations to allow a herring spawn-on-wild-*Fucus*-kelp fishery shortly before the normal start of the sac roe fishery. The intent of these decisions was to allow as much opportunity as possible to sac roe permit holders, because only a small minority would have an opportunity to participate in the sac roe fishery.

At the January 1999 meeting, BOF instituted a *Macrocystis* kelp open pound fishery and allowed for a wild *Fucus* spawn-on-kelp fishery for sac roe permit holders who had not sold sac roe product. Wild *Fucus* harvest is limited to an area west of Wood Point to Canal Point, including Stuart Island, and the guideline harvest level (GHL) may not exceed 30 metric tons. The herring pound spawn-on-kelp GHL may not be more than 90 tons, to include combined weight of herring eggs and kelp.

Since 2001, little (less than 1 ton) or no harvest has occurred from either the *Macrocystis* kelp or wild *Fucus* spawn-on-kelp fisheries (Appendix D2).

Food and Bait Fishery

Early records indicate about 3,200 short tons of "fall herring" were processed in Norton Sound from 1916 to 1941 (Menard et al. 2013). This fishery, dependent on salt curing, declined because foreign competition produced poor marketing conditions. Japan began gillnetting in Norton Sound during 1968 with 3 vessels. Effort was concentrated about 12 miles offshore between St. Michael and Golovin. Approximately 40 Japanese vessels reported harvesting a record 1,400 short tons of herring during 1969 (Menard et al. 2013). An average annual harvest of approximately 450 short tons was reported in Norton Sound by the Japanese during 1968–1974. All foreign fleets were prohibited in 1977 from gillnet fishing in the area.

Since 1977, there has not been a consistent domestic commercial food and bait herring fishery in Norton Sound. Most of the reported food and bait herring harvest estimates were initially

harvested as sac roe but bought and processed as food and bait, therefore they were considered food and bait for the purposes of this report. The largest Norton Sound herring harvest in the last 50 years occurred in 1995 when an estimated 6,763 short tons of sac roe herring were delivered, of which only 116 short tons were purchased as food and bait. Since 1997, no more than 91 short tons of herring were sold annually as food and bait (Appendix D1).

COMMERCIAL FISHERY MANAGEMENT

The overall statewide management strategy is based upon the *Bering Sea Herring Fishery Management Plan* (5 AAC 27.060) to annually harvest 0–20% of the herring biomass. The upper end of the exploitation range is applied to stocks in good condition. The lower end of the exploitation range is applied to stocks exhibiting a trend of decreasing abundance and poor recruitment. If a minimum biomass threshold level of 7,000 short tons for Norton Sound is not achieved, no commercial fishery will be allowed.

Typically, herring are long-lived fish and will usually remain harvestable for at least 5 years after recruiting into the fishery. Harvesting only a percentage of the biomass ensures fish will remain for following years. This type of strategy helps mitigate population fluctuations caused by successive years of poor recruitment, a common occurrence in marine-spawning fish. Before 1983, harvests in Norton Sound were regulated by subdistrict so harvests would be dispersed over the entire fishing grounds (Menard et al. 2013). This strategy prevented harvest efforts from concentrating in 1 area, on what was then thought to be a distinct stock of fish.

Methods to reliably forecast herring returns are still being developed and estimates of recruitment are not available; therefore, inseason assessments of biomass supersede projected biomass for management of Norton Sound herring. The herring fishery is managed for a 20% exploitation rate at biomass levels twice minimum threshold or greater. If the run does not materialize as projected, the harvest exploitation rate may be reduced to a lower level. Starting in 2016, due to budget limitations, ADF&G no longer plans to fly aerial surveys to estimate biomass or conduct ASL sampling. Because of the decline in market demand, there is no expectation that commercial harvest will exceed 20% of actual biomass.

Generally, fisheries management staff has tried to set commercial openings to allow gillnetters to fish flood tides as they crest. Figured heavily in this strategy is the belief that ripe females approach the beach at that time to spawn. Because the Norton Sound fishery covers a large area with varying tides, opening at the optimal time throughout the district is not always possible. The fishing fleet must be flexible to maximize catches and roe quality. However, since 1997 there have been limited markets for herring and the catch has been well below the GHL. Since 2002, to maximize efficiency for fishermen and buyers, ADF&G has opened the fishery continuously once buyers are ready and then buyers direct the fleet when to set and pull nets.

In the past, duration of beach seine openings was dependent on herring abundance near the beach and favorable weather conditions for spotters and fishing. Beach seiners preferred to work flood tides like gillnetters; however, fisheries managers frequently provided less optimal fishing times. Beach seiners can harvest their allotment of 10% of the preseason harvest goal in a single 3 hour opening under ideal conditions. By nature of the gear, beach seiners have the potential to wrap up large numbers of fish that could potentially exceed their allocation. In the past, management staff often reduced beach seine efficiency by allowing a gillnet opening to occur before a beach seine opening. This opening breaks up school size and reduces likelihood of excessive harvests. Occasionally, the beach seine fleet has been used to test roe quality of herring newly arrived in

nearshore waters before a gillnet opening. The potential for waste would have been great had the entire gillnet fleet fished on poor quality herring.

In the 2000s, the market desired a higher roe percent and larger size fish. These criteria have been difficult to achieve with beach seine gear and therefore no buyer interest has existed for herring harvested from beach seines.

SUBSISTENCE FISHERY USE

Pacific herring were used for subsistence purposes by coastal residents well before the mid-1800s when their use was first documented by early explorers. Subsistence harvest of herring and herring roe-on-kelp is not documented but is believed to be relatively small. It is also known that St. Michael and Stebbins residents harvest herring spawn-on-kelp for subsistence use.

PORT CLARENCE AND KOTZEBUE PACIFIC HERRING OVERVIEW

COMMERCIAL FISHERY OVERVIEW

Port Clarence and Kotzebue commercial herring fisheries have been in regulation since 1982. In Port Clarence and Kotzebue Districts, regulations state that herring may be taken from April 15 through November 15, except that herring may not be taken during the open commercial salmon fishing season. The 1983 and 1984 regulations set a guideline harvest of 150 metric tons (165 tons) for each subdistrict, which is still in effect. Purse seines, beach seines, and gillnets are legal commercial gear within these districts.

Before 1987, no spring sac roe commercial fisheries had ever occurred within these districts. In 1987 and 1988 a spring sac roe herring fishery was attempted in the Port Clarence District. A fish buyer located in Nome in 1994 and 1995 provided a ready crab bait market and transportation for fish, which facilitated a spring harvest. However, no one has fished for bait since 1996 (Appendix D4).

Regulations allow spawn-on-kelp fisheries in Port Clarence and Kotzebue Districts. Attempts at open pound *Macrocystis* harvest in Port Clarence District in 1991 and 1992 were unsuccessful.

HISTORICAL RESOURCE INVESTIGATIONS

Resource investigations of Port Clarence and Kotzebue Sound area herring stocks were conducted by ADF&G from March 1976 to September 1978 (Barton 1978). These studies indicated herring populations from Golovnin Bay (Norton Sound) northward differed significantly in size and behavioral characteristics from herring populations occurring in the southern Bering Sea. Differences between populations were summarized as follows (Barton 1978):

Seward Peninsula Populations	Southern Norton Sound to Southern Bering Sea Pelagic Populations
Smaller herring at age with lower vertebral counts.	Larger herring with probable higher vertebral counts.
Lower abundance.	Higher abundance.
Subtidal spawning (3 m) in shallow bays, inlets, and lagoons.	Intertidal and shallow subtidal spawning along exposed rocky headlands.
Zosteria sp. primary spawning substrate.	*Fucus* sp. primary spawning substrate.
More euryhaline.	Less euryhaline.
Overwinter in shallow bays; water is warmed by river discharge under ice cover.	Over winter in deep ocean layers near the Pribilof Islands.
Fall (non-spawning) runs documented.	No fall runs documented.
Larval development in brackish water.	Larval development probable in more saline water.

Data collected from herring populations along the Seward Peninsula strongly indicated that a separate stock of herring occurs in Port Clarence and Kotzebue Sound Districts. These data do not preclude possibility of more southern stocks utilizing this region, such as stocks that winter near the Pribilof Islands and migrate to the western Alaska coast to spawn. Migration to central Bering Sea for wintering herring stocks along the western Seward Peninsula is unlikely; rather they might remain in coastal lagoons, bays, or inlets that are warmed by river discharge under the ice (Barton 1978). Size difference may be explained by warmer water temperatures from river discharge. Water temperatures and feeding conditions in deep ocean waters are probably more favorable for growth than those in herring winter habitats along the Seward Peninsula, where apparently, they have become adapted to Arctic conditions (Barton 1978).

Aerial surveys are difficult in Port Clarence District because of organic coloring of waters of Imuruk Basin, Tuksuk Channel, Grantley Harbor, and, to a lesser extent, Port Clarence. Presence of other species of fish caught in test commercial gear sets indicate the need for verifying species composition of any biomass sighted. A further complicating factor within Port Clarence is spring ice conditions. Port Clarence is a sheltered body of water that becomes highly stained over winter and takes time to clear once ice melts. Typically, outside waters are significantly warmer than inside waters, which are covered by ice longer, thereby slowing solar gain and water mixing. Soon after ice begins to shift, herring move into the warm shallow lagoons to spawn. Herring are invisible to aerial observation once they enter stained water. The best aerial survey conditions exist just outside the entrance to Port Clarence, where herring mass just before the ice moves. Herring have been observed in Imuruk Basin in the fall, and seals have also been observed by aerial observation when returning through the area from salmon surveys.

KING CRAB OVERVIEW

NORTON SOUND KING CRAB OVERVIEW

District Boundaries

Norton Sound Section (Q3) consists of all waters in Registration Area Q north of the latitude of Cape Romanzof (61 degrees 49 minutes N latitude), east of the International Dateline, and south of 66 degrees N latitude (Figure 10).

Abundance

From 1976 to late 1990s, abundance of legal (over 4.75-inch carapace width) red king crab *Paralithodes camtschaticus* biomass in Norton Sound was estimated based on standardized results from triennial trawl surveys and sporadic summer pot surveys, which indicated periods of weak and strong recruitment (Menard et al. 2013; Appendix E9).

Since 1998 a length-based population model has been used to predict biomass for the red king crab population in Norton Sound (Zheng et al. 1998). Incorporating data from trawl surveys (Appendices E9, and E23–E25), historical winter and summer pot studies, and winter and summer fisheries (Appendices E16–E22), the model is used to project abundance estimates of legal male crab even in years when no trawl survey occurs, allowing abundance-based management of the summer commercial crab fishery. Every time new data is incorporated into the population model, it estimates current abundance as well as revises prior years' abundances. Trawl survey estimates prior to 1996 were revised and standardized in 2013 (NPFMC 2013). Starting in 2018, the triennial trawl surveys were replaced by annual trawl surveys, which will help greatly in abundance estimation.

Preliminary results from the latest trawl survey, which occurred in 2018, indicated that legal male red king crab abundance decreased more than 3-fold since the 2017 survey (Appendix E9). This decreasing trend was also noted in prerecruit 1 and 2 size classes but not in female red king crab, which had the highest number in the history of the trawl survey (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome). Both the estimated legal crab and prerecruit 1 abundances are the lowest in the history of the trawl survey and the prerecruit 2 abundance estimate is the lowest since 1999 (Menard et al. 2013).

The following estimates are based on the model's results from February of 2018 including the latest data from the 2017 trawl survey, the 2017 summer fishery, and the 2011–2012 winter study. In 2013, legal biomass estimate for the summer crab fishery was 3.9 million pounds, a 13% decrease from the 4.4 million pounds estimated for 2012. The legal population estimate stayed the same for 2014, then increased the following 2 years, by 17% to 4.7 million pounds in 2015, and by 2% to 4.8 million pounds in 2016. From 2016 to 2017, the estimate decreased by 12% to 4.3 million pounds, and again decreased, by 65% from 2017 to 2018, to 2.6 million pounds (NPFMC 2018).

No winter study has taken place after the 2011–2012 season because ADF&G did an expanded spring and summer tagging study from 2012 to 2015. Results from this tagging project will be compared with previous winter tagging projects for possible future incorporation into model estimates.

COMMERCIAL FISHERY OVERVIEW – SUMMER

The last year that a large-vessel summer commercial crab fishery existed in Norton Sound Section was in 1990. No summer commercial fishery occurred in 1991 because of ADF&G staff constraints. In 1992, the summer commercial fishery resumed. Regulation changes adopted during the March 1993 BOF meeting changed participation in the fishery to small boats. A superexclusive designation went into effect for the Norton Sound commercial crab fishery June 27, 1994. This designation stated a vessel registered for the Norton Sound crab fishery may not be used to take king crab in any other registration area during that registration year. Later, a vessel moratorium put into place before the 1996 season was intended to precede a license

limitation program. Community Development Quota (CDQ) groups were allocated a portion of the summer harvest beginning in 1998, but no CDQ harvest occurred until the 2000 season. The North Pacific License Limitation Program (LLP) went into effect for the Norton Sound crab fishery January 1, 2000. The program states a vessel which exceeds 32 feet in length overall must hold a valid crab license issued under LLP by National Marine Fisheries Service. Regulation changes and location of buyers resulted in harvest distribution moving eastward in Norton Sound in the mid-1990s (Appendix E14).

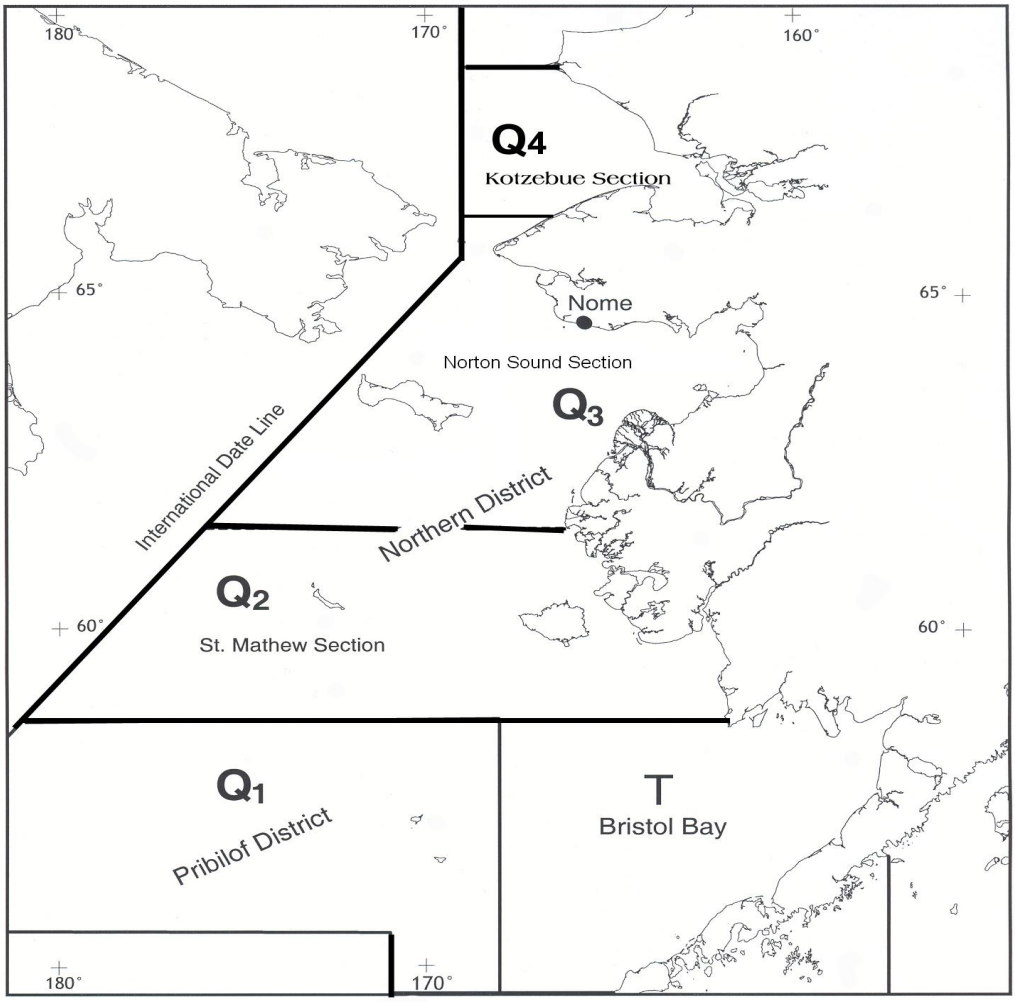

Figure 10.–King crab fishing districts and sections in Statistical Area Q.

During the March 1999 BOF meeting a new management strategy was enacted for the Norton Sound summer red king crab fishery. A threshold level of abundance of legal male red king crab biomass was set at 1.5 million pounds. A summer commercial season may only open if the legal crab biomass is estimated to be at least 1.5 million pounds, and if the legal biomass falls in the range of 1.5 to 2.5 million pounds the harvest rate will be no more than 5% so that the stock may rebuild. If legal biomass is 2.5 million pounds or more, the harvest rate will be no more than 10%. In March of 2012, this regulation was modified by the BOF so that the new threshold level of abundance of legal male red king crab biomass was set at 1.25 million pounds. If the estimated legal crab biomass falls within the range of 1.25 to 2.0 million pounds, the harvest rate will be no more than 7% of legal male abundance. From 2.0 to 3.0 million pounds, the harvest rate will be

no more than 13%. If the estimated legal biomass is more than 3.0 million pounds, the harvest rate will be no more than 15%. Improved abundance estimates, and the current management strategy will greatly reduce the risks of overfishing the stock.

Since 1981, to protect crab utilized by the inshore subsistence fishery from commercial harvest, an area delineated by a line 10 to 15 miles off the shores of southern Seward Peninsula from Port Clarence to St. Michael has been closed to the summer commercial fishery. This closure line has been adjusted over the years to its current position adopted by the BOF in 2002 (Appendix E12).

To reduce handling mortality of sublegal and smaller female crab, BOF at its March 2008 meeting put a new regulation into effect: a minimum of 4 escapement rings are required per pot with each ring having a minimum inside diameter of 4.5 inches located within 1 mesh size from the bottom of the pot, or at least one-half of the vertical surface of a square pot or sloping side-wall surface of a conical or pyramid pot must be composed of no less than 6.5-inch stretched mesh. Also starting with the 2008 season, even though the minimum legal size of red king crab is 4.75-inch in carapace width (CW), the local seafood plant did not always buy crab less than 5.0-inch CW. The Anchorage buyer, however, has continued to buy crab if they are of legal size.

In 2010, due to concern over lack of stock status information, the North Pacific Fishery Management Council closed the Bering Strait area above Cape Prince of Wales to crabbing. Only state waters (within 3 miles of shore) were open to crabbing north of the latitude of Cape Prince of Wales (Appendix E12).

CDQ Fishery

NSEDC and Yukon Delta Fisheries Development Association (YDFDA) divide the CDQ allocation. Only fishermen designated by these 2 CDQ groups may participate in this portion of the king crab fishery. Fishermen were required to have a CDQ fishing permit from CFEC and register their vessel with ADF&G before they made their first delivery. Fishermen operated under authority of the CDQ group and each CDQ group decided how their crab quota was harvested.

During the March 2002 BOF meeting, new regulations were adopted that affected the CDQ crab fishery and relaxed closed-water boundaries in eastern Norton Sound and waters west of Sledge Island (Appendix E12). The Norton Sound CDQ fishery may begin at 12:00 noon, June 15, or no less than 72 hours after commercial gillnet or beach seine herring fishing is closed, whichever is later, through 12:00 noon, June 28. After July 1, the commissioner may, by emergency order, open a CDQ fishery for any remaining allocation after closure of the open-access fishery. At the March 2008 BOF meeting the regulation requiring the herring fishery to be closed was repealed, and the CDQ fishery can occur by emergency order before, during, or after the open-access fishery. Previously, the open-access fishery started on July 1, but BOF passed a regulation allowing ADF&G to open the fishery by emergency order anytime beginning on or after June 15.

From 2016 to 2018, NSEDC chose to harvest their CDQ allocation during the winter fishing season.

Commercial Catch Sampling

The Norton Sound red king crab summer commercial fishery had the benefit of an onboard observer during the 2000 and 2001 seasons because there was a floating processor on the fishing grounds in those years. In years with no onboard observer, a smaller percentage of crab from the commercial harvest is sampled because fishermen deliver always of the day and night. The

seafood processing plant, NSSP, began operating in Nome in summer 2002, greatly improving the ability of Nome ADF&G staff to sample crab brought to the Nome dock. Crab were either sampled at NSSP or at the small-boat harbor where non-resident fishermen or catcher-processors not selling to NSSP offload their catch for delivery to Anchorage. An average of 4,000 crab were sampled during the summer for the last 10 years (Appendices E20–E22).

From 2016 to 2018, up to 500 crab were also sampled during the winter commercial fishery out of live holding tanks. Since 2015, all crab have been sampled at NSSP, during both the summer and winter fisheries. ADF&G will continue to make a concerted effort to coordinate catch sampling with fishermen and buyers to ensure optimal commercial harvest data collection.

COMMERCIAL FISHERY OVERVIEW – WINTER

A winter commercial through the ice fishery has existed in Norton Sound since 1978. Until recent years, all harvest occurred within 15 miles of Nome, with an area closed to commercial fishing that is roughly 2 miles west to 3 miles east of town and extending 3 miles offshore (Appendix E15). The harvest is generally divided among residents who buy crab directly from the fishermen, the seafood plant (NSSP) in Nome, and other non-local markets such as Anchorage.

By regulation, season dates were initially from January 1 to April 30, but in its March 1985 meeting, the BOF set the new season dates from November 15 to May 15 (Appendix E4). In March of 2015, a proposal adopted by the BOF set new season dates with the start date to be established by emergency order on or after January 15 and the regulatory closure to occur on April 30, unless extended by emergency order. This action was initiated to reduce pot loss and potential ghost fishing by lost pots because the shore fast ice is relatively more stable and solid from mid-January to April.

Beginning in 2016, harvest allocation for the winter commercial fishery is 8% of the total open-access GHL. Another regulation adopted during the March 2015 BOF meeting and implemented starting with the 2017 season is commercial permit holders are limited to 20 pots each and each pot must have a current-year pot tag attached.

All 3 proposals were adopted by the BOF in response to the dramatic increases in winter fishing effort that has occurred in recent years due to much higher exvessel prices. During the years 1978–2011, an average of 9 permit holders fished commercially in winter. From 2012 to 2015, winter fishery participation more than tripled, to an average of 32 permit holders. From 1978 to 2011, the average harvest was roughly 7,000 pounds, but from 2012 to 2015, the average harvest increased almost 8-fold, to almost 55,000 pounds. Average exvessel price for winter red king crab from 2012 to 2015 was $6.68/lb, more than twice the average price of $3.25/lb during the previous 5-year period (Appendix E4). Part of the reason for the increase in prices was due to expansion of live king crab markets overseas, particularly in South Korea; from 2012 to 2015, crab were sold live to Korea by 2 catcher-processors based in Nome.

Prior to 2010, all the crabbers were based out of Nome. Starting with the 2009–2010 winter season, crabbers in other Norton Sound villages started participating in the winter commercial crab fishery. In 2012, both Shaktoolik and Unalakleet crabbers sold roughly a third each of the total harvest, whereas Nome crabbers only accounted for a quarter of the harvest sold. Since then, ice conditions in eastern Norton Sound have not been conducive to winter crab fishing; consequently, Nome crabbers harvested 90% or more of the total commercial winter harvest the

last 6 years. All crab harvested by crabbers based outside of Nome are shipped live and sold to NSSP in Nome. In 2014 and 2015, some crab were shipped live from Nome and sold to Aquatech in Anchorage by a Nome crabber.

SUBSISTENCE FISHERY OVERVIEW

Norton Sound residents utilize red king crab for subsistence, mainly during winter. Fishing occurs through cracks or holes cut in the ice with the use of hand lines and pots. To document trends in subsistence harvest, BOF enacted a regulation in 1977 requiring subsistence fishermen in Norton Sound to obtain a permit before fishing. Fishermen record their daily effort and catch on these permits.

Since 1990, the winter subsistence crab fishery harvest has ranged from a low of 256 crab during the 2000–2001 season to a high of 12,152 crab during the 1989–1990 season (Appendix E7). Lack of success in the winter crab fishery during some years has been attributed to a declining crab population caused by removal of crab in the summer commercial fishery together with low recruitment, low effort caused by poor ice conditions, and changes in nearshore winter distribution of crab. All these factors in varying degrees affect success of the winter fishery, as well as increased use of more efficient gear (pots instead of hand lines). Unstable ice conditions and record snowfalls adversely affected 1992–1993, 1996–1997, 2000–2001, 2003–2004, and 2005–2006 catches. During years of stable ice conditions, approximately 85 fishermen averaged 75 crab each. For the last 10 years, winter subsistence catch has averaged just over 6,000 crab annually (Appendix E7).

ST. LAWRENCE ISLAND AND KOTZEBUE KING CRAB OVERVIEW

District Boundaries

Formerly, St. Lawrence Island Section was located immediately west and north of Norton Sound Section, but in May of 2006, BOF expanded Norton Sound Section to include the St. Lawrence Island Section south of 66 degrees N latitude and west of 168 degrees W longitude (Figure 10). The former St. Lawrence Island Section north of 66 degrees N latitude is now the Kotzebue Section.

Abundance

Unlike Norton Sound, the area of the Bering Strait that includes St. Lawrence Island has never been surveyed consistently by ADF&G. Even though commercial and subsistence harvests are allowed by regulation, ADF&G does not have abundance estimates for this area. In summer of 2005, an exploratory pot survey was conducted by NSEDC in cooperation with ADF&G to assess the number and distribution of male blue king crab near King Island, Wales, and Port Clarence. The survey was only partially successful due to strong currents that made pot retrieval difficult when set deeper than 10 fathoms. Shallow pot placement resulted in a catch primarily of egg-bearing female blue king crab and indicated that using standard Norton Sound crab gear would only access a nursery site for gravid female blue king crab. When more suitable gear becomes available, further surveys will be necessary to determine the feasibility of a summer fishery. At the March 2008 BOF meeting, legal size requirement for blue king crab was changed from 5.5- to 5.0-inch. Preliminary data indicate that blue king crab size at maturity is very similar to Norton Sound red king crab.

In summers of 2006, 2008, and 2011, trawl surveys in the northern Bering Sea were conducted by NSEDC in cooperation with ADF&G to assess crab resources in the St Lawrence Island and Bering Strait areas of Norton Sound District. The primary focus was to collect information on blue king crab size, distribution, and abundance. The area surveyed lies west and northwest of the standard ADF&G triennial Norton Sound red king crab trawl survey locations. In 2006, trawls were conducted from near the southwest corner of St. Lawrence Island to the Bering Strait area southwest of Cape Prince of Wales. Size information and general distribution of blue king crab was collected. In 2008 prior to the trawl survey, a camera sled was towed a few meters above the seabed to observe crab and other species in the St. Lawrence Island area that had been trawled in 2006. The 2008 and 2011 trawl work were focused on looking at the distribution of blue and red king crab in the area between Port Clarence and King Island. More survey work is necessary to generate an abundance estimate and to better understand the distribution of blue king crab. The 2006, 2008, and 2011 survey data should only be considered a starting point to understanding the Bering Strait and St. Lawrence Island blue king crab stock. No surveys have been conducted by NSEDC in this area since 2011.

Commercial Fishery Overview

In 1984, a regulation was adopted to close waters within 10 miles of all inhabited islands within the St. Lawrence Island Section (St. Lawrence Island, Little Diomede, and King Island). This regulation attempts to protect stocks targeted by local fishermen and reduce impacts on marine mammal subsistence harvests. Since 1990, commercial catches in the former St. Lawrence Island Section have only been reported for 4 years. In 1992, 53 pounds of blue king crab were landed. In 1995, 7,913 pounds of blue king crab were delivered from 3 landings (Bue et al. 1997). In 2005, 316 pounds of red king crab were harvested in the Kotzebue area, and in 2006, 340 pounds were harvested.[2]

Fishermen from Little Diomede and St. Lawrence Island have bartered with and sold winter-caught blue king crab to residents of Nome and other villages for years. ADF&G does not have an accurate estimate of the magnitude of this trade. Remoteness of the villages contributes to lack of catch records. Current regulations allow a commercial harvest and sale of king crab caught near shore during winter. However, residents have decided not to export any of their winter catch for commercial sale.

MISCELLANEOUS FISH OVERVIEW

Several species other than salmon, crab, and herring are utilized for commercial and subsistence purposes in Norton Sound, Port Clarence, Kotzebue, and Arctic Districts (Appendix G1). Primary species include inconnu or "sheefish" *Stenodus leucichthys*, Dolly Varden *Salvelinus malma*, whitefish (*Coregonus laurettae*, *C. pidschian*, *C. sardinella*, *C. nasus*, and *Prosopium cylindraceum*, *Coregonus* sp., *Prosopium* sp.), and saffron cod *Eleginus gracilis*.

These fish are taken by set gillnets, beach seines, "jigging" through the ice, and rod and reel. Subsistence catches taken during summer months are normally air-dried, and winter catches are stored frozen. Fish are utilized for human consumption and for dog food. Fish taken for commercial purposes are mainly sold locally, although some are shipped out of the area.

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[2] Statewide electronic fish ticket database [Internet]. 1985–present. Juneau, AK: Alaska Department of Fish and Game, Division of Commercial Fisheries. [URL not available because some information is confidential]. Hereafter referenced as "fish tickets."

Subsistence harvest of most species is not limited by regulation. Commercial harvest may be prohibited in some freshwater areas, but limited commercial endeavors are allowed in many areas under terms of a permit.

INCONNU (SHEEFISH)

Spawning Areas and Timing

Sheefish are distributed throughout nearshore estuarine areas of Kotzebue Sound, with the largest spawning stocks and harvests in the Kobuk–Selawik River drainages and Hotham Inlet. However, there is a small population in the Sheshalik and Krusenstern areas of northern Kotzebue Sound and in the Koyuk River of Norton Bay in Norton Sound (Figure 11).

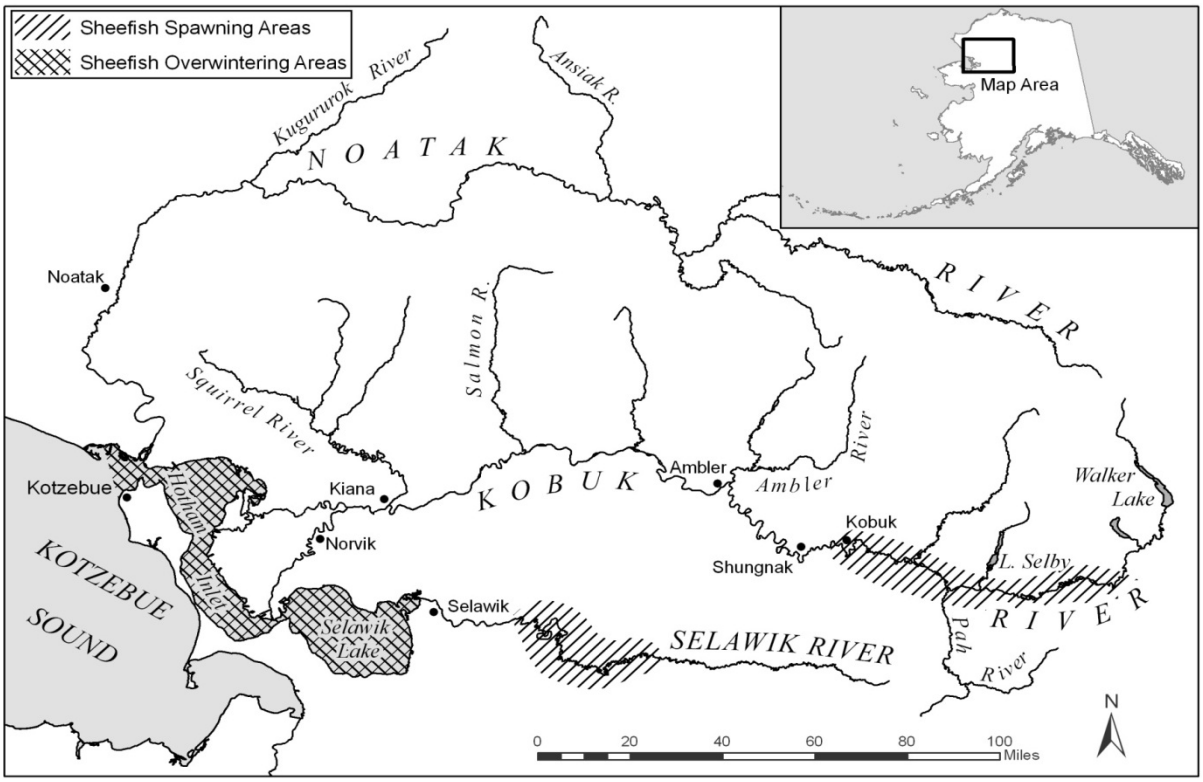

Figure 11.–Kotzebue and Kobuk River Valley villages and their spatial relationship with sheefish spawning and overwintering areas.

Spawning and overwintering migration behavior of sheefish makes them available for harvest by various fisheries throughout their life cycle, but also increases their vulnerability to overharvest. Although sheefish are capable of consecutive spawning, most spawn every 2–3 years, and slow maturation rates of 5–7 years for males and 7–11 for females increase the time required to restore depleted populations. Sheefish have high fecundity, and large females can carry over 400,000 eggs. Such populations may be subject to episodic recruitment events depending on environmental conditions. If spawner abundance is maintained above a threshold level, intermittent years of good recruitment can carry the population through years of less favorable ice conditions.

After ice breakup in Kotzebue Sound area, adult sheefish migrate upriver to spawning areas on the Kobuk and Selawik rivers. On the Kobuk River, spawning occurs upstream from the village

of Kobuk, and the greatest concentration is observed between the Mauneluk and Beaver rivers. Then, when spawning is complete in late September and early October, sheefish disperse downstream to overwintering areas within Hotham Inlet/Selawik Lake.

Historical Fishery Use

During the 1960s, ASL data indicated sheefish stocks were overharvested by commercial and subsistence fisheries in Kotzebue District. Consequently, an annual area commercial harvest quota of 25,000 pounds was instituted, but subsistence is given priority and has remained unrestricted.

Subsistence Fishery

Sheefish have long been utilized for subsistence purposes throughout Kotzebue basin, especially in Kotzebue, Selawik, and the villages along the Kobuk River. These harvests may include winter, summer, and fall catches. Because of budget constraints, the DOS did not survey the villages in Kotzebue District for subsistence sheefish harvests from 2005 to 2011. Due to limited survey effort during many years, total catch and effort should be regarded as minimum numbers and are not comparable year to year. Subsistence sheefish harvest information was not always collected for the town of Kotzebue, where a sizable ice fishery occurs for sheefish in late winter and spring. From 2012 to 2014, there were comprehensive subsistence surveys for fish and wildlife harvests of 6–9 Kotzebue area villages. For these years, the last years that information is available, estimated annual combined harvest of sheefish from these villages is well over 10,000 fish (Appendix F2).

Summer and fall subsistence fishing for sheefish occurs along Kobuk and Selawik rivers from June through October with gillnets, beach seines, and rod and reel. In spring, residents of Kotzebue, Noorvik, and Selawik harvest sheefish with hand jigs through the ice of Hotham Inlet and Selawik Lake. In early winter, Kotzebue, Noorvik, and Selawik fishermen use gillnets set under the ice in Hotham Inlet and Selawik Lake. No requirement exists for harvest reporting; catch information is gathered with the use of subsistence household surveys, if conducted.

In 1987, BOF adopted a regulation limiting size of gillnets used to take sheefish for subsistence to be not more than 50 fathoms in aggregate length or 12 meshes in depth, nor have a mesh size larger than 7.0 inches (5 AAC 01.120). This regulation was intended to conserve the larger, breeding portion of the stock. Except for this gear restriction, ADF&G does not restrict timing, area, or quantity of subsistence sheefish harvest.

Commercial Fishery

Most commercial fishing effort occurs through the ice in Hotham Inlet, near Kotzebue, using gillnets from 5.5-inch to 7.0-inch stretched mesh. Recorded commercial catches are relatively small, but undocumented catches may be significant. Therefore, harvest totals should be considered minimum estimates. Lack of markets outside northwestern Alaska greatly limits commercial activity; however, most individuals participating in the winter commercial fishery also fish for subsistence purposes. Sheefish incidentally caught in the commercial salmon fisheries are sold in years when there is a market, but only in small amounts. Reported harvest and effort in the commercial fishery have declined in the last 15 years. Since 1998, harvest has not exceeded 1,250 pounds, compared to the highest harvest of 8,224 pounds in the last 26 years (Appendix F1). Since 2005, there have been no reported commercial sheefish catches except in

2011 and 2015–2018. In all those seasons, there were fewer than 3 permit holders fishing, making catch information confidential.

Sport Fishery

Kotzebue District sheefish are considered by many to be among the pinnacle of Alaska freshwater sport fishing due to their large size. Despite this, the level of sport fishing effort is still quite low.

Residents of Kobuk River villages have expressed concern over sport fish practices near spawning grounds in the Upper Kobuk River. Catch-and-release fishing is considered by some residents to be disrespectful and damaging to sheefish. Also, the practice of discarding filleted carcasses in the water is thought to drive other sheefish away from the area. In 1986, the DOS investigated these concerns and found the concerns could be addressed if sport anglers were more aware of local customs and culture. An educational brochure is now available to fishermen about the Upper Kobuk River, in the hope that proper handling during catch-and-release can minimize the effect on spawning populations. Although overall harvests are substantial, populations appear to be healthy and sport harvests are relatively low (Scanlon 2017). Sheefish sport harvests in the last 10 years have averaged under 450 annually (Appendix F3).

Historical Escapement

Historically, aerial surveys were conducted on key sheefish spawning areas incidental to effort of enumerating salmon. These surveys were primarily conducted along the Upper Kobuk River in September. Survey conditions historically result in either very few or no sheefish being observed. During these surveys, species identification has been a problem. Surveys were not conducted from 1984 through 1990 because of high and/or turbid water, poor weather conditions, or lack of personnel. Through the early 1990s, incomplete escapement and catch data provided little basis for assessing current population status of sheefish in Kotzebue District, but some residents were concerned that the sheefish stocks were declining.

Because of these concerns, a cooperative tagging project on sheefish in Kotzebue District occurred from 1994 to 1997. This study was conducted by Division of Sport Fish, U.S. Fish and Wildlife Service (USFWS), and National Park Service. Spawning sheefish were tagged in the Upper Kobuk River and Selawik River. The Selawik River project ended in 1996, and it ended a year later in the Upper Kobuk River. Spawning population estimates of sheefish in the Upper Kobuk River were 32,300 in 1995, 43,000 in 1996, and 26,800 in 1997. Sheefish spawn upstream of the village of Kobuk; the greatest observed concentrations were between Maneluk and Beaver rivers. After spawning is complete in late September, fish disperse to downstream overwintering areas. In Selawik River, the spawning population estimate was 5,200 and 5,300 for 1995 and 1996, respectively. Tag recoveries showed that these stocks mixed in Hotham Inlet winter habitats but maintained fidelity to their spawning areas (DeCicco 2001).

From 2008 to 2014, the Division of Sport Fish conducted additional studies on sheefish in the Kobuk River, using radiotelemetry to document their spawning locations, describe the timing of upstream and downstream spawning migrations, and estimate their spawning frequency. The mean date of upstream passage ranged from late August to early September, and the mean date of downstream passage ranged from late September to early October. Sheefish were shown to exhibit several spawning strategies, but roughly a third each of males and females spawned at least every other year (Savereide and Huang 2016).

DOLLY VARDEN

Dolly Varden are distributed throughout Norton Sound, Port Clarence, Kotzebue, and Arctic Districts. Although taxonomists have disagreed on distinguishing Dolly Varden characteristics and distribution of Arctic char and Dolly Varden, most now agree char in this area are the northern form of Dolly Varden. To eliminate confusion, in this report these fish are referred to as Dolly Varden, the common name for this species complex; however, locally they are called trout.

Spawning Areas and Timing

Dolly Varden in northwest Alaska are primarily nonconsecutive spawners. They spawn throughout late summer and fall in almost all drainages of Norton Sound, some northern Seward Peninsula rivers, and the major drainages of Kotzebue Sound and Chukchi Sea. Fry emerge in spring and migrate to the ocean during early summer after spending from 1 to 6 (generally 2–5) years in freshwater. Movements of Norton Sound Dolly Varden coincide with salmon. In spring, Dolly Varden probably remain longer in streams following a large pink salmon run to feed on abundant outmigrating fry. Also, they are sometimes present in streams during summer to feed on salmon eggs, especially during years of high pink salmon abundance.

Because Dolly Varden are a late-maturing fish (generally age 6–7), they are susceptible to overfishing by commercial, subsistence, and/or sport fisheries. Consequently, commercial fisheries have been maintained at low levels or prohibited to both reduce potential overharvest and provide for reproductive needs and subsistence uses.

Subsistence Fishery

Dolly Varden is an important component in the diet of subsistence users in Norton Sound–Kotzebue Sound and Arctic areas. In some communities, they outrank salmon and whitefish in importance to subsistence; however, most fishermen in Norton Sound District report Dolly Varden as incidental catches in subsistence salmon nets. Subsistence fishermen harvest Dolly Varden with seines in fall, hook and line through ice in winter, and gillnets in spring. The fall seine fishery contributes the greatest number of fish to annual subsistence Dolly Varden harvest.

In Kotzebue District, fall seine fishing is a group effort with several households making up a fishing group. Catch is stored and allowed to freeze in willow cribs located near the seining site. These fish are used throughout the winter by the fishing group. Most Dolly Varden harvests take place before or just after freeze-up. Fishermen from Noatak usually fish before freeze-up, but residents of Kobuk River villages of Shungnak and Noorvik fish for Dolly Varden throughout the winter. Since 1991, subsistence catch of Dolly Varden in Noatak has ranged from almost 3,000 to over 11,000 fish (Appendix F5). However, these harvests should be considered minimal figures because of survey timing. Except for 2007, no Kivalina Dolly Varden harvest surveys have been conducted during the last 25 years. From 2012 to 2014, a comprehensive survey of fish and wildlife harvests was done in 6–9 Kotzebue area villages by the DOS, but not since then.

In Arctic District, fishery harvest studies by ADF&G's DOS noted that annual community catches of Dolly Varden in Kaktovik (Pedersen and Linn 2005) and Anaktuvuk Pass (Pedersen and Hugo 2005) produced annual catches of "char" (a mix of Arctic char and Dolly Varden).

Commercial Fishery

Dolly Varden generally appear in commercial catches usually beginning the last 3 weeks of August and are taken as a non-target species in the Kotzebue Sound commercial chum salmon fishery. In 1976, regulations closed the commercial chum salmon fishery on August 31 and thus reduced harvest of Dolly Varden. Spawning and overwintering Dolly Varden typically pass through the area during September but typically begin migration along the northern shore of Kotzebue Sound during the third week of August. Reported Dolly Varden sales are dependent upon available markets. The typical season catch, when buyers are purchasing Dolly Varden throughout August, is approximately 1,000 to 3,000 fish (Appendix F4). However, limited markets in the 2000s have resulted in less than 200 Dolly Varden reported sold each year in Kotzebue Sound, and none sold since 2005 because the buyer no longer purchases Dolly Varden. Regardless of sales, Dolly Varden catches are still required to be reported on fish tickets. During the 2011–2012 season, 3 fishermen caught and sold 903 pounds of Dolly Varden to the fish plant in Nome as bait[2]. The following year, 4 fishermen sold 2,256 pounds for bait. These were the only recorded sales of Dolly Varden in Norton Sound in the last 10 years except for 2016, but only 1 fisherman made any deliveries, therefore catch information is confidential.

Sport Fishery

Drainages of Kotzebue Sound and the Chukchi Sea are known for the large size of anadromous Dolly Varden, but Kotzebue area residents and non-locals boating on Kobuk and Noatak rivers are the primary participants in this area's Dolly Varden sport fishery. Both Noatak and Kobuk rivers are National Wild and Scenic rivers with headwaters included in Gates of the Arctic National Park. However, the Wulik River is probably the most important Dolly Varden stream in northwestern Alaska. The 90-mile Wulik River is known for the largest and most abundant Dolly Varden populations. Located approximately 90 miles north of Kotzebue, Wulik River flows into the Chukchi Sea through Kivalina Lagoon near the village of Kivalina and is estimated to have over 100,000 overwintering Dolly Varden annually.

Sport fishing effort has been consistently low, which is probably due to the remote location and difficult access of fishing sites (Scanlon 2017). Dolly Varden sport fish harvests in the last 10 years in Norton Sound averaged 1,800 fish annually but less than 900 fish in the Kotzebue/Chukchi Sea areas (Appendix F3).

Historical Escapement

Since 1990, aerial survey counts of overwintering Dolly Varden on the Wulik River have ranged from over 144,000 fish in 1993 to 1,500 fish in 2003 (Appendix F7). Weather and water conditions have precluded flying aerial surveys during many years. Weather permitting, Division of Sport Fish conducts aerial surveys of Noatak River spawning grounds in summer, and Kivalina and Wulik rivers overwintering areas in fall. Since 2000, however, only Wulik River has been surveyed.

WHITEFISH

Although sheefish belong to the whitefish family, this section deals with several smaller species of genera *Coregonus* and *Prosopium*. Genus *Coregonus* contains "broad" and "humpback" whitefish or *C. nasus* and *C. pidschian*, respectively. In addition, 3 whitefish species known as "ciscoes" belong to these genera: least cisco *C. sardinella*, Arctic cisco *C. autumnalis*, and

Bering cisco *C. laurettae*. "Round" whitefish *Prosopium cylindraceus* are the sole representatives of genus *Prosopium* in this area.

Spawning Areas and Timing

Whitefish occur throughout most bodies of fresh water in Norton Sound, Port Clarence, Kotzebue, and Arctic Districts and can also be found at various times of year in inshore marine waters. Several whitefish species spawn in freshwater in late August to October when lakes and streams are close to freezing.

Subsistence Fishery

Whitefish are important for subsistence use and taken mainly by beach seine or set gillnets. Catches are usually dried and used for human consumption or dog food. In some areas, fish are "gutted" and dried early in summer, but later in summer, fish are filleted and dried with eggs and viscera intact.

Subsistence catch enumeration is difficult because fishermen do not count fish individually, but by *tubs*, *bags*, *strings*, or other estimators of gross abundance. Additionally, many fish are dried and consumed or stored in caches before the survey period. Reported subsistence harvests were generally the result of a limited and sporadic survey effort and should be regarded as minimum values and not comparable from year to year. In 1997, subsistence harvests of whitefish were included for the first time in DOS household salmon harvest surveys in Kotzebue Sound villages (Appendix F8).

The relative importance of whitefish is higher in Kotzebue District than in many areas of Alaska (Georgette and Shiedt 2005). Average subsistence harvests of whitefish estimated for the village of Noatak and the 5 Kobuk River villages combined from 2012 to 2014, the last 3 years for which information is available, was 74,000 fish (Appendix F8). Harvest numbers are considered minimal and are not comparable year to year.

Commercial Fishery

Limited commercial whitefish harvests have been allowed since statehood, normally under auspices of a permit that delineates harvest levels, open areas, legal gear, etc. Commercial whitefish fisheries were generally limited to large open-water areas (e.g., Grantley Harbor in Port Clarence District) or ocean waters. Beach seines were stipulated as legal gear in some instances to reduce the number of incidental species taken. Little comparative commercial catch and effort data were recorded, but harvest levels were historically low. Most commercial catches were made in Golovnin Bay in Norton Sound District, in Kuzitrin River in Port Clarence District, and in Hotham Inlet and Selawik River in Kotzebue District. Fish were sold to local markets for human consumption, dog food, or, more recently, crab bait. During the 2006–2007 season 1 local Nome fisherman, who waived confidentiality, sold just over 3,700 pounds of whitefish. No further whitefish harvests occurred until the 2010–2011 season, and since then just over 4,700 pounds of whitefish have been commercially harvested in 1 season (Appendix F9).

In the Arctic District, a commercial fishery for freshwater finfish has existed in the Colville River delta (located approximately 60 miles west of Prudhoe Bay) since 1964 (Menard et al. 2013). Historically, commercial fishing generally took place during late June and July for broad and humpback whitefish and October through early December for Arctic and least cisco. However, since 1990 commercial fishing effort has predominantly occurred in October and

November for Arctic and least cisco. Set gillnets are used as capture gear, and fishing during fall months occurs under the ice. All fish were harvested with the intent to sell commercially and are reported daily on a catch form. However, not all fish reported on permits for this area were sold. Those fish not commercially sold were retained and used for subsistence purposes. No commercial harvest has been reported since 2007 from the Coville River (Appendix H1).

Sport Fishery

No harvest data are collected in Norton Sound, Port Clarence, or Kotzebue Districts for whitefish.

Historical Escapement

Whitefish escapements have not been monitored in the past, but limited ADF&G observations and fishermen interviews do not indicate declining populations.

SAFFRON COD

Saffron cod, or tomcod as they are called locally, are extensively utilized as a subsistence resource in Norton Sound–Port Clarence and Arctic–Kotzebue areas. Tomcod are taken through the ice by jigging, and with gillnets in open water and under the ice.

No extensive commercial fishery on tomcod in Norton Sound–Port Clarence and Arctic–Kotzebue areas has ever occurred, but during the 1980s, a limited commercial fishery occurred in Norton Sound (Menard et al. 2013). According to local fishermen, these fish were used for dog food, crab bait, and human consumption. In the mid-1990s, NSEDC established markets for several fish species not commercially utilized in the past. The need for crab bait was the primary factor in initiating the saffron cod fishery near Unalakleet. A total of 1,402 pounds of saffron cod were sold during the 1993–1994 season. The NSEDC market was not available the following winter and was probably a factor in the reduced harvest of 52 pounds. No commercial harvest was reported again until the fall of 2009. Since then, total annual tomcod harvest has ranged from 1,700 pounds to almost 34,000 pounds, all sold to NSSP in Nome for use as crab bait (Appendix F10). NSSP would only buy tomcod that were caught through the ice by jigging gear.

Miscellaneous Finfish Species

Other finfish species taken for subsistence in Norton Sound, Port Clarence, Kotzebue, and Arctic areas include capelin, rainbow smelt (boreal smelt), northern pike, starry flounder, yellow fin sole, Arctic flounder, Alaska plaice, Arctic grayling, burbot, blackfish and halibut (Appendix G1).

Subsistence Fishery

Subsistence utilization of these species has been documented, although effort and catch vary widely in scale and importance with locality. Some species are important to the subsistence community in certain localities during specific seasons of the year. In Nome Subdistrict, both Nome and Solomon rivers were closed to subsistence fishing for Arctic grayling in 2001 when abundance was determined to be low.

Commercial Fishery

Burbot, or freshwater cod, have been commercially sold sporadically in the past in Kotzebue, Port Clarence, and Norton Sound Districts under commercial permits.

Sport Fishery

Sport fisheries for Arctic grayling exist in Norton Sound–Port Clarence and Arctic–Kotzebue areas, but they are relatively small. Average annual sport fish harvests for Arctic grayling in the last 5 years were roughly 500 fish in both Norton Sound and Kotzebue Districts. In Norton Sound, average Arctic grayling sport fish harvests for the last 10 years are roughly a third of that of Dolly Varden, but in Kotzebue District, average Arctic grayling sport fish harvests for the last 10 years is half that of Dolly Varden (Appendix F3).

CAPELIN

Commercial Fishery

No reported commercial fishery has occurred for capelin *Mallotus villosus*, although there are substantial stocks in northern Norton Sound (Pahlke 1985).

Subsistence

Because no subsistence permit for capelin is required, accurate harvests of capelin are not reported or documented. Capelin spawning events occurring on Nome beaches are incidentally reported to ADF&G by Nome residents or observed by ADF&G employees. Tracking these reported sightings did not start until 2013. Starting that year, capelin have been sighted nearshore of Nome or spawning on beaches of Nome as early as early June and as late as July 19 (Appendix F11). Many residents harvest capelin with various gear types, such as nets, buckets, plastic bags, and shovels.

SECTION 2: SALMON FISHERIES

2018 NORTON SOUND SALMON FISHERY

COMMERCIAL FISHERY SEASON SUMMARY

Like last year, well above average to near record runs of chum, pink, sockeye, and coho salmon highlighted the 2018 fishery. The coho salmon commercial harvest was a record and the chum salmon commercial harvest was the second highest on record and the best since 1983. The sockeye salmon commercial harvest, although a small portion of the overall harvest, was the second highest in history at over 3,600 fish. The pink salmon run was one of the greatest runs for an even-numbered year and pink salmon escapements were records at some salmon counting projects. However, there was minimal interest from the only buyer in purchasing pink salmon. No commercial fishing targeting Chinook salmon was allowed; however, the Chinook salmon run met escapement for the first time since 2015.

The commercial fishery season started on June 23 in Subdistricts 2–4 (Golovin, Elim and Koyuk), with one 24-hour fishing period targeting chum salmon, followed by Subdistrict 1 (Nome) with a 24-hour fishing period on June 27 and in Subdistricts 5 and 6 (Shaktoolik and Unalakleet) with a 24-hour fishing period on July 1. Well above average catches of chum salmon and well above average escapement enabled ADF&G to allow fishing depending on buyer capacity. The buyer switched to 48-hour fishing periods in early July with two 48-hour fishing periods in all subdistricts and there was some extension of fishing time based on buyer capacity and if weather affected the fleet being able to fish. In the first week of August coho salmon catches and escapements indicated a well above average run and by mid-August fishing time was expanded from two 48-hour fishing periods a week to 4–6 days of fishing in all subdistricts except Subdistrict 4 if the buyer had capacity. Additional fishing time for each subdistrict was based on fishing effort and buyer capacity. Fishing time was not extended in Subdistrict 4 because of poorer catches and escapement compared to previous years.

Total Norton Sound commercial salmon harvest was 270 Chinook, 39,123 pink, 237,823 chum, 260,505 coho, and 3,311 sockeye salmon (Table 1), and did not include 636 Chinook, 1,326 pink, 207 chum, 202 coho, and 312 sockeye salmon kept for personal use. The combined commercial (including personal use) harvest of all salmon species (543,479 fish) ranked highest since 1998 in Norton Sound. The number of commercial permits fished in 2018 (149) was 10 more than last year and was the second highest since 1993 (Appendix A2). The 2018 fishery value to the permit holders of $4,001,929 was a record and was the eighth year in the last 9 years that the value exceeded 1 million dollars (Appendix A3). Before 2010 the last time the fishery value exceeded 1 million dollars was in the 1980s. Adjusting for inflation no other years had a higher fishery value than 2018.

The record coho salmon catch of 260,505 fish was roughly half of the Norton Sound salmon harvest in 2018 (Table 1) and was 36% above the previous record catch in 2017 and over 110% and 165%, respectively, above the recent 5-year and 10-year averages (Appendix A1). The chum

salmon catch of 237,823 fish was the highest since 1983 and ranked second highest in history (Menard et al. 2013).

Average dock prices per pound in 2018 were $2.99 for Chinook salmon, $0.25 for pink salmon, $0.80 for chum salmon, and $1.40 for both sockeye and coho salmon (Appendix A4). Average commercial weights by species were 10.3 pounds for Chinook salmon, 3.0 pounds for pink salmon, 7.1 pounds for chum salmon, 5.7 pounds for sockeye salmon, and 7.1 pounds for coho salmon (Appendix A5).

Only 1 salmon buyer operated in Norton Sound during the 2018 season. The Unalakleet fish plant operated by NSSP was the base of commercial fisheries operations. Salmon were both delivered to the Unalakleet dock and tendered from Subdistricts 2–5. Subdistrict 1 catch was delivered to the Nome plant by the permit holders, and some catches from Subdistricts 2 and 3 were also processed in Nome. The floating processor *Pavlof* was also anchored offshore of Elim, processing and freezing salmon delivered by tenders.

SUBSISTENCE FISHERY SEASON SUMMARY

Subsistence salmon fishermen in Port Clarence District and Subdistricts 1–3 (Nome, Golovin, and Elim) were required to possess a subsistence permit for each household that fished in these locations. Like the last several years, the return rate in 2018 was close to 100% (Table 2). A record coho salmon catch and above average catches of pink salmon and sockeye salmon resulted in the highest subsistence salmon catch in northern Norton Sound (including Port Clarence) since 2008.

In southern Norton Sound, in 2018, postseason household surveys were conducted in Koyuk, Shaktoolik, and Unalakleet, and attempts were made to contact 100% of the households. The southern Norton Sound subsistence catch was well below the 5-year and 10-year averages; however, a full survey was not conducted in Koyuk, which could have contributed to the lower averages (Appendices A9–A13).

In Norton Sound District, only certain rivers in Subdistrict 1 (Nome) have subsistence salmon harvest limits, in place since 1985. In 2018, an above average chum salmon run was forecasted for Subdistrict 1 and it was not closed to salmon fishing in mid-June for the 13th year in a row.

Regulations allow for cash sales of up to $500 worth of subsistence-taken finfish per household. In 2018 there was a total of 12 customary trade permits issued in Norton Sound and Port Clarence Districts. Cash sales of $1375 were recorded in 2018 for both Norton Sound and Port Clarence Districts combined (Appendix A34).

Season Summary by Subdistrict

Nome–Norton Sound Subdistrict 1

In Subdistrict 1, 2018 chum salmon run abundance was projected to achieve the subdistrictwide BEG range of 23,000–35,000 chum salmon and amounts necessary for subsistence (ANS) range of 3,430–5,716 chum salmon. As such, a Tier II fishery was not implemented in 2018. There has not been a Tier II fishery or Tier II subsistence fishing restrictions implemented since 2005.

The Subdistrict 1 BEG for chum salmon has been exceeded for the last 9 years. However, achievement of the goal is often a result of better and more productive chum salmon runs east of Cape Nome disproportionately contributing to the BEG. The chum salmon escapement goal

range for the Eldorado River, which is east of Cape Nome, is double the combined escapement goal range of the Nome and Snake rivers, both of which are west of Cape Nome, highlighting the disparity in river productivity within the subdistrict. In the last 8 years, the Eldorado River has exceeded the chum salmon escapement goal range every year, and the Nome and Snake rivers have exceeded their escapement goal ranges in 6 of the last 7 years (Appendices A22–A23 and A26). Although chum salmon runs are greater east of Cape Nome (Appendix A32), for pink salmon the run strength is much greater west of Cape Nome (Appendix A33). Both the Nome and Sinuk rivers have much larger runs of pink salmon, particularly in even-numbered years, compared to rivers east of Cape Nome. Nome River has the only pink salmon escapement goal (13,000 in an even year) in Subdistrict 1, and in 2018 had the greatest pink salmon escapement of any river in the subdistrict with over 3.2 million fish counted through the Nome River weir, an all-time high, surpassing the last record, in 2008, by almost 3-fold (Appendix A26). No coho salmon escapement goals have been established in Subdistrict 1, but the escapement in Nome and Snake rivers was at least 50% above average compared to previous years in the 2000s of reliable escapement estimates with no large-scale flooding events.

Commercial fishing in the Nome Subdistrict was allowed for the sixth consecutive season since the mid-1990s. In 2018, 7 permit holders fished, which was the most since fishing resumed in 2013, but the effort was only a little more than half of any other district. Permit holders fished during 15 of the 17 fishing periods, forgoing fishing during the third to last fishing period and the last period of the year. The coho salmon commercial harvest was a record and was almost 8 times higher than the previous record in 1982 (Menard et al. 2013). The sockeye salmon harvest was lower than last year's record catch but was still more than twice the recent 5-year average. The chum salmon commercial harvest was the highest since 1986 and ranked seventh highest in history. Total commercial harvest, including personal use, was 18 Chinook, 10,205 chum, 3,930 pink, 9,080 coho, and 426 sockeye salmon (Appendix A6).

In recent years, subsistence fishing time was liberalized in Nome Subdistrict by increasing marine gillnet fishing time from 3 days to 5 days a week west of Cape Nome and 7 days a week east of Cape Nome. Also, freshwater gillnet fishing time was increased from 4 days to 5 days a week. In 2018 the chum salmon run to Nome Subdistrict was the greatest since the early 1980s with record escapements at Eldorado, Solomon, and Nome weirs. However, the chum salmon subsistence catch was one of the lowest, except for years of subsistence closures, catch limits, or Tier II fishing restrictions. Weather was not an issue for preventing fishing. Possible explanations for the low chum salmon catch was that subsistence permit holders went to Pilgrim River to harvest another large run of sockeye salmon, and the huge pink salmon run in Nome Subdistrict resulted in less gillnet fishing for chum salmon because nets were being plugged with pink salmon. Although the coho salmon run to Nome Subdistrict occurs 1 month later and is much smaller than the chum salmon run, the subsistence harvest of coho salmon was a record for the second year in a row and was nearly 4 times the chum salmon subsistence harvest. The pink salmon subsistence harvest was over 8 times the chum salmon harvest.

For over 40 years subsistence salmon permits have been required for the Nome Subdistrict, and during the 2018 season 620 permits were issued, the highest on record. Of the 620 permits issued, 611 were returned (Table 2). Reported subsistence harvest was 11 Chinook, 1,196 chum, 10,786 pink, 4,940 coho, and 336 sockeye salmon (Appendix A6).

Golovin–Norton Sound Subdistrict 2

The Subdistrict 2 regulatory salmon management plan limits commercial harvest to a maximum of 15,000 chum salmon before mid-July to protect chum salmon stocks and allow for some harvest while flesh quality is at its best. By mid-July, the chum salmon run can be assessed, and fishing time adjusted accordingly. The counting tower project on the Niukluk River was used to evaluate escapement in the Golovin Subdistrict from 1995 to 2012, but the project was discontinued in 2013. The Niukluk River is a tributary of Fish River, a major salmon-producing river in the Golovin Subdistrict. Telemetry studies in the early 2000s showed an average of 33% of the chum salmon in the Fish River drainage pass the Niukluk River tower (Todd et al. 2005).

There was no commercial chum salmon fishing in Golovin Subdistrict in the mid-2000s, largely because escapements, in most of those years, had fallen short of the lower bound SEG of greater than 30,000 fish for the Niukluk River (Appendix A25). Consequently, ADF&G has implemented a conservative approach with respect to determining when commercial fishing may occur. In 2014 a new counting tower project was initiated by NSEDC on the Fish River, and in 2018, operation of this tower did not begin until July 10 due to high water and continued until August 26, when it was pulled due to high water, with passage of 37,170 chum salmon, over 2.7 million pink, and 19,338 coho salmon (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome). The aerial survey escapement goal range for Niukluk River and Ophir Creek is 750–1,600 coho salmon but the aerial survey was not completed this year because of lack of aircraft.

The season began with three 24-hour fishing periods starting June 23 through July 1 per the buyer's request. From July 3 to August 3 there were two 48-hour periods a week, except for one 24-hour period and one 72-hour period that occurred to allow additional fishing time because of above average salmon returns. Beginning August 4 fishing period lengths continued to be increased because a record coho salmon run occurred and there were no buyer capacity concerns. The last 2 weeks of the season had 120-hour periods and the longest period was 144 hours, but fishing effort was minimal because some permit holders traveled to Unalakleet to fish. Total commercial catch, including personal use, was 31 Chinook, 75 sockeye, 2,995 coho, 4,171 pink, and 25,070 chum salmon caught by 18 permit holders (Table 5; Appendix A7). The chum salmon commercial harvest was the highest harvest since fishing resumed in 2008. Coho salmon commercial harvest was above average and was the fifth highest since 2008.

This was the fifteenth year that subsistence salmon permits were required in Golovin Subdistrict and 207 out of 210 permits issued were returned (Table 2). Subsistence fishing was allowed 7 days a week with no catch limits throughout the season. Reported harvest was 50 Chinook, 83 sockeye, 1,369 coho, 6,944 pink, and 773 chum salmon (Appendix A7). The total number of salmon reported harvested (9,219) was between the 5-year (8,398) and 10-year (9,430) averages, as was the number of coho reported harvested. Even though chum salmon had a good run, the reported subsistence harvest was the third lowest in over 20 years. Both sockeye and pink salmon harvests were above average.

Elim–Norton Sound Subdistrict 3

The Subdistrict 3 management plan directs ADF&G to project that chum salmon escapement goals will be reached and ensure that harvestable surpluses will be in excess of subsistence needs before directed chum or pink salmon commercial fishing is allowed. Further, in times of low chum salmon abundance, directed pink salmon commercial fishing may not occur before July 7

in the subdistrict. By this date, historical data indicate that the bulk of the chum salmon run is inriver, and commercial pink salmon fishing would be expected to have little impact on chum salmon escapement or subsistence needs.

In 2018 the escapement past the Kwiniuk tower was 87 Chinook, 6 sockeye, 41,658 chum, 1,804,752 pink, and 17,172 coho salmon (Appendix A24). Chinook salmon passage was below the escapement goal of 250 fish for the third year in a row, but the chum salmon passage was well above the escapement goal range of 11,500–23,000 fish. Pink salmon escapement was well above average and coho salmon escapement was the second highest on record, trailing only the 2006 escapement when no commercial fishing occurred. Counting at the Kwiniuk River tower has only extended into coho salmon season starting in 2001.

The Elim Subdistrict commercial fishing schedule was the same as the Golovin Subdistrict, with less additional fishing time in the final month of the season because of more participation in the Elim Subdistrict than the Golovin Subdistrict. Total commercial catch including personal use was 138 Chinook, 482 sockeye, 20,002 coho, 9,474 pink, and 38,419 chum salmon caught by 34 permit holders (Table 6; Appendix A8). The pink salmon run was well above average but there were no directed pink salmon fishing periods. The chum salmon run was well above average and the commercial harvest was the highest since 1983 and the tenth highest on record. The coho salmon run was one of the greatest on record and the commercial harvest was a new record, narrowly surpassing last year's record commercial harvest.

There were 56 subsistence salmon permits issued for Elim Subdistrict in 2018 and all were returned. The number of salmon reported harvested (6,699) was slightly below the 5-year average. Estimated subsistence harvests by species were 59 Chinook, 35 sockeye, 1,657 coho, 4,360 pink, and 588 chum salmon (Appendix A8). The chum salmon harvest was well below average, but the pink and coho salmon harvests were average.

Norton Bay–Norton Sound Subdistrict 4

Until recently, Norton Bay Subdistrict has typically been managed based on Shaktoolik and Unalakleet Subdistricts' salmon run assessments due to a lack of ground-based escapement projects in Norton Bay. However, in 2011, an enumeration tower project was initiated by NSEDC on the Inglutalik River to provide an index of salmon escapement to Norton Bay. In most years high water prevented operating the project during coho salmon season but this year, the tower was in operation well into August. However, the project started a week and a half later into the season than last season due to high water. Escapements counts were 207 Chinook, 28,736 chum, 20,231 pink, 141 sockeye, and 2,367 coho salmon (Appendix A29). All counts were below average in 2018 based on its operation since 2011. Currently, the Inglutalik River escapement counts are considered ancillary to comparative catch statistics for inseason management until a longer time series of escapement data becomes established.

In 2008, a small-scale commercial salmon fishery occurred in Norton Bay Subdistrict for the first time since 1997, and until 2011, 4 to 7 permit holders participated each season. Participation was limited due to a combination of reasons, particularly in 2010: inadequate tendering capacity, mechanical breakdowns on tender vessels, and reduced fishery effort probably due to concurrent fisheries prosecuted in the Elim and Shaktoolik Subdistricts. However, in 2011, effort increased to 12 permit holders and since then, there have been up to 20 permit holders fishing in Norton Bay Subdistrict each year (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome).

In 2018, the Norton Bay Subdistrict commercial fishing schedule was the same as the Elim Subdistrict, but fishing was closed 2 weeks earlier because of lower commercial harvest rates. Total commercial catch by species for Norton Bay Subdistrict including personal use was 52 Chinook, 158 sockeye, 1,513 coho, 1,007 pink, and 14,548 chum salmon caught by 12 permit holders (Table 7; Appendix A9). The chum salmon commercial harvest was less than half of the previous years' chum salmon commercial harvest but was still ninth highest on record. The coho salmon commercial harvest was half of last year's coho salmon harvest and the second lowest commercial harvest in the last 10 years. There was extreme flooding in Subdistrict 4 rivers in July and August of 2014 and this may have been a contributing factor to the poor returns from that parent year.

To protect Chinook salmon ADF&G restricted subsistence fishing in Norton Bay Subdistrict to two 36-hour fishing periods a week during the month of June. The first fishing period each week had a restriction of 6.0 inches or smaller mesh size and the second period had no mesh size restrictions.

This was the eleventh consecutive year that household subsistence salmon surveys were conducted in the village of Koyuk (Appendix A9). There were 23 households that were successfully contacted out of a possible 84 in 2018. Results from these households were expanded to estimate harvests by species, gear type, and location (e.g., Inglutalik River, Ungalik River, Koyuk River, Mukluktulik River, and marine waters) for those households not surveyed. An estimated 69 Chinook, 100 sockeye, 596 coho, 1,367 pink, and 1,469 chum salmon were reported as subsistence harvest in Norton Bay Subdistrict in 2018 (Appendix A9).

Shaktoolik and Unalakleet–Norton Sound Subdistricts 5 and 6

In Shaktoolik and Unalakleet Subdistricts, where management actions are usually the same for both subdistricts, commercial fishing is typically only allowed after Chinook salmon have been observed in increasing numbers in subsistence fishing nets and ADF&G is confident the midpoint of the Chinook salmon escapement goal range of 1,200–2,600 fish will be reached at the North River counting tower; otherwise, no commercial gillnet fishing periods are allowed for any species until after June 30.

Observations during the season indicated that the Unalakleet River was once again the river that had the most fishing effort out of Subdistricts 5 and 6, the Unalakleet and Shaktoolik Subdistricts. Unalakleet River weir had its highest Chinook salmon escapement count on record and most salmon counting projects within Subdistricts 5 and 6 had average to above average chum salmon escapement counts, average pink salmon escapement counts, and record coho salmon escapement counts.

Directed commercial Chinook salmon fishing has only occurred in 2 of the previous 18 years in these 2 subdistricts, and none since 2005. Restrictive action was also taken in the subsistence and sport fisheries from 2003 to 2004 and since 2006. Because the 2018 forecast was for a below average run of Chinook salmon, commercial fishing targeting chum salmon did not begin until July 1 with a 24-hour fishing period and all fishing periods throughout the season occurred concurrent for both subdistricts. Chum salmon escapement counts, and chum salmon commercial harvest numbers allowed for two 48-hour fishing periods per week in July. Record coho salmon escapement counts and commercial harvest allowed for a minimum of 48-hour fishing periods in August with the possibility of longer fishing periods if there were no buyer capacity or buyer staff concerns. In August there were two 72-hour fishing periods and a 96-hour fishing period as well.

Continued above average coho salmon escapement counts allowed for two 120-hour fishing periods in September (Appendix G7).

Shaktoolik Subdistrict commercial catches for chum salmon were fourth highest on record with 41,482 fish caught and Unalakleet Subdistrict commercial catches for chum salmon were second highest on record with 108,305 fish caught (Table 1; Appendices A10 and A11). Coho salmon commercial harvest was a record for both subdistricts with 71,468 fish caught in Shaktoolik and 155,578 fish caught in Unalakleet. Although an incidental catch, the sockeye salmon harvest was the highest on record in both subdistricts with 516 fish caught in Shaktoolik and 1,766 fish caught in Unalakleet. Number of permit holders in 2018 was 37 for Shaktoolik Subdistrict (Table 8), and 80 for Unalakleet Subdistrict (Table 9).

Due to the below average run of Chinook salmon forecast for 2018, additional restrictions on subsistence fishing were required to reach escapement. After ADF&G staff met with residents of Shaktoolik and Unalakleet it was decided that Unalakleet River would close to subsistence net fishing June 1. In addition, the marine waters of southern Norton Sound from Bald Head (near Elim) south to Wood Point (near St. Michael) excluding the Koyuk River, subsistence salmon fishing in all fresh waters from Bald Head to Black Point were closed to subsistence salmon fishing June 9. After June 9 one 24-hour fishing period with gillnets restricted to 6 inches or smaller mesh size was allowed each week in the marine waters. In June there were 2 weeks that allowed for two 24-hour fishing periods because of good subsistence salmon catches and favorable weather. In July, subsistence fishing time in marine waters had two 24-hour fishing periods before the lower end of the Chinook salmon escapement goal was reached, and all waters stayed open to subsistence salmon gillnet fishing on July 15. The first inriver gillnet fishing period in both subdistricts was a 12-hour fishing period on July 4 with restricted mesh and there was only 1 other inriver gillnet fishing period before all waters stayed open to subsistence salmon gillnet fishing on July 15 and that fishing period was for 12 hours.

The Shaktoolik Subdistrict subsistence catch of 162 Chinook was below both the 5-year and 10-year averages (Appendix A10). In Unalakleet Subdistrict, the 810 Chinook salmon harvested in the subsistence fishery was above the 5-year average but below the 10-year average (Appendix A11).

Escapement

Escapement projects in Norton Sound include counting towers on North, Inglutalik, Fish, and Kwiniuk rivers; sonar/tower on Shaktoolik River; and weirs on Unalakleet, Snake, Nome, Solomon, Eldorado, Bonanza (new), and Pilgrim rivers (Table 3; Appendices A18 and A22–A31).

Escapement project operations were a result of multiple collaborators, including ADF&G, NSEDC, and Native Village of Unalakleet. All projects supplied important daily information to ADF&G that was very useful for management of local salmon resources and will become more important the longer they operate. Funding sources for projects come from USFWS Office of Subsistence Management, NSEDC, and ADF&G.

High water prevented aerial surveys during the beginning of the season, and in 2018, the unprecedented amount of pink salmon carcasses sometimes prevented effective aerial surveys during the coho season. As usual, the Nome Subdistrict streams received the most intensive

assessment efforts because salmon stocks local to the Nome area are easily accessed by the road system and are exposed to intensive subsistence and sport fishing pressure.

Chinook Salmon

The 2018 Chinook salmon run was weak but was an improvement from the previous year. Subsistence fishing restrictions were in effect in June that allowed only one 24-hour fishing period a week in the marine waters with gear restricted to 6 inches or smaller mesh size.

The North River count of 2,568 Chinook salmon was the highest since 2014 and was second highest in the last 20 years (Appendix A30). The Unalakleet River weir had the highest count (3,326) in the 9-year project history (Appendix A31).

The escapement goal of 250 Chinook salmon at Kwiniuk River counting tower was not reached for the third year in a row and only 87 fish were counted (Appendix 24).

Chum Salmon

Chum salmon escapement goal ranges were exceeded in all rivers with counting projects and those rivers that had aerial surveys flown. Because of a lack of aircraft during certain times in 2018 not all rivers were surveyed but based on commercial and subsistence catches and reports of chum salmon in the rivers from residents there were no concerns with chum salmon escapement anywhere in Norton Sound.

Subdistrict 1 chum salmon escapement was again well above the subdistrictwide BEG range of 23,000–35,000 chum salmon with an estimate of 85,333 fish (Table 3; Appendix A21). Subdistrict 1 escapements of chum salmon have exceeded the upper bound of the escapement goal range in 13 of the last 17 years of the established goal. As in previous years, more than half (77%) of the chum salmon escapement occurred in rivers east of Cape Nome, and Eldorado River had the largest estimated escapement for an individual river system, contributing 42,361 chum salmon or 50% of the subdistrictwide escapement (Appendix A32).

Escapement at Kwiniuk River tower was 41,658 chum salmon (Appendix A24), the second highest in over 25 years and well above the Kwiniuk River escapement goal range of 11,500–23,000 fish.

In southern Norton Sound the Inglutalik River had the lowest cumulative count of chum salmon (28,736) in the 8-year project history (Appendix A29), but the North River tower count of 26,150 chum salmon was a record in the 23-year project history (Appendix A30). The Inglutalik River's low count of chum salmon may have been the result of poor survival of the 4-year-old age class because of the catastrophic flooding that occurred in 2014.

Coho Salmon

Coho salmon are found in nearly all the chum salmon producing streams throughout Norton Sound, with the primary commercial contributors being the Unalakleet and Shaktoolik rivers. Because inclement weather is normally experienced in this area during August and September, escapement data can be somewhat incomplete. Streams in the northern subdistricts of Norton Sound are typically surveyed.

The 2018 coho salmon run was probably the greatest on record with record harvests and escapements. Although no coho salmon escapement goals have yet been established in Nome

Subdistrict, the Snake River weir count of 7,491 coho salmon and the Nome River weir count of 8,902 coho salmon were both record setting (Appendices A23 and A26).

There are 3 aerial survey goals in Norton Sound. Niukluk River and Ophir Creek have an aerial survey escapement goal range of 750–1,600 coho salmon. Kwiniuk River has an aerial survey escapement goal range of 650–1,300 coho salmon, and North River has an aerial survey goal range of 550–1,100 coho salmon (Table 3). No aerial surveys were flown, but escapement goals were believed to have been reached based on tower counts. The Fish River counting tower downstream of Niukluk River and Ophir Creek had a count of 19,338 coho salmon, and past radiotelemetry studies have estimated one-third of Fish River tagged coho salmon spawn in the Niukluk River-Ophir Creek drainage (Todd et al. 2015). The Kwiniuk River counting tower had a count of 17,172 coho salmon, which was the second highest count on record (Appendix A24). The record count at the tower (22,341) was set in 2006 when no commercial fishing occurred and with this year's Elim Subdistrict harvest of 20,002 coho salmon the 2018 run was believed to be greater than the 2006 run. The North River counting tower also had the second highest count on record with 20,010 coho salmon (Appendix A30) and was a record count through August. The record count of 22,274 coho salmon was set in 2009, when the project was operated into September, 2 weeks longer than this year.

Pink Salmon

For over 30 years pink salmon returns to Norton Sound have followed an odd- and even-year cycle with the even-numbered year returns typically much higher in number than the odd-numbered years. In 2018, there were record escapements for several rivers. The Snake River pink salmon count of 463,742 was over double the previous record count set in 1998 (Appendix A23). The Nome River pink salmon count of over 3.2 million fish obliterated the previous record of nearly 1.2 million pink salmon counted in 2008 (Appendix A26). The Kwiniuk River pink salmon count of over 1.8 million fish was the fourth highest in the 54-year project history (Appendix A24; Menard et al. 2013). However, the North River pink salmon count of 477,429 fish was only the seventh highest in the 23-year project history (Appendix A30). There are 3 pink salmon escapement goals in Norton Sound and those goals, at Kwiniuk (8,400), Nome (13,000), and North (25,000) rivers, were all easily exceeded in 2018 (Table 3).

Sockeye Salmon

Sockeye salmon are typically found in small numbers throughout the Norton Sound District with the largest spawning stock at Glacial Lake, where 1,000 to 2,000 sockeye salmon usually return to spawn each year. However, large runs from 5,000 to over 10,000 sockeye salmon have occurred, as counted in the mid-2000s and in 2015 through Glacial Lake weir (Appendix A28), which was operated from 2000 to 2015. In 2018, the aerial survey escapement goal range of 800–1,600 at Glacial Lake was reached with a count of 1,570 sockeye salmon (Table 3).

Enforcement

Fishing regulations are primarily enforced by the Department of Public Safety, Alaska Wildlife Troopers (AWT). One AWT officer provided enforcement for the Norton Sound–Port Clarence Area in 2018. In addition, Nome ADF&G Division of Commercial Fisheries has 5 deputized staff with the ability to issue citations.

2019 NORTON SOUND SALMON OUTLOOK

Salmon outlooks and harvest projections for the 2019 salmon season are based on qualitative assessments of parent-year escapements, sibling relationships, subjective determinations of freshwater overwintering and ocean survival, and in the case of the commercial fishery, the projections of local market conditions. ADF&G expects similarly strong coho and chum salmon run strengths in 2019 as in 2018, but the Chinook salmon run will probably be weak again and no commercial fishing targeting Chinook salmon is expected in Norton Sound. Additional subsistence restrictions for Chinook salmon are expected in southern Norton Sound. Sales of incidentally harvested Chinook salmon will not be allowed in Subdistricts 5 and 6 until late July or early August because of subsistence fishing restrictions starting in June. Elsewhere, incidentally caught Chinook salmon in commercial fisheries will be allowed to be sold. Chum salmon runs are expected to be above average and the harvest is expected to be 170,000 to 220,000 fish. ADF&G expects the pink salmon run to be above average for an odd-numbered year, but harvest will depend on buyer interest and could range from 25,000 to 75,000 fish. No pink salmon directed fishing periods would be expected because of buyer interest in more valuable salmon species and the pink salmon harvest would probably be an incidental harvest only. However, ADF&G does have the authority to increase fishing net aggregate length from 100 fathoms to 200 fathoms if there were a pink salmon directed fishery. Also, in June, a seine fishery targeting pink and chum salmon in Subdistricts 5 and 6 could occur with the requirement that Chinook salmon be returned to the water unharmed, and in that case, the pink salmon harvest may exceed 200,000 pink salmon. The coho salmon run is expected to be well above average based on ocean survival conditions in recent years. The commercial harvest is expected to be 190,000 to 240,000 fish.

2018 PORT CLARENCE SALMON FISHERY

Commercial Fishery Season Summary

Port Clarence is the salmon district immediately to the northwest of Norton Sound, with a larger run of sockeye salmon than Norton Sound. In 2018, though the run was smaller compared to 2017, it was still the third highest since the record runs of the mid-2000s. However, because there was no buyer interest, no commercial sockeye salmon fishing occurred in Port Clarence even though the run was expected to exceed the necessary inriver goal of 30,000 sockeye salmon. End of season subsistence catch reports combined with Pilgrim River weir counts showed that the run well exceeded the 30,000 sockeye salmon threshold for a commercial fishery.

Subsistence Fishery Season Summary

Salmon Lake, located in Port Clarence District, is drained by Pilgrim River, which is easily accessed by road from Nome. Subsistence fishing permits have been required for Pilgrim River since 1964, and beginning in 2003, the number of permits issued has greatly increased with the record sockeye salmon runs in the mid-2000s. A total of 500 Pilgrim River subsistence permits were issued in 2018, second only to 2016 when 506 permits were issued. Pilgrim River estimated subsistence harvests by species were 13 Chinook salmon, 96 coho salmon, 150 chum salmon, 9,073 sockeye salmon, and 380 pink salmon (Table 2). The sockeye salmon harvest was 75% of the record harvest of 12,148 sockeye salmon harvested last year. For comparison, prior to 2015, the record was 5,556 sockeye salmon harvested in 2006. Most of the Pilgrim River harvest is by seines.

Port Clarence District also has large summer and fall chum salmon runs that are harvested by residents of Teller and Brevig Mission using gillnets in marine waters.

Although permits have been required in the Pilgrim River drainage for over 50 years, 2018 was the fifteenth year that permits were required throughout Port Clarence District. The number of subsistence salmon permits issued for all waters of Port Clarence District, excluding Pilgrim River and Salmon Lake, was 189 permits (Table 2).

In 2018 there were 7 customary trade permits issued in Port Clarence District. Cash sales of $1375 were recorded in 2018 for both Norton Sound and Port Clarence Districts combined (Appendix A34).

Escapement

In 2018, escapement of chum salmon to the Pilgrim River was 33,135 fish, the seventh highest out of the 22-year project history at the Pilgrim River, including both counting tower and floating weir counts (Appendix B2). Escapement of pink salmon to the Pilgrim River was over 46,000 fish, which ranked third highest in the 22-year project history. For sockeye salmon, Salmon Lake spawning populations seldom exceeded 10,000 fish in years prior to 2003, but similar to Glacial Lake in Norton Sound, record-breaking runs were counted through the Pilgrim River weir in the mid-2000s. In 2018, the sockeye salmon count at Pilgrim River weir was the third highest (33,802) since 2007, and ADF&G waived subsistence catch limits early in the season, as happened in the previous 3 years.

Aerial surveys are not typically flown in Port Clarence District except for Salmon Lake because higher priority is assigned to Nome Subdistrict and surrounding areas where commercial fishing occurs. Aerial surveys have shown an increasing trend of sockeye salmon returns to Salmon Lake since 2010 (Appendix B1). The combined escapement goal range of Salmon Lake and Grand Central River is 4,000–8,000 sockeye salmon by aerial survey, and this year's survey count of 26,527 fish exceeded the upper end of the range by over 230% (Table 3). Salmon Lake aerial survey escapement goal for sockeye salmon has been reached the last 8 years, but in 3 of those years, subsistence closures were required in Pilgrim River.

Enforcement

In 2018, 1 AWT officer patrolled Pilgrim River in Port Clarence District.

2019 Port Clarence Salmon Outlook

The GHR set by BOF for the Port Clarence commercial sockeye salmon fishery allows for a harvest of up to 10,000 sockeye salmon. In the Port Clarence District, ADF&G expects the commercial fishery to remain closed because of a lack of buyer interest even though the inriver goal of 30,000 sockeye salmon at Pilgrim River is expected to be reached. Subsistence fishing closures in the Pilgrim River are not expected, but ADF&G will limit sockeye salmon subsistence harvest to 25 fish initially and will increase or waive the limit if the run is similar to the last several years.

2018 KOTZEBUE SOUND SALMON FISHERY

Commercial Fishery Season Summary

In 2018, the Kotzebue Sound District commercial salmon fishery had 3 buyers, Copper River Seafoods (CRS), Maniilaq dba Arctic Circle Wild Salmon, and Pacific Star. CRS and Pacific Star were the major buyers. Maniilaq did not begin buying until August 9.

The commercial salmon season opened on July 10 and closed by regulation after August 31. Commercial fishing was allowed 6 days a week with no fishing on Saturday. From July 10 through July 30 fishing was open for 12 hours daily; from July 31 through August 24 fishing was open for 14 hours daily; from August 26 through August 31 fishing was open for 10 hours daily. During the season the earliest that fishing opened was at 8:00 AM and the latest that fishing closed was at 10:00 PM. Commercial fishing periods increased to 14 hours once a floating processor vessel arrived and eliminated restricting fishing time based on limited airplane cargo capacity to move the fish out of Kotzebue.

In the commercial salmon fishery, gear is limited to setnets with an aggregate of no more than 150 fathoms per permit holder. Fishermen generally operate with 1 end on or near shore and set in deeper channels from the mud flats farther out from shore. Most gear used in the district is 5.75-inch to 6.0-inch stretch mesh gillnet.

The commercial harvest of 695,153 chum salmon was a record, exceeding the previous record of 677,239 chum salmon caught in 1981 (Menard et al. 2013). Also, 13 Chinook salmon and 15 sockeye salmon were sold. No chum salmon were reported kept for personal use, but 194 Chinook salmon, 48 sockeye salmon, 1,190 pink salmon, 20 coho salmon, 688 Dolly Varden, 344 sheefish and 18 whitefish were reported in the catch and kept for personal use. Additional fish kept for personal use were probably not reported on fish tickets.

The 2018 harvest was the fourth time in the last 5 years the harvest exceeded 400,000 chum salmon but was only the eighth time in history for a harvest that high (Appendix C1). There were 95 permit holders that sold fish in 2018, which was just a few less than last year when 98 permit holders sold fish and was the third highest permit holder participation in over 20 years. The highest daily fishing effort occurred on July 31 when 62 permit holders fished.

A total of 5,642,859 pounds of chum salmon (average weight 8.1 lb) was sold at an average of $0.40 per pound, which was 17% lower than last year's price of $0.48 per pound (Appendix C2). The total exvessel value was $2,279,477, which was 24% more than last year and only the fourth time in over 25 years that the value was over 1 million dollars (Appendix C3). The 20-year average exvessel value of the fishery was just under $600,000, without adjusting for inflation.

ASL composition was taken from commercial catch samples but was not used to manage the fishery. Most of the chum salmon each year are usually 4- and 5-year-old fish. In 2018, commercial catch samples were 2% age-0.2 fish, 76% age-0.3 fish, 21% age-0.4 fish and <1% age-0.5 fish. The age composition was similar to previous years. (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome).

Subsistence Fishery Season Summary

Since May of 2015, no subsistence salmon surveys have been conducted in Kotzebue Sound District. In 2018, subsistence harvesters reported large numbers of chum salmon in both the Kobuk River and Noatak River.

Escapement

Primary fishery management objectives are to provide adequate chum salmon escapement throughout the duration of the commercial fishery to ensure sustainability of the fishery and to provide for subsistence priority. A test fishery conducted on the Kobuk River provides the only inseason escapement index of the Kotzebue Sound District.

This year's test fishery chum salmon CPUE cumulative index at the ADF&G test fishery project on Kobuk River near Kiana was 2,529 and was the fifth highest in the 26-year project history.

Kobuk River test fishery catch samples in 2018 were 3% age-0.2 fish, 89% age-0.3 fish, 7% age-0.4 fish, and 1% age-0.5 fish. The percentage of age-0.3 fish was over double that of 2017.

No aerial surveys were conducted in 2018.

Enforcement

One AWT officer patrolled the Kotzebue Sound District 2018 commercial salmon fishery.

2019 Kotzebue Salmon Outlook

The outlook for the 2019 season is based on the parent-year returns and returning age classes observed in the commercial catch samples and in the test fishery catch samples from the Kobuk River in 2018. During the 2019 season, the 4-year-old component of the run is expected to be average based on the 3-year-old return. The 5-year-old component of the run is expected to be well above average based on the 4-year-old return last season. The 3-year-old and 6-year-old age classes are much smaller components of the run and are expected to be average (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome). The commercial harvest is expected to fall within the range of 450,000 to 650,000 chum salmon, but there is the possibility of record harvest of nearly 700,000 chum salmon depending on buyer capacity.

SECTION 3: PACIFIC HERRING FISHERIES

2018 NORTON SOUND PACIFIC HERRING FISHERY

SAC ROE

A commercial fishery directed on sac roe did not occur for the fifth consecutive season in 2018. Like the last 3 seasons, the lack of a sac roe fishery in 2018 was due to a lack of market interest (Appendix D1–D3).

SPAWN-ON-KELP

There was no market interest expressed in the commercial spawn-on-wild-kelp (*Fucus* sp.) or *Macrocystis* spawn-on-kelp fisheries.

BAIT FISHERY

A small directed herring bait fishery occurred in 2018. The Norton Sound commercial bait herring fishery was opened by emergency order on May 14 and NSSP purchased 81 short tons of herring from May 15 to May 19 with 6 permit holders making deliveries (Appendix D2).

COMMERCIAL FISHERY MANAGEMENT

In 2018, due to budget limitations, ADF&G did not fly aerial surveys to estimate biomass nor conduct ASL sampling. With the decline in market demand, there was no expectation that commercial harvest would exceed 20% of actual biomass.

Budget reductions have resulted in no ADF&G field crew deployed to Cape Denbigh during the 2018 season, and no test fishery operations being conducted from Unalakleet. No commercial samples were taken.

CATCH REPORTING AND ENFORCEMENT

No AWT officers were on Norton Sound herring grounds during the 2018 fishery because there was no sac roe fishery.

Biomass Determination

There were no Norton Sound herring aerial surveys conducted this season by NSEDC or ADF&G biologists. Due to budget restrictions, there will no longer be aerial surveys or ASL sampling conducted by ADF&G in future.

SECTION 4: KING CRAB FISHERIES

NORTON SOUND CRAB FISHERY

ABUNDANCE

The ADF&G length-based population model estimated harvestable legal (over 4.75-inch CW) male crab biomass for the 2018 commercial crab fishery at 3.5 million pounds. This estimate was based on the model's results from spring of 2018 that included the latest data from the 2017 summer fishery and the 2017 trawl survey (Appendix E9). By BOF regulation, a harvest rate of up to 15% is allowed when the legal male biomass exceeds 3.0 million pounds. Additionally, the North Pacific Fishery Management Council had set an allowable biological catch (ABC) of 350,000 pounds for 2018, which is to include the winter and summer commercial harvests, estimated winter and summer subsistence harvests, and estimated incidental mortality of non-target crab discards. Starting in 2016, under the new king crab management plan, both winter and summer commercial fisheries are now combined under one red king crab harvest strategy. Based on the recommended ABC, ADF&G applied a harvest rate of 9.0% to the legal male population, yielding a total GHL of 319,410 pounds for the commercial red king crab fisheries. By regulation 8% of the GHL is allocated to the winter commercial fishery resulting in a potential 25,553-pound allocation. The CDQ fishery is allocated 7.5% by regulation resulting in a potential 23,956-pound allocation. Any commercial harvest allocation not taken during the winter commercial fishery will be added to the summer commercial fishery allocation.

WINTER OPEN-ACCESS COMMERCIAL FISHERY

The winter commercial season (for both open-access and CDQ) opened March 3, almost a month later than last year, primarily due to the main buyer's concerns with high deadloss seen last year attributed to cold temperatures. For the open-access portion, 37 fishermen registered (16 fished). One land-based processor (NSSP in Nome) registered to buy crab, and 13 fishermen applied for a catcher-seller permit to sell crab dockside (8 made sales). Because NSSP did not purchase open-access crab until the CDQ fishery closed on April 14, catcher-sellers were the only crabbers that made open-access sales for the first 6 weeks of the fishery. Based on fish tickets submitted, the first landing was made March 5 and last landing was made on April 24 (Table 12). From beginning to the end of both seasons, the harvest rate was consistent, but lower than the last 3 years, with landings every day except 2 (Tables 12 and 13; Appendix E5). Of note this year is that it was the second snowiest winter on record for the Nome area, and winter crabbers reported difficulties getting to and from their pots, as well as much more effort required to dig out their crab holes, so they were not able to check as many pots in a day as in past years, which potentially impacted the harvest rate. Crabbers harvested 5,161 pounds, or 20% of the open-access quota. Even though the fishery remained open until the regulatory closure date of April 30, the ice around Nome was too unstable and crabbers either lost or pulled all their pots a week before the closure date.

For comparison to past years, information below includes winter CDQ catch. A total of 322 landings were made, with an overall CPUE of 4 crab/pot, half as much as last year, and

average weight of 3.2 lb/crab, the heaviest in the last 20 years (Appendix E4). Price of crab averaged $6.95/lb, the second highest in the Norton Sound winter king crab fishery, but total exvessel value was $186,044, less than 40% of last year's value. A total of 29,118 lb (9,180 crab) were harvested in the winter, with roughly half harvested in March and half in April. Total amount of crab harvested was less than 40% compared to last year.

Ice was relatively stable from the end of February until the third week of April, when over 160 out of 336 pots reported fishing were lost (49%) (Appendix E11). Nome crabbers reported fishing from 25 miles west to 50 miles east of Nome, excluding the area closed to commercial fishing. Like last year, most fishermen (39, or 90%) and harvest (91%) came from the Nome area, with the remaining fishermen (2 each) and harvest (1% and 8%, respectively) coming from Elim and White Mountain areas. Like the last couple of years, ice was unstable in most of eastern and southern Norton Sound and, except for Elim and White Mountain, no harvest or effort came from these areas.

CDQ FISHERY

In 2018, as in the previous 11 years, YDFDA transferred their quota to NSEDC. During the last 13 years except for 2013, NSEDC fishermen harvested all, or nearly all, of the entire allocation. Starting in 2016, the CDQ fishery has been prosecuted during the winter season, but 2018 was the first time that NSSP purchased only CDQ crab at first, even though both the CDQ and open-access fisheries were opened on March 3. From then until the last landing was made on April 14, 27 crabbers that fished (out of 34 that registered) harvested 23,957 pounds, or 100% of the CDQ quota (Table 13), and none was harvested during the summer fishery.

In 2018, there were a total of 262 CDQ landings and 2,242 pots lifts (Table 13). Average price paid to CDQ fishermen was $7.00/lb, for an exvessel value of $159,919 (86% of the total winter value) for the CDQ fishery. This was the 18th year a CDQ harvest occurred since the CDQ fishery was implemented in 1998.

SUMMER OPEN-ACCESS COMMERCIAL FISHERY

The 2018 summer open-access commercial crab fishery was opened by emergency order at 12:00 noon, June 24 in the Norton Sound Section, with a GHL of 290,292 pounds of crab, which included the unharvested portion of the winter open-access quota. NSSP was registered to buy crab, and 3 fishermen registered to sell crab dockside as catcher-seller (2 made sales). NSSP operated a seafood processing plant in Nome and 3 tenders in eastern Norton Sound. Crab were sold to NSSP and to residents.

The first open-access deliveries were made on June 26 and final deliveries were made July 29, the day after the fishery was closed by emergency order at 12:00 noon, for a season length of 34 days, the sixth shortest since 1993 when the Norton Sound king crab fishery effectively became a small-boat fishery. This year, as in past years, the season start was based on when the crab processor was ready to purchase crab. Once the season was under way, NSSP purchased crab continuously with no reports of poor crab meat fill.

For the 2018 season, as in the past 3 years, the harvest rate was excellent at the start but, unlike the last 3 seasons, slowed noticeably halfway into the 5-week fishery (Appendix E3). For the first half, the daily CPUE averaged 13 crab and went as high as 18 crab per pot, but for the second half, the daily CPUE averaged 6 crab and went as low as 1 crab per pot (Table 14). Until

the harvest rate slowed down, the projected trend line in the second week of July showed that the quota could be reached in less than a week. At the time, most of the fleet was fishing east of the 164°W longitude line. However, CPUE for most of the fleet declined soon after and feedback from some highlining crabbers indicated the crab were probably moving west. The fleet took over 2 weeks to locate the crab again and harvest the remaining quota, but due to concerns that the harvest rate could have picked up as fast as it had slowed down, the fleet was put on 24-hour minimum closure notice starting in mid-July.

The open-access harvest from fish ticket reports was 89,613 red king crab or 298,396 pounds (103% of the open-access quota; Table 14). Of this total, 2,035 pounds were reported as personal use. Out of the 35 vessels and 36 permit holders that registered to fish, 33 vessels and permit holders made 256 landings (Appendix E1). Average weight was 3.3 lb/crab, the heaviest in at least the last 20 years. Number of pots registered was 1,400, and there were 8,797 pot pulls. CPUE was 10 crab per pot, the lowest since 2013. In 2018, the harvest rate tracked similarly to the last 3 years for the first half, but after midseason tracked more closely to 2013 (Appendix E3). The average price paid was $6.25/lb, same as last year, tied for the second highest amount ever paid for the summer fishery, but the exvessel value of the fishery was $1.846 million, 72% of last year's value (Appendix E1).

HARVEST AREAS AND COMMERCIAL CATCH SAMPLING

Fish ticket reports document 10 statistical areas were fished in the summer open-access fishery (Table 15). Like last year, the top harvest (59%) and most effort (49%) came from statistical area 636401, which is southwest of Golovnin Bay in eastern Norton Sound, followed by statistical area 646401, southeast of Nome, which yielded 20% of the total harvest. Third highest harvest (7.5%) came from 2 statistical areas: 626401, southeast of Golovnin Bay, and 666402, west of the closed area. Except for 666402, the top 3 statistical areas are directly south of the closed boundary line (Appendix E12), and, like last year, effort was concentrated in this main area. But unlike last year, once most of the remaining fleet moved west, effort (and harvest) was concentrated in 666402, as opposed to the usual 656401 statistical area, directly south of Nome. Preliminary results from the 2018 trawl survey indicate that bottom temperatures in 666402 (and farther south) were cooler than most of the rest of Norton Sound (data on file with Arctic Research Group, ADF&G Division of Commercial Fisheries, Nome). The remaining 6 statistical areas all had less than 4% of the total harvest (Appendix E13). The catch from statistical areas east of 164°W longitude made up 67% of the harvest, the highest in the last 10 years (Appendix E14).

Carapace length (CL) measurements and shell age were collected from 3,008 commercially caught crab during the summer open-access fishery (Appendix E22). Since the summer of 2002, NSEDC has operated a seafood processing plant in Nome. In 2018, 100% of sampling data was collected from this plant, either as crabbers offloaded their catch or from holding tanks. Carapace age was classified as new (2–12 months old) or old (over 13 months old). Male new-shell crab made up 84% of the total legal crab sampled. Recruit crab are new-shell legal crab less than 116 mm CL. Postrecruit crab are legal new-shell male crab greater than or equal to 116 mm CL and all legal old-shell males. Recruit crab made up 16% of the legal crab sampled and postrecruit crab made up 84%, the highest since 1994 (Appendix E2). Overall mean CL of legal male crab was 123 mm, the highest since the early 1980s, and corresponding with the heaviest crab (Menard et al. 2013 and Appendices E16–E22).

ENFORCEMENT

No AWT trooper made dockside checks during the 2018 summer crab fishery; however, an ADF&G staff member who worked the king crab fishery was deputized to cite violations if necessary. No violations were cited in 2018.

SUBSISTENCE FISHERY

Both a summer and a winter subsistence red king crab fishery occur in Norton Sound, though most of the effort and harvest is from the winter fishery (Appendices E6 and E7). For the 2017–2018 winter crab season, 121 permits out of the 123 issued were returned, and the 82 permit holders that fished reported retaining 4,424 crab. The number caught, which included crab thrown back to the ocean, was 5,767 crab, 54% of the average catch from the previous 10 years. Residents of Brevig Mission, Golovin, St. Michael, and White Mountain signed up to fish and caught little or no crab, but residents of Savoonga and Unalakleet had a combined harvest of 844 crab, almost a fifth of the total harvest. All permittees fished with pots. Out of at least 179 pots reported fishing, 33 (18%) were reportedly lost during the season due to moving ice. Percentages of subsistence crab harvested each month are as follows: January 2%, February 34%, March 34%, April 13%, and May 15% (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome).

During the 2018 Norton Sound summer subsistence crab season, all 32 issued permits were returned, and the 14 fishermen who fished reported harvesting a total of 673 crab. 89% of the harvest came from the Nome area and 11% from the Unalakleet area. Residents of Brevig Mission and Savoonga signed up for subsistence permits but did not report any harvest. Crab kept per fisherman averaged 48 crab for summer 2018 (Appendix E6). Five pots were reported lost (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome).

SPORT FISHERY

Sport fishermen can fish for crab, and a harvest log issued by the Nome office, similar to a subsistence permit, is required. Sport fishermen are only allowed to keep 6 male crab daily, and they must be of legal size (4.75 inch or greater). The only recent harvest by sport fishermen was in 2005. That year, 9 harvest logs were issued and 8 were returned, showing that 6 non-resident sport fishermen caught 918 crab and kept 106, for an average harvest of 18 crab per fisherman (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome). In 2018, 1 harvest log was issued but no crabs were harvested.

FUTURE RESOURCE INVESTIGATIONS

Red king crab biomass estimates from Norton Sound trawl surveys are an integral part of the data used in the length-based population model to project the summer king crab legal biomass and appropriate GHL for the summer commercial king crab fishery. Starting in 2018, the trawl surveys are scheduled to take place annually. Prior to 2018, they took place every 3 years.

An observer program has been ongoing during the summer (2012–present) and initiated during the winter (starting in 2016) crab commercial fisheries. Observers are collecting information about the handling of non-target (e.g., sublegal and female) red king crab. Additionally, up to 500 crab each winter are being sampled during the commercial fishery, with CL measurements and shell age information collected, to monitor the fast-growing winter commercial fishery.

ST. LAWRENCE ISLAND CRAB FISHERY

Commercial Fishery

In 2006, the BOF split the St. Lawrence Island Section between north and south of 66 degrees N latitude. In the northern section, now known as the Kotzebue Section, the commercial season was from noon June 15 through August 1. The southern section was merged with Norton Sound Section. This change was initiated by Norton Sound area fishermen to expand fishing opportunity to an area with little commercial utilization since 1995. No harvest was reported from this new area in 2018. No permit holders fished in the Kotzebue Section in 2018.

SECTION 5: MISCELLANEOUS SPECIES

INCONNU (SHEEFISH)

Commercial Fishery

In Kotzebue Sound District, for the winter of 2017–2018, 2 fishermen reported selling inconnu, commonly known as sheefish (Appendix F1). However, catch information is confidential because there were less than 3 fishermen. Sheefish are not commonly found in either Norton Sound or Port Clarence Districts.

Subsistence and Sport Fishery

From 2012 to 2014, there were comprehensive subsistence surveys for fish and wildlife harvests of 6–9 Kotzebue area villages conducted by the DOS. In 2013, surveyed households in 5 Kobuk River villages and Buckland, Noatak, and Selawik reported harvesting over 22,000 sheefish, more than any other year since 1990 (Appendix F2). In 2014, the last year that surveys were conducted, sheefish harvest totaled almost 32,000 fish, but included harvest by the residents of Kotzebue. Because survey effort was limited during many years, harvest numbers should be considered minimal and are not comparable year to year.

Sport fish harvest reports for Kotzebue Sound District in 2017 indicate a harvest of 46 sheefish, less than 7% of 2016 (Appendix F3). Sheefish sport harvests in the last 10 years have averaged less than 450 fish annually. Information for 2018 is not yet available.

Escapement

No aerial surveys are flown to determine sheefish escapement. An ADF&G test fishery project on the Kobuk River helps to give an index of abundance, but the test fishery is operated to determine the index of chum salmon abundance and begins operation well after sheefish have begun to pass the site. In 2018, Kobuk River test fishery resulted in 150 sheefish caught in 200 drifts, for a cumulative CPUE of 149, the third lowest CPUE in this decade (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome).

DOLLY VARDEN

Commercial Fishery

Dolly Varden *Salvelinus malma* are occasionally and incidentally caught in commercial salmon fisheries in Norton Sound and Kotzebue Districts. During the 2018 commercial salmon fishery, Kotzebue District reported 648 Dolly Varden caught but not sold (Appendix F4), and Norton Sound reported 1 caught but not sold.

Subsistence and Sport Fishery

Subsistence harvest data for Dolly Varden were not recorded for Norton Sound or Port Clarence, and household surveys for Dolly Varden subsistence catches were not conducted in Arctic communities. A comprehensive survey of fish and wildlife harvests was done in 6–9 Kotzebue area villages by the DOS from 2012 to 2014. During those years, surveyed Noatak households

reported harvesting from 6,200 to 9,300 Dolly Varden annually (Appendix F5). No surveys have been conducted since 2014.

Sport fish harvest was 1,531 Dolly Varden in Norton Sound and 1,830 Dolly Varden in Kotzebue/Chukchi Sea areas in 2017 (Appendix F3). Information is not yet available for 2018. Overall, Dolly Varden sport fish harvests in the last 10 years in Norton Sound averaged just over 1,800 annually, with most fish usually harvested out of the Unalakleet River, but in 2018, more were harvested out of the Nome River (Appendix F6).

Escapement

Dolly Varden escapement is determined from aerial surveys conducted by ADF&G Sport Fish Division in the Kotzebue area, and weir or tower counts in Norton Sound. In 2018, a survey on the Wulik River counted a total of 97,385 Dolly Varden (Appendix F7).

WHITEFISH

Commercial Fishery

No whitefish were harvested during the 2017–2018 season in Norton Sound District because there were no buyers (Appendix F9).

Subsistence Fishery

Subsistence harvest data for whitefish were not recorded for Norton Sound, Port Clarence or Arctic Districts, but a comprehensive survey of fish and wildlife subsistence harvests by the DOS was conducted in 6–9 Kotzebue area villages from 2012 to 2014. During those 3 years, survey data showed that an average of 74,000 whitefish were harvested annually for 8 villages in Kotzebue District (Appendix F8). Due to varying survey effort, harvest numbers are considered minimal and are not comparable year to year. No surveys have been conducted since 2014.

SAFFRON COD

Commercial Fishery

During the 2017–2018 season, no saffron cod *Eleginus gracilis*, commonly known as tomcod, was harvested in Norton Sound because there were no buyers (Appendix F10). However, average harvest for the last 5 years was almost 16,000 pounds by 18 permit holders.

Subsistence

In Norton Sound areas, tomcod are primarily fished by "jigging" through the ice. Because no subsistence permit is required, and a sport fish license is not needed for Alaska residents in northern Norton Sound from Cape Prince of Wales to Bald Head, harvests of tomcod are not reported or documented. In 2018, Norton Sound household subsistence surveys were conducted; however, subsistence harvest information of tomcod was not collected.

CAPELIN

Subsistence

In 2018, sightings of spawning capelin were actively solicited by a graduate student studying capelin in the Nome area from June 15 to June 21; therefore, there were more sightings reported than in other years (Appendix F11). No other information on capelin harvest is available.

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REFERENCES CITED

ADF&G (Alaska Department of Fish and Game). 1967. 1966 annual report Arctic-Yukon-Kuskokwim area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Annual Management Report, Anchorage.

Barton, L. H. 1978. Finfish resource surveys in Norton Sound and Kotzebue; final report, Alaska Marine Environment Assessment Project, Research Unit 19. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region OCS Report No. 13, Anchorage.

Bockstoce, J. 1979. The archeology of Cape Nome, Alaska. The University Museum, University of Pennsylvania, Philadelphia.

Bue, F. J., T. L. Lingnau, C. F. Lean, and E. L. Brennan. 1997. Annual management report 1996, Norton Sound-Port Clarence-Kotzebue. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 3A97-30, Anchorage.

Clark, J. H. 2001. Biological escapement goal for chum salmon in District 1 of Norton Sound. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A01-09, Anchorage.

DeCicco, F. 2001. Fishery management report for sport fisheries in the Northwest Alaska regulatory areas, 1999-2000. Alaska Department of Fish and Game, Fishery Management Report No. 01-1, Anchorage.

Estensen, J. L., G. L. Todd, and C. S. Monsivais. 2005. Estimation of abundance and distribution of chum salmon in the Unalakleet River drainage, 2004. Alaska Department of Fish and Game, Fishery Data Series No. 05-52, Anchorage.

Estensen, J. L., and T. Hamazaki. 2007. Estimation of abundance and distribution of chum salmon (*Oncorhynchus keta)* in the Unalakleet River drainage, 2005. Alaska Department of Fish and Game, Fishery Data Series No. 07-03, Anchorage.

Gaudet, D. M., and G. Schaefer. 1982. Migrations of salmon in Norton Sound, Alaska determined by tagging in 1978-1979. Alaska Department of Fish and Game, Division of Commercial Fisheries, Informational Leaflet No. 198, Juneau.

Georgette, S., D. Caylor, and S. Tahbone. 2003. Subsistence salmon harvest summary, northwest Alaska 2002. Alaska Department of Fish and Game, Division of Subsistence and Kawerak, Inc., Anchorage.

Georgette, S., and A. Shiedt. 2005. Whitefish: traditional ecological knowledge and subsistence fishing in the Kotzebue Sound Region, Alaska. Alaska Department of Fish and Game and Maniilaq Association, Technical Paper No. 290, Juneau.

Joy, P., A. L. J. Brase, and D. J. Reed. 2005. Estimation of coho salmon abundance and spawning distribution in the Unalakleet River 2004. Alaska Department of Fish and Game, Fishery Data Series No. 05-38, Anchorage.

Joy, P., and D. J. Reed. 2006. Estimation of coho salmon abundance and spawning distribution in the Unalakleet River, 2005. Alaska Department of Fish and Game, Fishery Data Series No. 06-38, Anchorage.

Joy, P., and D. J. Reed. 2007. Estimation of coho salmon abundance and spawning distribution in the Unalakleet River 2004-2006, final report for study 05-101 USFWS, Office of Subsistence Management Fishery Information Service Division. Alaska Department of Fish and Game, Fishery Data Series No. 07-48, Anchorage.

Kent, S. 2010. Unalakleet River salmon studies, 2002–2008. Alaska Department of Fish and Game, Fishery Data Series No. 10-83, Anchorage.

Magdanz, J. S., and D. E. Punguk. 1981. Nome River fishery II. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 5, Nome.

Menard, J., J. Soong, and S. Kent. 2010. 2008 Annual management report Norton Sound, Port Clarence, and Kotzebue. Alaska Department of Fish and Game, Fishery Management Report No. 10-49, Anchorage.

Menard, J., J. Soong, S. Kent, and A. Brown. 2013. 2012 Annual management report Norton Sound-Port Clarence Area, and Arctic-Kotzebue Area. Alaska Department of Fish and Game, Fishery Management Report No. 13-28, Anchorage.

REFERENCES CITED (Continued)

Menard, J., J. Soong, S. Kent, L. Harlan, and J. Leon. 2015. 2014 Annual management report Norton Sound-Port Clarence Area, and Arctic-Kotzebue Area. Alaska Department of Fish and Game, Fishery Management Report No. 15-39, Anchorage.

Menard, J., J. Soong, S. Kent, L. Harlan, and J. Leon. 2017. 2015 Annual management report Norton Sound, Port Clarence, and Arctic, Kotzebue Areas. Alaska Department of Fish and Game, Fishery Management Report No. 17-15, Anchorage.

Menard, J., J. Soong, J. Bell, and L. Neff. 2018. 2017 Annual management report Norton Sound, Port Clarence, and Arctic, Kotzebue Areas. Alaska Department of Fish and Game, Fishery Management Report No. 18-16, Anchorage.

NPFMC (North Pacific Fisheries Management Council). 2013. Stock assessment and fishery evaluation report for the king and Tanner crab fisheries of the Bering Sea and Aleutian Islands Regions. Stock Assessment and Fishery Evaluation Reports. North Pacific Fishery Management Council. 605 W. 4th Ave., Suite 306, Anchorage.

NPFMC (North Pacific Fisheries Management Council). 2018. Stock assessment and fishery evaluation report for the king and Tanner crab fisheries of the Bering Sea and Aleutian Islands Regions. Stock Assessment and Fishery Evaluation Reports. North Pacific Fishery Management Council. 605 W. 4th Ave., Suite 306, Anchorage.

Pahlke, K. A. 1985. Preliminary studies of capelin (*Mallotus villosus)* in Alaska waters. Alaska Department of Fish and Game, Division of Commercial Fisheries, Informational Leaflet 250, Juneau.

Pedersen, S., and A. Linn Jr. 2005. North Slope (Kaktovik) subsistence fish harvest assessment. USFWS Office of Subsistence Management, Fisheries Resource Monitoring Program, Annual Report No. FIS 01-101, Anchorage, Alaska.

Pedersen, S., and S. C. Hugo. 2005. North Slope (Anaktuvuk Pass) subsistence fish harvest assessment. USFWS Office of Subsistence Management, Fisheries Resource Monitoring Program, Annual Report No. FIS 02-050-3, Anchorage, Alaska.

Ray, D. J. 1975. The Eskimos of Bering Strait, 1650-1898. University of Washington Press, Seattle.

Scanlon, B. 2017. Fishery management report for sport fisheries in the Northwest/North Slope Management Area, 2015. Alaska Department of Fish and Game, Fishery Management Report No. 17-32, Anchorage.

Savereide, J. W., and J. Huang. 2016. Spawning location, run timing, and spawning frequency of Kobuk River sheefish 2008–2014. Alaska Department of Fish and Game, Fishery Data Series No. 16-31, Anchorage.

Thomas, D. C. 1982. The role of local fish and wildlife resources in the community of Shaktoolik, Alaska. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 13, Nome.

Todd, G. L., C. S. Monsivais, and D. F. Kaplan. 2005. Estimation of chum salmon abundance, migration timing and spawning distribution in the Fish River complex, Norton Sound Alaska, 2002-2004. Alaska Department of Fish and Game, Fishery Data Series No. 05-67, Anchorage.

Wuttig, K. G. 1998. Escapement of Chinook salmon in the Unalakleet River in 1997. Alaska Department of Fish and Game, Fishery Data Series No. 98-08, Anchorage.

Wuttig, K. G. 1999. Escapement of Chinook salmon in the Unalakleet River in 1998. Alaska Department of Fish and Game, Fishery Data Series No. 99-10, Anchorage.

Zheng, J., G. H. Kruse, and L. Fair. 1998. Using multiple data sets to assess red king crab *Paralithodes camtschaticus* in Norton Sound, Alaska: a length-based stock synthesis approach. Fishery Stock Assessment Models. Alaska Sea Grant College Program Report No. AK-SG-98-01, University of Alaska Fairbanks.

TABLES

Table 1.–Norton Sound commercial salmon harvest summary by subdistrict, 2018.

		Subdistricts						
		1	2	3	4	5	6	Total
Number of fishermen [a]		7	18	33	12	37	80	149
Chinook	Number	8	20	73	49	19	101	270
	Weight (lb)	74	158	750	580	190	1,027	2,779
Sockeye	Number	398	74	399	158	516	1,766	3,311
	Weight (lb)	2,368	434	2,172	908	2,916	10,180	18,978
Coho	Number	8,964	2,995	19,987	1,513	71,468	155,578	260,505
	Weight (lb)	64,663	20,428	141,125	10,847	504,618	1,103,037	1,844,718
Pink	Number	2,816	4,171	9,328	1,007	2,489	19,312	39,123
	Weight (lb)	8,827	12,330	25,909	2,742	7,327	59,058	116,193
Chum	Number	10,002	25,070	38,416	14,548	41,482	108,305	237,823
	Weight (lb)	71,937	183,296	271,458	106,338	295,007	767,578	1,695,614
Total	Number	22,188	32,330	68,203	17,275	115,974	285,062	541,032
	Weight (lb)	147,869	216,646	441,414	121,415	810,058	1,940,880	3,678,282

Note: The above harvests do not include personal use. Average commercial weights by species were 10.3 lb for Chinook salmon, 5.7 lb for sockeye salmon, 7.1 lb for coho salmon, 3.0 lb for pink salmon, and 7.1 lb for chum salmon.

[a] Number of fishermen is a unique number of permit holders that fished in each subdistrict. Some permit holders fished in more than 1 subdistrict.

Table 2.–Subsistence salmon harvest for northern Norton Sound, 2018.

	Permits fished [a]	Number of salmon harvested					
		Chinook	Sockeye	Coho	Pink	Chum	Total
Marine waters	23	4	75	386	952	484	1,901
Bonanza River	13	0	0	219	329	43	591
Eldorado River- below weir	13	0	0	117	539	80	736
Flambeau River	2	0	0	8	0	15	23
Safety Sound	5	0	0	54	185	193	432
Nome River- above weir	7	0	0	19	28	0	47
Nome River- below weir	309	5	125	2,040	7,488	317	9,975
Cripple Creek	30	0	0	325	140	4	469
Penny River	42	0	0	530	64	3	597
Sinuk River	21	0	130	72	100	9	311
Snake River - above weir	7	0	0	17	230	0	247
Snake River - below weir	99	1	3	1,017	578	23	1,622
Solomon River - above weir	2	0	0	3	0	0	3
Solomon River - below weir	27	1	3	133	136	25	298
Other Rivers & Creeks	1	0	0	0	17	0	17
Nome Subdistrict total [b]	466	11	336	4,940	10,786	1,196	17,269
Cape Woolley [c]	1	0	0	0	20	0	20
Marine Waters	10	28	34	116	1,405	315	1,898
Kachavik River	14	0	5	176	470	17	668
McKinley River	8	2	16	223	0	0	241
Chinik Creek	8	0	15	57	20	17	109
Fish River - above tower	16	4	0	202	1,976	131	2,313
Fish River - below tower	26	13	13	393	2,830	280	3,529
Niukluk River	19	3	0	202	243	13	461
Golovin Subdistrict total [d]	94	50	83	1,369	6,944	773	9,219
Marine Waters	5	30	10	46	29	151	266
Kwiniuk River - above tower	5	1	0	36	972	38	1,047
Kwiniuk River - below tower	34	19	25	1,230	2,780	282	4,336
Next Creek	5	1	0	21	15	12	49
Tubutulik River	6	8	0	54	328	89	479
Iron Creek	10	0	0	270	212	16	498
Other Rivers & Creeks	1	0	0	0	24	0	24
Elim Subdistrict total [e]	43	59	35	1,657	4,360	588	6,699
Port Clarence - marine waters	68	40	2,215	649	3,754	4,296	10,954
Agiapuk River	1	0	0	2	0	0	2
Tuksuk Channel	10	2	952	8	312	1,032	2,306
Imuruk Basin	1	0	124	0	95	134	353
Kuzitrin River	1	0	17	9	15	13	54
Pilgrim River- above weir	82	4	2,215	46	59	42	2,366
Pilgrim River- below weir	162	9	6,858	50	321	108	7,346
Salmon Lake	0	0	0	0	0	0	0
Port Clarence District total [f g]	316	55	12,381	764	4,556	5,625	23,381
Total		175	12,835	8,730	26,666	8,182	56,588

-continued-

[a] There were 6 locations where subsistence permits were issued in 2018 for northern Norton Sound: 1-Nome Subdistrict; 2-Cape Woolley; 3-Golovin Subdistrict; 4-Elim Subdistrict; 5-Pilgrim River; and 6-Port Clarence District. Except for Pilgrim River and Salmon Lake, each permit is valid for both marine and fresh waters. Permits fished include those permit holders who fished but reported no harvest.

[b] Of 620 Nome Subdistrict permits issued, 614 were returned.

[c] All 14 Cape Woolley permits issued were returned.

[d] Of 210 Golovin Subdistrict permits issued, 208 were returned.

[e] All 56 Elim Subdistrict permits issued were returned.

[f] Of 500 Pilgrim River permits issued, 495 were returned. All 189 Port Clarence District permits issued were returned.

[g] No Salmon Lake permits were issued.

Table 3.–Salmon counts of rivers and associated salmon escapement goal ranges (SEG, BEG or OEG), Norton Sound and Port Clarence, 2018.

	Chinook salmon			Chum salmon				
Stream	Weir/ tower count	Escapement goal range	Aerial survey count [a]	Weir/ tower count	Escapement goal range	Aerial survey count [a]	Aerial survey expansion	Escapement goal range
Salmon L.								
Grand Central R.								
Pilgrim R.	88			33,135				
Glacial L.								
Sinuk R.						150	11,061	
Cripple R.								
Penny R.								
Anvil Creek								
Snake R.	12			3,028	1,600–2,500 [b]	260		
Nome R.	56			5,240	2,900–4,300 [b]	305		
Flambeau R.						4,921	12,823	
Eldorado R.	31			42,361	6,000–9,200 [b]			
Bonanza R.	11			7,903		850		
Solomon R.	11			2,917		215		
Nome Subdistrict					23,000–35,000 [c]		85,238	
Fish R.	102			37,170				
Boston Cr.			7			40		
Niukluk R.								
Ophir Cr.								
Kwiniuk R.	87	250		41,658	11,500–23,000 [d]			
Tubutulik R.					9,200–18,400 [e]			
Ungalik R.						1,980		
Inglutalik R	207			28,736		1,530		
Shaktoolik R.	1,384			52,765				
Unalakleet R. [f]	3,326			128,253				
Old Woman R.								
North R.	2,568	1,200–2,600		26,150				

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Table 3.–Page 2 of 2.

Stream	Coho salmon			Sockeye salmon			Pink salmon		
	Weir/ tower count	Aerial survey count [a]	Escapement goal range	Weir/ tower count	Aerial survey count [a]	Escapement goal range	Weir/ tower count	Escapement goal range	Aerial survey count [a]
Salmon L.					20,627	Combined			
Grand Central R.					5,900	4,000–8,000			
Pilgrim R.	239			33,802			46,490		
Glacial L.					1,570	800–1,600			
Sinuk R.									1,068,00
Cripple R.		1,009							300,000
Penny R.		690							80,800
Anvil Creek									
Snake R.	7,491	1,270		455			463,742		10,700
Nome R.	8,902			245			3,246,072	13,000	30,000
Flambeau R.		1,470			5				1,320
Eldorado R. [b]	47	702		3			197,119		
Bonanza R.	1,030	1,373		189			885,735		5,500
Solomon R.	161	1,015		18			456,035		10,000
Fish R.	19,338			40			2,759,770		
Boston Cr.									81,100
Niukluk R.			Combined						
Ophir Cr.			750–1,600						
Kwiniuk R.	17,172		650–1,300	6			1,804,752	8,400	
Tubutulik R.									
Ungalik R.		190							
Inglutalik R	2,367	70		141			20,231		
Shaktoolik R.	53,562			6			702,607		
Unalakleet R. [f]	58,755			630			[f]		
Old Woman R.									
North R.	20,010		550–1,100	66			477,429	25,000	

Note: Data not available for all streams. Sustainable escapement goal (SEG), biological escapement goal (BEG), and optimal escapement goal (OEG) are listed.

[a] All aerial surveys are rated fair to good, unless otherwise noted.

[b] The Alaska Board of Fisheries (BOF) also established an OEG with the same range as the BEG.

[c] BOF established OEG is the same range as the BEG and is based on a combination of weir counts and expanded aerial survey counts. The OEG and BEG do not include Cripple and Penny rivers.

[d] This represents the OEG in regulation. The BEG is 10,000–20,000 for the Kwiniuk River and 8,000–16,000 for the Tubutulik River.

[e] The goal listed is actual fish and not aerial counts. However, currently there is no counting project on the river.

[f] Starting in 2018, the weir picket spacing was increased to allow pink salmon to pass through; therefore, pink salmon are no longer enumerated.

Table 4.–Commercial salmon set gillnet catches from Nome, Subdistrict 1, Norton Sound, 2018.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	6/27–6/28	24	5	0	1,546	14	0	0
2	Chum	6/30–7/01	24	4	0	1,864	240	13	0
3	Chum	7/03–7/04	24	1 [a]	0	179	25	0	0
4	Chum	7/06–7/08	48	3	0	1,166	140	0	0
5	Chum	7/10–7/14	96	4	0	2,171	995	16	0
6	Chum	7/17–7/22	120	3	0	1,076	563	19	60
7	Chum	7/24–7/26	48	3	0	740	461	8	101
8	Chum	7/27–7/29	48	3	0	391	364	23	136
9	Coho	7/31–8/05	120	4	3	225	0	41	496
10	Coho	8/07–8/09	48	5	0	201	0	81	869
11	Coho	8/10–8/16	144	5	0	304	14	52	2,158
12	Coho	8/18–8/20	48	4	0	40	0	20	1,427
13	Coho	8/22–8/25	72	5	3	57	0	55	2,024
14	Coho	8/27–8/31	96	4	2	28	0	40	1,306
15	Coho	9/02–9/05	72	0	0	0	0	0	0
16	Coho	9/06–9/09	72	6	0	14	0	30	387
17	Coho	9/10–9/14	96	0	0	0	0	0	0
Totals				7	8	10,002	2,816	398	8,964

Note: An additional 10 Chinook, 203 chum, 1,114 pink, 28 sockeye, and 116 coho salmon were retained for personal use in 2018. Period 15 was opened for 72 hours (9/2–9/5) and period 17 was opened for 96 hours (9/10–9/14), but no one fished.

[a] Permit holder waived confidentiality.

Table 5.–Commercial salmon set gillnet catches from Golovin, Subdistrict 2, Norton Sound, 2018.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	6/23–6/24	24	8	4	2,030	4	0	0
2	Chum	6/27–6/28	24	6	2	2,882	28	10	0
3	Chum	6/30–7/01	24	10	8	3,025	121	7	0
4	Chum	7/03–7/05	48	12	4	6,352	428	19	0
5	Chum	7/07–7/09	48	8	1	2,226	513	2	1
6	Chum	7/10–7/11	24	4	0	757	188	0	0
7	Chum	7/13–7/15	48	8	0	2,670	720	5	0
8	Chum	7/17–7/20	72	5	0	1,543	413	10	17
9	Chum	7/21–7/23	48	8	0	2,151	841	9	83
10	Chum	7/25–7/27	48	8	1	1,084	836	5	213
11	Chum	7/28–7/30	48	2	[a]	[a]	[a]	[a]	[a]
12	Coho	8/01–8/03	48	3	0	136	0	2	169
13	Coho	8/04–8/07	72	2	[a]	[a]	[a]	[a]	[a]
14	Coho	8/08–8/10	48	2	[a]	[a]	[a]	[a]	[a]
15	Coho	8/12–8/16	96	2	[a]	[a]	[a]	[a]	[a]
16	Coho	8/18–8/24	144	2	[a]	[a]	[a]	[a]	[a]
17	Coho	8/27–8/31	96	2	[a]	[a]	[a]	[a]	[a]
18	Coho	9/02–9/07	120	2	[a]	[a]	[a]	[a]	[a]
19	Coho	9/09–9/14	120	1	[a]	[a]	[a]	[a]	[a]
Totals				18	20	25,070	4,171	74	2,995

Note: An additional 11 Chinook and 1 sockeye salmon were retained for personal use in 2018.

[a] Information is confidential because less than 3 permit holders fished.

Table 6.–Commercial salmon set gillnet catches from Elim, Subdistrict 3, Norton Sound, 2018.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	6/23–6/24	24	12	5	3,714	9	0	0
2	Chum	6/27–6/28	24	23	26	7,005	57	3	0
3	Chum	6/30–7/01	24	18	12	4,763	66	3	0
4	Chum	7/03–7/05	48	24	7	6,791	798	28	0
5	Chum	7/07–7/09	48	17	7	4,589	926	17	0
6	Chum	7/10–7/11	24	16	0	2,223	1,287	8	0
7	Chum	7/13–7/15	48	17	0	3,126	1,707	22	0
8	Chum	7/17–7/20	72	16	0	3,234	2,269	15	106
9	Chum	7/21–7/23	48	18	1	1,027	947	22	119
10	Chum	7/25–7/27	48	16	2	405	669	10	359
11	Coho	7/28–7/30	48	14	1	371	593	13	554
12	Coho	8/01–8/03	48	14	1	346	0	42	1,102
13	Coho	8/04–8/07	72	16	7	371	0	50	4,567
14	Coho	8/08–8/10	48	16	0	111	0	36	2,748
15	Coho	8/12–8/16	96	20	0	138	0	31	3,094
16	Coho	8/18–8/20	48	16	0	86	0	19	2,576
17	Coho	8/21–8/23	48	14	0	34	0	9	1,061
18	Coho	8/25–8/27	48	15	0	12	0	4	984
19	Coho	8/28–8/31	72	10	2	35	0	24	1,258
20	Coho	9/02–9/07	120	8	1	28	0	27	908
21	Coho	9/09–9/14	120	7	1	7	0	16	551
Totals				34	73	38,416	9,328	399	19,987

Note: An additional 65 Chinook, 3 chum, 146 pink, 83 sockeye, and 15 coho salmon were retained for personal use in 2018.

Table 7.–Commercial salmon set gillnet catches from Norton Bay, Subdistrict 4, Norton Sound, 2018.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	6/23–6/24	24	8	7	1,196	3	0	0
2	Chum	6/27–6/28	24	9	10	2,401	6	2	0
3	Chum	6/30–7/01	24	9	8	1,975	12	1	0
4	Chum	7/03–7/05	48	9	8	3,255	89	20	0
5	Chum	7/07–7/09	48	10	2	1,295	79	21	0
6	Chum	7/10–7/11	24	7	1	600	100	10	0
7	Chum	7/13–7/15	48	6	0	609	50	5	0
8	Chum	7/17–7/20	72	8	2	1,381	361	38	26
9	Chum	7/21–7/23	48	8	0	661	132	14	46
10	Chum	7/25–7/27	48	8	1	481	110	13	131
11	Chum	7/28–7/30	48	6	1	213	65	9	116
12	Chum	8/01–8/03	48	7	4	220	0	22	191
13	Coho	8/04–8/07	72	4	3	104	0	3	231
14	Coho	8/08–8/10	48	5	0	102	0	0	514
15	Coho	8/12–8/16	96	4	1	37	0	0	226
16	Coho	8/18–8/20	48	0	0	0	0	0	0
17	Coho	8/21–8/23	48	1	[a]	[a]	[a]	[a]	[a]
18	Coho	8/25–8/27	48	1	[a]	[a]	[a]	[a]	[a]
19	Coho	8/28–8/31	72	1	[a]	[a]	[a]	[a]	[a]
Totals				12	49	14,548	1,007	158	1,513

Note: An additional 3 Chinook salmon were retained for personal use in 2018. Period 16 was opened for 48 hours (8/18–8/20), but no one fished.

[a] Information is confidential because less than 3 permit holders fished.

Table 8.–Commercial salmon set gillnet catches from Shaktoolik, Subdistrict 5, Norton Sound, 2018.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	7/01–7/02	24	10	0	4,013	122	25	
2	Chum	7/05–7/07	48	14	0	10,810	484	96	
3	Chum	7/09–7/11	48	19	0	7,134	757	90	4
4	Chum	7/13–7/15	48	19	0	4,164	277	67	21
5	Chum	7/17–7/20	48	19	0	5,438	495	49	1,020
6	Chum	7/21–7/23	48	19	5	2,754	178	10	1,451
7	Chum	7/25–7/27	48	21	0	3,341	126	35	3,264
8	Coho	7/28–7/30	48	16	2	807	50	14	2,516
9	Coho	8/01–8/03	48	16	3	759	0	8	5,960
10	Coho	8/04–8/07	72	20	1	619	0	42	11,464
11	Coho	8/08–8/10	48	32	2	913	0	31	15,100
12	Coho	8/12–8/16	96	33	2	416	0	14	10,457
13	Coho	8/18–8/20	48	22	2	150	0	9	5,624
14	Coho	8/21–8/23	48	23	2	87	0	9	8,029
15	Coho	8/25–8/27	48	23	0	21	0	2	2,239
16	Coho	8/28–8/31	72	26	0	37	0	11	3,169
17	Coho	9/02–9/07	120	6	0	15	0	2	742
18	Coho	9/09–9/14	120	8	0	4	0	2	408
Totals				37	19	41,482	2,489	516	71,468

Note: No salmon were reported as retained for personal use in 2018.

Table 9.–Commercial salmon set gillnet catches from Unalakleet, Subdistrict 6, Norton Sound, 2018.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	7/01–7/02	24	24	0	3,946	3,531	10	0
2	Chum	7/05–7/07	48	37	0	14,116	5,760	195	0
3	Chum	7/09–7/11	48	38	0	24,081	3,331	389	4
4	Chum	7/13–7/15	48	43	0	14,954	1,724	217	85
5	Chum	7/17–7/20	48	46	0	21,768	2,624	223	2,012
6	Chum	7/21–7/23	48	49	17	8,761	1,075	89	2,100
7	Chum	7/25–7/27	48	43	7	6,442	856	101	5,603
8	Coho	7/28–7/30	48	53	16	4,505	411	96	6,481
9	Coho	8/01–8/03	48	54	18	3,404	0	79	11,216
10	Coho	8/04–8/07	72	51	11	1,519	0	82	16,726
11	Coho	8/08–8/10	48	67	5	1,754	0	102	26,845
12	Coho	8/12–8/16	96	71	9	1,455	0	64	27,234
13	Coho	8/18–8/20	48	65	6	702	0	35	13,263
14	Coho	8/21–8/23	48	62	6	327	0	17	12,824
15	Coho	8/25–8/27	48	49	1	132	0	4	7,394
16	Coho	8/28–8/31	72	49	4	217	0	28	10,583
17	Coho	9/02–9/07	120	30	1	202	0	33	11,134
18	Coho	9/09–9/14	120	17	0	20	0	2	2,074
Totals				80	101	108,305	19,312	1,766	155,578

Note: An additional 547 Chinook, 1 chum, 66 pink, 200 sockeye, and 71 coho salmon were retained for personal use in 2018.

Table 10.–Kotzebue District commercial chum salmon catch and average weight by date, 2018.

Date	Permits fished	Catch	Pounds	Average weight
7/10	20	2,945	23,954	8.13
7/11	32	4,941	40,447	8.19
7/12	35	5,111	40,990	8.02
7/13	34	5,281	43,477	8.23
7/15	42	7,548	61,382	8.13
7/16	18	6,053	48,293	7.98
7/17	50	12,875	105,261	8.18
7/18	30	8,119	64,505	7.94
7/19	52	14,233	112,749	7.92
7/20	56	22,815	184,156	8.07
7/22	48	18,510	153,494	8.29
7/23	52	11,654	96,057	8.24
7/24	53	21,823	172,730	7.92
7/25	53	22,955	187,980	8.19
7/26	52	19,844	162,709	8.20
7/27	55	18,458	150,913	8.18
7/29	51	16,114	135,153	8.39
7/30	57	22,390	186,452	8.33
7/31	63	32,561	266,049	8.17
8/1	37	12,035	99,539	8.27
8/2	58	23,358	190,061	8.14
8/3	40	19,566	158,961	8.12
8/5	40	20,660	167,754	8.12
8/6	33	17,932	148,124	8.26
8/7	42	13,531	110,602	8.17
8/8	40	6,797	55,239	8.13
8/9	45	24,414	204,855	8.39
8/10	51	25,572	211,935	8.29
8/12	24	6,282	52,175	8.31
8/13	22	11,829	98,172	8.30
8/14	28	13,126	106,205	8.09
8/15	47	27,049	217,188	8.03
8/16	49	32,034	254,341	7.94
8/17	42	19,299	158,712	8.22
8/19	38	17,708	148,621	8.39
8/20	34	16,937	139,788	8.25
8/21	43	17,399	143,253	8.23
8/22	38	16,685	131,317	7.87
8/23	36	12,950	101,616	7.85
8/24	27	11,599	85,502	7.37
8/26	15	8,188	63,309	7.73
8/27	27	9,577	74,718	7.80
8/28	25	7,347	57,163	7.78
8/29	30	11,507	90,647	7.88
8/30	34	10,097	79,640	7.89
8/31	26	7,445	56,671	7.61
Total	95	695,153	5,642,859	8.12

Note: Also harvested during the 2018 commercial fishery and kept for personal use were 194 Chinook, 48 sockeye, 34 chum, 1,190 pink, and 20 coho salmon, and 18 whitefish, 688 Dolly Varden, and 344 sheefish.

Table 11.–Historical chum salmon catch for Kobuk River drift test fishery, 1993–2018.

Year	Dates of operation	Number of drifts	Cumulative CPUE [a]	Midpoint date
1993	7/12–8/12	164	494	8/03
1994	7/13–8/30	248	1,207	8/04
1995	7/12–8/16	196	1,188	8/02
1996	7/09–8/14	208	2,581	7/31
1997	7/09–8/14	202	797	8/03
1998	7/10–8/15	182	538	7/29
1999	7/11–8/13	176	1,357	8/02
2000	7/07–8/14	228	1,481	8/01
2001	7/05–8/13	232	1,575	7/26
2002	7/05–8/12	218	875	7/23
2003	7/09–8/13	214	749	8/02
2004	7/02–8/12	242	855	8/05
2005	7/07–8/15	207	1,207	8/06
2006	7/07–8/19	217	743	8/16
2007	7/11–8/20	207	1,342	8/09
2008	7/09–8/14	200	2,269	7/30
2009	7/10–8/20	242	971	8/06
2010	7/15–8/24	234	1,401	8/05
2011	7/13–8/21	220	2,499	8/10
2012	7/17–8/16	151	2,398	8/08
2013	7/17–8/25	208	2,698	8/06
2014	7/17–8/13	152	4,150	8/02
2015	7/17–8/25	204	2,535	8/05
2016	7/20–8/24	189	1,484	8/06
2017	7/20–8/26	202	2,097	8/09
2018	7/20–8/27	204	2,529	8/08

[a] Cumulative catch per unit of effort (CPUE) is calculated as the sum of daily CPUE during the period of data collection, and daily CPUE (I) is calculated as the number of fish that would have been caught if 100 fathoms of gillnet had been fished for 60 minutes. $I = (6{,}000 * C)/(L * T)$, where C = number of chum salmon caught, L = length of gillnet in fathoms, and T = mean fishing time in minutes.

Table 12.–Daily catch for the winter open access commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, March 3–April 30, 2018.

Date [a]	Landings	Number of crab	Crab harvested (lb)	Cumulative total (lb)	Number of pots pulled	Average weight (lb)	CPUE
03/05	1	8	24	24	4	3.0	2
03/10	1	7	21	45	2	3.0	4
03/11	2	39	117	162	10	3.0	4
03/12	1	18	54	216	4	3.0	5
03/13	2	15	45	261	7	3.0	2
03/14	2	14	42	303	8	3.0	2
03/18	1	26	78	381	3	3.0	9
03/20	1	12	35	416	1	2.9	12
03/22	1	19	60	476	3	3.2	6
03/24	2	27	81	557	13	3.0	2
03/30	1	38	114	671	5	3.0	8
04/01	4	123	335	1,006	14	2.7	9
04/05	2	34	102	1,108	11	3.0	3
04/06	1	32	96	1,204	9	3.0	4
04/12	2	53	159	1,363	13	3.0	4
04/13	3	57	171	1,534	7	3.0	8
04/14	3	166	535	2,069	24	3.2	7
04/16	1	38	124	2,193	10	3.3	4
04/17	5	145	464	2,657	44	3.2	3
04/18	9	289	938	3,595	63	3.2	5
04/19	5	117	362	3,957	20	3.1	6
04/21	3	130	408	4,365	15	3.1	9
04/22	1	59	183	4,548	6	3.1	10
04/23	4	152	474	5,022	16	3.1	10
04/24	2	44	139	5,161	12	3.2	4
Total	60	1,662	5,161		324	3.1	5

Source: Fish ticket data.

[a] The open access fishery closed by regulation on April 30, but the last delivery was made on April 24.

Table 13.–Daily catch for the CDQ king crab harvest, Norton Sound Section, Eastern Bering Sea, March 3–April 14, 2018.

Date [a]	Landings	Number of crab	Pounds of crab	Cumulative total (lb)	Number of pots pulled	Average weight (lb)	CPUE
03/04	2	37	110	110	17	3.0	2
03/05	4	94	287	397	27	3.1	3
03/06	5	122	377	774	35	3.1	3
03/07	1	45	137	911	16	3.0	3
03/08	6	250	797	1,708	70	3.2	4
03/09	6	125	408	2,116	46	3.3	3
03/10	5	125	400	2,516	36	3.2	3
03/11	11	375	1,196	3,712	103	3.2	4
03/12	5	191	609	4,321	39	3.2	5
03/13	7	157	480	4,801	53	3.1	3
03/14	6	193	564	5,365	59	2.9	3
03/15	10	328	1,008	6,373	79	3.1	4
03/16	3	80	323	6,696	29	4.0	3
03/17	1	76	250	6,946	20	3.3	4
03/18	10	341	1,085	8,031	73	3.2	5
03/19	3	27	89	8,120	25	3.3	1
03/20	9	255	811	8,931	82	3.2	3
03/21	4	137	423	9,354	30	3.1	5
03/22	1	37	129	9,483	8	3.5	5
03/23	10	304	942	10,425	103	3.1	3
03/24	3	131	426	10,851	35	3.3	4
03/25	12	334	1,063	11,914	94	3.2	4
03/26	4	118	386	12,300	26	3.3	5
03/27	6	89	276	12,576	67	3.1	1
03/28	9	198	620	13,196	61	3.1	3
03/29	4	111	339	13,535	37	3.1	3
03/30	7	96	283	13,818	57	2.9	2
03/31	5	192	631	14,449	51	3.3	4
04/01	14	505	1,619	16,068	102	3.2	5
04/02	5	135	428	16,496	46	3.2	3
04/03	6	164	556	17,052	49	3.4	3
04/04	8	116	368	17,420	66	3.2	2
04/05	8	198	635	18,055	62	3.2	3
04/06	4	154	497	18,552	46	3.2	3
04/07	11	342	1,087	19,639	132	3.2	3
04/08	6	126	409	20,048	51	3.2	2
04/09	4	72	239	20,287	28	3.3	3
04/10	5	163	542	20,829	34	3.3	5
04/11	9	260	824	21,653	72	3.2	4
04/12	7	127	421	22,074	33	3.3	4
04/13	9	345	1,106	23,180	82	3.2	4
04/14	7	243	777	23,957	61	3.2	4
Total	262	7,518	23,957		2,242	3.2	3

Source: Fish ticket data.

[a] The Community Development Quota (CDQ) fishery closed on April 14, and the last deliveries were made on April 14.

Table 14.–Daily catch for the summer open access commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, June 24–July 28, 2018.

Date [a]	Landings	Number of crab	Number of pounds	Cumulative total (lb)	Number of pots pulled	Average weight (lb)	CPUE
6/26	6	1,881	6,328	6,328	197	3.4	10
6/27	10	3,220	10,356	16,684	335	3.2	10
6/28	16	6,965	23,053	39,737	544	3.3	13
6/29	5	1,962	6,472	46,209	155	3.3	13
6/30	9	4,221	13,768	59,977	313	3.3	13
07/01	4	1,067	3,557	63,534	110	3.3	10
07/02	1	13	36	63,570	1	2.8	13
07/03	13	5,927	19,252	82,822	446	3.2	13
07/04	16	8,221	26,688	109,510	584	3.2	14
07/05	2	1,067	3,706	113,216	80	3.5	13
07/06	7	3,069	10,069	123,285	273	3.3	11
07/07	23	12,983	44,265	167,550	804	3.4	16
07/08	3	1,897	6,347	173,897	104	3.3	18
07/10	20	9,997	33,288	207,185	751	3.3	13
07/11	6	3,630	12,469	219,654	229	3.4	16
07/12	5	973	3,174	222,828	166	3.3	6
07/13	14	2,876	9,473	232,301	460	3.3	6
07/14	4	575	1,955	234,256	100	3.4	6
07/15	10	2,437	7,964	242,220	381	3.3	6
07/17	16	3,124	10,271	252,491	615	3.3	5
07/18	1	57	185	252,676	40	3.2	1
07/19	2	43	126	252,802	40	2.9	1
07/20	10	1,602	5,311	258,113	295	3.3	5
07/21	6	797	2,672	260,785	225	3.4	4
07/22	7	1,198	4,066	264,851	222	3.4	5
07/23	5	1,602	5,156	270,007	169	3.2	9
07/24	6	894	2,996	273,003	212	3.4	4
07/25	6	1,944	6,598	279,601	205	3.4	9
07/26	2	74	224	279,825	34	3.0	2
07/27	6	1,793	6,417	286,242	205	3.6	9
07/28	10	1,908	6,519	292,761	325	3.4	6
07/29	5	1,596	5,635	298,396	177	3.5	9
Total	256	89,613	298,396		8,797	3.3	10

Source: Fish ticket data.

[a] The open access fishery closed by emergency order on July 28 at midnight, and the last deliveries were made on July 29.

Table 15.–Summer commercial harvest of red king crab from Norton Sound Section by statistical area, Norton Sound District, 2018.

Statistical area	Number of crab	Pounds of crab	Number of pots pulled	CPUE	Average weight (lb)
616331	338	1,110	114	3	3.3
626331	284	956	39	7	3.4
626401	6,991	22,520	660	11	3.2
636330	284	949	39	7	3.3
636401	52,746	174,811	4,288	12	3.3
646401	17,795	60,162	1,693	11	3.4
656401	1,478	4,885	625	2	3.3
666330	188	595	30	6	3.2
666401	3,048	9,963	490	6	3.3
666402	6,461	22,445	819	8	3.5
Total	89,613	298,396	8,797	10	3.3

APPENDIX A: NORTON SOUND FISHERIES

Appendix A1.–Commercial salmon catch by species, Norton Sound District, 1990–2018.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	8,895	434	56,712	0	65,123	131,164
1991	6,068	203	63,647	0	86,871	156,789
1992	4,541	296	105,453	6,284	83,394	199,968
1993	8,972	284	43,291	163,176	54,448	270,171
1994	5,285	80	102,152	982,389	18,290	1,108,196
1995	8,860	128	47,862	81,644	42,898	181,392
1996	4,999	1	70,458	487,441	10,833	573,732
1997	12,573	161	32,284	20	34,103	79,141
1998	7,429	7	29,623	588,013	16,324	641,396
1999	2,508	0	12,662	0	7,881	23,051
2000	752	14	42,701	166,548	6,120	216,135
2001	213	44	19,492	0	11,100	30,849
2002	5	1	1,759	0	600	2,365
2003	12	16	17,058	0	3,560	20,646
2004 [a]	0	40	42,016	0	6,296	48,352
2005	151	8	85,517	0	3,983	89,659
2006	20	3	130,808	0	9,995	140,826
2007	17	2	126,122	3,769	22,408	152,318
2008	66	46	120,293	75,792	25,124	221,321
2009 [a]	0	84	86,998	17,306	34,121	138,509
2010	118	96	62,068	31,539	117,803	211,624
2011	145	347	58,884	7,120	110,552	177,048
2012 [a]	0	100	36,963	205,403	62,765	305,231
2013 [a]	0	193	53,864	8,227	119,056	181,340
2014	84	319	112,568	181,633	107,674	402,278
2015	780	3,653	153,844	62,167	147,350	367,794
2016	183	2,635	102,722	208,739	51,167	365,446
2017	230	2,806	191,197	18,954	163,422	376,609
2018	270	3,311	260,505	39,123	237,823	541,032
Avg 2013–2017	255	1,921	122,839	95,944	117,734	338,693
Avg 2008–2017	161	1,028	97,940	81,688	93,903	274,720

[a] No Chinook salmon sales were allowed by ADF&G or the buyer would not purchase Chinook salmon.

Appendix A2.–Number of commercial salmon permits fished, Norton Sound, 1990–2018.

	Subdistrict						District
Year	1	2	3	4	5	6	total [a]
1990	0	15	23	0	28	73	128
1991	0	16	24	0	25	75	126
1992	2	1	21	9	25	71	110
1993	1	8	26	15	37	66	153
1994	1	5	21	0	39	71	119
1995	2	7	12	0	26	58	105
1996	1	4	12	0	20	54	86
1997	0	11	21	9	19	57	102
1998	0	16	23	0	28	52	82
1999	0	0	0	0	15	45	60
2000	0	12	13	0	26	49	79
2001	0	5	5	0	13	29	51
2002	0	0	0	0	7	5	12
2003	0	0	0	0	10	20	30
2004	0	0	0	0	11	25	36
2005	0	0	0	0	12	28	40
2006	0	0	0	0	22	40	61
2007	0	0	11	0	15	47	71
2008	0	4	12	4	23	58	91
2009	0	5	17	7	21	49	88
2010	0	10	19	5	35	59	115
2011	0	13	32	12	30	65	123
2012	0	14	24	18	21	55	123
2013	1	14	21	18	24	57	124
2014	3	18	29	20	24	63	128
2015	4	12	26	16	23	56	128
2016	5	10	25	18	28	68	141
2017	6	10	26	18	31	69	139
2018	7	18	34	12	36	80	149
Avg 2013–2017	4	13	25	18	26	63	132
Avg 2008–2017	2	11	23	14	26	60	120

[a] District total is the number of fishermen that actually fished in Norton Sound; some fishermen may have fished more than 1 subdistrict.

Appendix A3.–Round weight and value of commercially caught salmon by species, Norton Sound District, 1990–2018.

	Pounds caught (round weight in pounds)					Salmon	Value of
Year	Chinook	Sockeye	Coho	Pink	Chum	roe (lb)	catch ($)
1990	168,745	[a]	426,902	[a]	482,060	75	474,064
1991	107,541	[a]	469,495	[a]	597,272	221	413,479
1992	57,571	[a]	820,406	18,230	595,345	2,641	448,395
1993	151,504	[a]	287,702	406,820	347,072	2,608	368,723
1994	98,492	[a]	766,050	2,185,066	122,540	0	863,060
1995	174,771	[a]	356,190	198,121	290,445	0	356,164
1996	95,794	[a]	573,372	1,196,115	84,349	0	340,347
1997	225,136	1,095	235,517	50	253,006	880	363,908
1998	127,831	43	232,705	1,330,624	106,687	0	358,982
1999	48,421	0	88,037	0	57,656	0	76,860
2000	11,240	118	307,565	369,800	40,298	0	149,907
2001	3,803	353	152,293	0	79,558	0	56,921
2002	50	11	12,972	0	4,555	0	2,941
2003	136	121	139,775	0	23,687	0	64,473
2004	0	254	302,379	0	42,385	0	122,506
2005	2,511	2,069	659,278	0	28,071	0	296,154
2006	167	23	869,427	0	68,500	0	389,707
2007	206	16	1,002,078	10,537	151,386	0	572,195
2008	970	262	855,980	187,979	171,151	0	759,451
2009	0	583	679,416	46,698	240,502	0	722,167
2010	1,697	726	472,939	87,954	799,550	0	1,220,487
2011	1,659	2,396	438,481	19,768	774,906	0	1,269,730
2012	0	691	245,078	492,372	425,233	0	758,908
2013	0	1,416	410,791	24,201	823,453	0	1,183,236
2014	1,079	2,154	815,394	565,346	747,466	0	1,915,749
2015	10,704	25,642	1,226,475	215,552	1,018,487	0	1,940,408
2016	2,123	16,057	701,598	747,683	345,197	0	1,237,229
2017	2,321	16,748	1,308,875	72,839	1,163,445	0	2,788,316
2018	2,779	18,978	1,844,718	116,193	1,695,614	0	4,001,929

[a] Information not available.

Appendix A4.–Estimated mean prices paid to commercial salmon fishermen in dollars, Norton Sound District, 1990–2018.

Year	Chinook	Sockeye	Pink	Chum	Coho
1990	1.01	[a]	(0.75 for roe)	0.23	0.50
1991	0.87	[a]	[a]	0.27 (3.00 for roe)	0.36 (3.00 for roe)
1992	0.66	[a]	0.16	0.22	0.33 (1.50 for roe)
1993	0.72	0.40	0.15	0.24	0.22 (1.76 for roe)
1994	1.02	[a]	0.15	0.29	0.52
1995	0.66	[a]	0.18	0.18	0.43
1996	0.54	[a]	0.10	0.08	0.28
1997	1.00	[a]	0.06	0.11	0.47
1998	0.74	[a]	0.14	0.09	0.29
1999	0.82	[a]	[a]	0.11	0.35
2000	1.30	[a]	0.10	0.15	0.30
2001	1.00	0.37	[a]	0.19	0.25
2002	0.39	[a]	[a]	0.07	0.20
2003	0.64	0.45	[a]	0.14	0.44
2004	[a]	[a]	[a]	0.14	0.39
2005	1.22	0.45	[a]	0.15	0.44
2006	1.49	[a]	[a]	0.14	0.44
2007	0.55	0.55	0.14	0.24	0.53
2008	0.73	0.56	0.23	0.34	0.77
2009	[a]	0.34	0.18	0.33	0.93
2010	2.25	0.63	0.32	0.62	1.47
2011	3.01	1.04	0.25	0.68	1.70
2012	[a]	1.45	0.36	0.52	1.47
2013	[a]	1.49	0.22	0.55	1.77
2014	2.00	0.63	0.29	0.60	1.60
2015	2.25	0.60	0.14	0.50	1.10
2016	2.45	0.90	0.10	0.48	1.39
2017	3.00	1.40	0.03	0.79	1.40
2018	2.99	1.40	0.25	0.80	1.40
Avg 2013–2017	2.43	1.00	0.16	0.58	1.45

[a] None sold.

Appendix A5.–Mean commercial salmon harvest weights, Norton Sound District, 1990–2018.

	Mean round weight in pounds [a]				
Year	Chinook	Sockeye	Coho	Pink	Chum
1990	19.0	7.4	7.5	[c]	7.4
1991	17.7	7.2	7.4	[c]	6.9
1992 [b]	12.7	7.6	7.8	2.9	7.1
1993	16.9	7.4	6.7	2.6	6.5
1994	18.6	6.6	7.6	2.2	6.7
1995	19.7	7.2	7.4	2.4	6.8
1996	19.2	8.0	8.4	2.5	7.9
1997	17.9	6.8	7.3	2.5	7.4
1998	17.2	6.1	7.9	2.3	6.5
1999	19.3	[c]	7.0	[c]	7.3
2000	15.0	8.4	6.9	2.2	6.5
2001	17.9	8.0	7.8	[c]	7.2
2002 [b]	10.0	11.0	7.4	[c]	7.6
2003 [b]	11.3	7.6	8.2	[c]	6.7
2004	[c]	6.4	7.2	[c]	6.7
2005	16.6	6.3	7.7	[c]	7.1
2006 [b]	14.5	7.7	6.7	[c]	6.9
2007 [b]	12.0	8.0	8.0	2.8	6.8
2008 [b]	14.7	5.7	7.1	2.5	6.8
2009	[c]	6.9	7.8	2.7	7.0
2010 [b]	14.4	7.6	7.6	2.8	6.8
2011 [b]	11.4	6.9	7.3	2.8	7.0
2012	[c]	6.9	6.6	2.4	6.8
2013	[c]	7.3	7.6	2.9	6.9
2014 [b]	12.9	6.8	7.2	3.1	6.9
2015 [b]	13.7	7.0	8.0	3.5	6.9
2016 [b]	11.6	6.1	6.8	3.6	6.8
2017 [b]	10.1	6.0	6.8	3.8	7.1
2018 [b]	10.3	5.7	7.1	3.0	7.1

[a] Based on age-weight-length samples or fish tickets.

[b] Low Chinook salmon weight due to utilization of restricted mesh size.

[c] None sold.

Appendix A6.–Commercial and subsistence salmon catch by species, by year in Nome Subdistrict, Norton Sound District, 1990–2018.

	Nome (Subdistrict 1)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	0	0	0	0	0	0	58	234	510	2,233	4,246	7,281	58	234	510	2,233	4,246	7,281
1991	0	0	0	0	0	0	83	166	1,279	194	3,715	5,437	83	166	1,279	194	3,715	5,437
1992	1	2	693	185	881	1,762	152	163	1,481	7,351	1,684	10,831	153	165	2,174	7,536	2,565	12,593
1993	0	2	611	0	132	745	52	80	2,070	873	1,766	4,841	52	82	2,681	873	1,898	5,586
1994	0	1	287	0	66	354	23	69	983	6,556	1,673	9,304	23	70	1,270	6,556	1,739	9,658
1995	0	1	369	0	122	492	26	148	1,365	336	3,794	5,669	26	149	1,734	336	3,916	6,161
1996	0	0	9	13	3	25	9	185	828	3,510	2,287	6,819	9	185	837	3,523	2,290	6,844
1997	0	0	0	0	0	0	10	50	325	175	2,696	3,256	10	50	325	175	2,696	3,256
1998	0	0	0	0	0	0	15	14	1,057	4,797	964	6,847	15	14	1,057	4,797	964	6,847
1999 [a]	0	0	0	0	0	0	11	85	161	58	337	652	11	85	161	58	337	652
2000	0	0	0	0	0	0	7	26	747	2,657	535	3,972	7	26	747	2,657	535	3,972
2001	0	0	0	0	0	0	2	92	425	113	858	1,490	2	92	425	113	858	1,490
2002	0	0	0	0	0	0	4	79	666	3,161	1,114	5,024	4	79	666	3,161	1,114	5,024
2003	0	0	0	0	0	0	63	76	351	507	565	1,562	63	76	351	507	565	1,562
2004	0	0	0	0	0	0	100	106	1,574	15,047	685	17,512	100	106	1,574	15,047	685	17,512
2005	0	0	0	0	0	0	62	177	1,287	5,075	803	7,404	62	177	1,287	5,075	803	7,404
2006 [b]	0	0	0	0	0	0	24	159	3,865	9,329	890	14,267	24	159	3,865	9,329	890	14,267
2007	0	0	0	0	0	0	18	297	1,103	850	2,938	5,206	18	297	1,103	850	2,938	5,206
2008	0	0	0	0	0	0	39	127	3,423	12,592	739	16,920	39	127	3,423	12,592	739	16,920
2009	0	0	0	0	0	0	32	64	1,132	487	387	2,102	32	64	1,132	487	387	2,102
2010	0	0	0	0	0	0	39	77	1,983	6,281	3,124	11,504	39	77	1,983	6,281	3,124	11,504
2011	0	0	0	0	0	0	19	47	1,229	1,389	1,428	4,112	19	47	1,229	1,389	1,428	4,112
2012	0	0	0	0	0	0	11	171	1,150	8,376	2,521	12,229	11	171	1,150	8,376	2,521	12,229
2013 [c]	[c]	[c]	[c]	[c]	[c]	[c]	48	211	1,804	845	3,065	5,973	48	211	1,804	845	3,065	5,973
2014	3	7	39	1,169	1,456	2,674	31	405	3,042	6,648	3,844	13,970	34	412	3,081	7,817	5,300	16,644
2015	4	244	13	509	4,861	5,631	21	1,081	1,790	3,180	3,967	10,039	25	1,325	1,803	3,689	8,828	15,670
5-year avg [d,e]	13	196	1,536	1,185	3,442	6,371	27	581	2,571	5,191	3,092	11,461	37	737	3,799	6,138	5,846	16,557
10-year avg [e,f]	6	87	683	527	1,530	2,831	27	339	2,177	5,508	2,366	10,417	32	417	2,791	5,982	3,743	12,965

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	Nome (Subdistrict 1)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
2016	0	10	118	1,456	662	2,246	26	601	2,274	10,069	3,260	16,230	26	611	2,392	11,525	3,922	18,476
2017	43	522	5,973	1,605	6,788	14,931	8	605	3,943	5,211	1,326	11,093	51	1,127	9,916	6,816	8,114	26,024
2018	18	426	9,080	3,930	10,205	23,659	11	336	4,940	10,786	1,196	17,269	29	762	14,020	14,716	11,401	40,928
5-year avg [d,e]	13	196	1,536	1,185	3,442	6,371	27	581	2,571	5,191	3,092	11,461	37	737	3,799	6,138	5,846	16,557
10-year avg [e,f]	6	87	683	527	1,530	2,831	27	339	2,177	5,508	2,366	10,417	32	417	2,791	5,982	3,743	12,965

Note: Commercial harvest numbers may include some salmon reported on fish tickets that were retained for personal use and not commercially sold.

[a] Beginning in 1999, Tier II chum salmon fishing restrictions limited the number of permit holders that could fish for chum salmon.

[b] Beginning in 2006, Tier II chum salmon fishing restrictions were suspended.

[c] Less than 3 permit holders fished; therefore, information is confidential.

[d] 2013–2017.

[e] Confidential information excluded from averages.

[f] 2008–2017.

Appendix A7.–Commercial and subsistence salmon catch by species, by year in Golovin Subdistrict, Norton Sound District, 1990–2018.

	Golovin (Subdistrict 2)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	52	21	9	9	15,993	16,066	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1991	49	1	0	0	14,839	14,889	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1992	6	9	2,085	0	1,002	3,102	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1993	1	4	2	8,480	2,803	11,290	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1994 [b]	0	0	3,424	0	111	3,535	253	168	733	8,410	1,337	10,901	253	168	4,157	8,410	1,448	14,436
1995 [b]	0	0	1,616	4,296	1,987	7,899	165	34	1,649	7,818	10,373	20,039	165	34	3,265	12,114	12,360	27,938
1996 [b]	0	0	638	0	0	638	86	134	3,014	17,399	2,867	23,500	86	134	3,652	17,399	2,867	24,138
1997 [b]	19	2	102	20	8,003	8,146	138	427	555	4,570	4,891	10,581	157	429	657	4,590	12,894	18,727
1998 [b]	1	0	3	106,761	723	107,488	184	37	1,292	13,340	1,893	16,746	185	37	1,295	120,101	2,616	124,234
1999 [b]	0	0	0	0	0	0	60	48	1,234	469	3,656	5,467	60	48	1,234	469	3,656	5,467
2000 [b]	0	0	1,645	17,408	164	19,217	169	18	2,335	10,906	1,155	14,583	169	18	3,980	28,314	1,319	33,800
2001 [b]	0	43	30	0	7,094	7,167	89	72	880	1,665	3,291	5,997	89	115	910	1,665	10,385	13,164
2002 [b]	0	0	0	0	0	0	69	66	1,640	14,430	1,882	18,087	69	66	1,640	14,430	1,882	18,087
2003 [b]	0	0	0	0	0	0	166	28	309	5,012	1,477	6,992	166	28	309	5,012	1,477	6,992
2004 [c]	0	0	0	0	0	0	164	6	654	19,936	880	21,640	164	6	654	19,936	880	21,640
2005 [c]	0	0	0	0	0	0	96	15	686	11,467	1,852	14,116	96	15	686	11,467	1,852	14,116
2006 [c]	0	0	0	0	0	0	136	38	1,760	14,670	722	17,326	136	38	1,760	14,670	722	17,326
2007 [c]	0	0	0	0	0	0	188	321	1,179	3,980	4,217	9,885	188	321	1,179	3,980	4,217	9,885
2008 [c]	0	0	256	2,699	623	3,578	146	95	2,337	10,155	350	13,083	146	95	2,593	12,854	973	16,661
2009 [c]	0	0	2,452	0	87	2,539	237	33	1,377	3,787	1,694	7,128	237	33	3,829	3,787	1,781	9,667
2010 [c]	3	2	5,586	2,039	17,212	24,842	59	32	2,020	9,620	1,133	12,864	62	34	7,606	11,659	18,345	37,706
2011 [c]	7	0	859	3	20,075	20,944	99	74	1,345	5,652	2,122	9,292	106	74	2,204	5,655	22,197	30,236
2012 [c]	2	14	573	31,055	3,791	35,435	57	52	1,143	7,635	1,056	9,943	59	66	1,716	38,690	4,847	45,378
2013 [c]	0	0	5,362	1,180	3,113	9,655	47	15	964	3,655	3,256	7,937	47	15	6,326	4,835	6,369	17,592
2014 [c]	28	47	4,156	7,888	13,560	25,679	36	91	1,720	7,363	1,719	10,929	64	138	5,876	15,251	15,279	36,608
2015 [c]	73	1,214	2,996	1,596	20,525	26,404	147	71	1,091	4,443	2,250	8,002	220	1,285	4,087	6,039	22,775	34,406
5-year avg. [d]	24	300	2,821	5,268	9,940	18,354	58	44	1,250	5,193	1,854	8,398	82	344	4,071	10,461	11,794	26,752
10-year avg. [e]	13	152	2,383	6,214	9,149	17,911	89	50	1,447	6,281	1,562	9,430	102	202	3,830	12,495	10,711	27,341

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	Golovin (Subdistrict 2)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
2016 [c]	17	157	880	15,346	5,331	21,731	35	29	844	6,747	1,006	8,661	52	186	1,724	22,093	6,337	30,392
2017 [c]	4	83	710	331	7,173	8,301	25	12	1,631	3,756	1,037	6,461	29	95	2,341	4,087	8,210	14,762
2018 [c]	31	75	2,995	4,171	25,070	32,342	50	83	1,369	6,944	773	9,219	81	158	4,364	11,115	25,843	41,561
5-year avg. [d]	24	300	2,821	5,268	9,940	18,354	58	44	1,250	5,193	1,854	8,398	82	344	4,071	10,461	11,794	26,752
10-year avg. [e]	13	152	2,383	6,214	9,149	17,911	89	50	1,447	6,281	1,562	9,430	102	202	3,830	12,495	10,711	27,341

Note: Commercial harvest numbers may include some salmon reported on fish tickets that were retained for personal use and not commercially sold.

[a] Norton Sound District subsistence salmon harvest surveys have been conducted sporadically since statehood, but no information is available.

[b] Subsistence harvests were estimated from Division of Subsistence household surveys.

[c] Beginning in 2004 a permit was required for the subdistrict, replacing household surveys. The permit system helped to record harvest by residents living outside the subdistrict.

[d] 2013–2017.

[e] 2008–2017.

Appendix A8.–Commercial and subsistence salmon catch by species, by year in Elim Subdistrict, Norton Sound District, 1990–2018.

	Elim (Subdistrict 3)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	202	0	0	501	3,723	4,426	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1991 [b]	161	0	0	0	804	965	312	0	2,153	3,555	2,660	8,680	473	0	2,153	3,555	3,464	9,645
1992 [b]	0	0	3,531	0	6	3,537	100	0	1,281	6,152	1,260	8,793	100	0	4,812	6,152	1,266	12,330
1993 [b]	3	0	4,065	0	167	4,235	368	0	1,217	1,726	1,635	4,946	371	0	5,282	1,726	1,802	9,181
1994 [b]	0	0	5,345	0	414	5,759	322	104	1,180	9,345	3,476	14,427	322	104	6,525	9,345	3,890	20,186
1995 [b]	4	44	3,742	2,962	1,171	7,923	284	17	1,353	2,046	3,774	7,474	288	61	5,095	5,008	4,945	15,397
1996 [b]	0	0	1,915	68,609	0	70,524	417	52	1,720	9,442	2,319	13,950	417	52	3,635	78,051	2,319	84,474
1997 [b]	844	0	1,409	0	2,683	4,936	619	50	1,213	1,314	2,064	5,260	1,463	50	2,622	1,314	4,747	10,196
1998 [b]	105	0	1,462	145,66	2,311	149,54	414	49	1,831	6,891	1,376	10,561	519	49	3,293	152,560	3,687	160,108
1999 [b]	0	0	0	0	0	0	424	13	975	1,564	744	3,720	424	13	975	1,564	744	3,720
2000 [b]	10	0	5,182	46,369	535	52,096	248	46	1,429	5,983	1,173	8,879	258	46	6,611	52,352	1,708	60,975
2001 [b]	7	0	1,696	0	681	2,384	427	70	1,352	1,390	898	4,137	434	70	3,048	1,390	1,579	6,521
2002 [b]	0	0	0	0	0	0	565	14	1,801	8,345	1,451	12,176	565	14	1,801	8,345	1,451	12,176
2003 [b]	0	0	0	0	0	0	660	39	1,143	2,524	1,687	6,053	660	39	1,143	2,524	1,687	6,053
2004 [c]	0	0	0	0	0	0	412	0	704	7,858	683	9,657	412	0	704	7,858	683	9,657
2005 [c]	0	0	0	0	0	0	225	9	1,011	3,721	598	5,564	225	9	1,011	3,721	598	5,564
2006 [c]	0	0	0	0	0	0	179	13	1,769	5,216	1,267	8,444	179	13	1,769	5,216	1,267	8,444
2007 [c]	1	0	5,908	1,648	4,567	12,124	260	0	2,295	1,742	2,334	6,631	261	0	8,203	3,390	6,901	18,755
2008 [c]	5	0	4,602	14,536	304	19,447	269	0	1,804	7,655	1,284	11,012	274	0	6,406	22,191	1,588	30,459
2009 [c]	0	1	9,582	35	597	10,215	545	13	2,434	1,522	600	5,114	545	14	12,016	1,557	1,197	15,329
2010 [c]	9	5	10,180	11,658	23,453	45,305	97	7	1,679	7,830	3,925	13,538	106	12	11,859	19,488	27,378	58,843
2011 [c]	4	12	8,336	165	23,531	32,048	160	3	1,688	704	3,671	6,226	164	15	10,024	869	27,202	38,274
2012 [c]	3	1	2,003	52,775	2,262	57,044	42	0	1,302	10,848	1,494	13,686	45	1	3,305	63,623	3,756	70,730
2013 [c]	6	27	6,675	601	1,434	8,743	39	15	1,515	1,134	1,218	3,921	45	42	8,190	1,735	2,652	12,664
2014 [c]	101	164	15,938	28,507	17,525	62,235	276	38	1,808	4,595	2,081	8,798	377	202	17,746	33,102	19,606	71,033
2015 [c]	533	1,535	14,155	2,787	30,116	49,126	198	154	1,158	1,828	1,573	4,911	731	1,689	15,313	4,615	31,689	54,037
5-year avg. [d]	152	598	14,075	14,760	13,518	43,103	145	60	1,601	3,588	1,362	6,757	297	659	15,676	18,348	14,880	49,860
10-year avg. [e]	78	301	10,508	15,297	11,774	37,958	184	33	1,691	4,650	1,779	8,336	262	334	12,199	19,947	13,552	46,294

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	Elim (Subdistrict 3)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
2016 [c]	69	728	14,197	39,028	6,736	60,758	163	60	1,164	6,717	830	8,934	232	788	15,361	45,745	7,566	69,692
2017 [c]	51	538	19,410	2,877	11,779	36,655	51	35	2,362	3,664	1,109	7,221	102	573	21,772	6,541	12,888	41,876
2018 [c]	138	482	20,002	9,474	38,419	68,515	59	35	1,657	4,360	588	6,699	197	517	21,659	13,834	39,007	75,214
5-year avg. [d]	152	598	14,075	14,760	13,518	43,103	145	60	1,601	3,588	1,362	6,757	297	659	15,676	18,348	14,880	49,860
10-year avg. [e]	78	301	10,508	15,297	11,774	37,958	184	33	1,691	4,650	1,779	8,336	262	334	12,199	19,947	13,552	46,294

Note: Commercial harvest numbers may include some salmon reported on fish tickets that were retained for personal use and not commercially sold.

[a] Norton Sound District subsistence salmon harvest surveys have been conducted sporadically since statehood, but no information is available.

[b] Subsistence harvests were estimated from Division of Subsistence household surveys.

[c] Beginning in 2004 a permit was required for the subdistrict, replacing household surveys. The permit system helped to record harvest by residents living outside the subdistrict.

[d] 2013–2017.

[e] 2008–2017.

Appendix A9.–Commercial and subsistence salmon catch by species, by year in Norton Bay Subdistrict, Norton Sound District, 1990–2018.

	Norton Bay (Subdistrict 4)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1900	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]		[a]	[a]	[a]	[a]	[a]	[a]
1991	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1992	27	0	0	0	1,787	1,814	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1993	267	0	0	290	1,378	1,935	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1994 [b]	0	0	0	0	0	0	308	1	370	6,049	4,581	11,309	308	1	370	6,049	4,581	11,309
1995 [b]	0	0	0	0	0	0	475	46	985	3,514	5,828	10,848	475	46	985	3,514	5,828	10,848
1996 [b]	0	0	0	0	0	0	295	3	676	3,929	4,161	9,064	295	3	676	3,929	4,161	9,064
1997 [b]	194	0	0	0	531	725	656	54	322	1,795	4,040	6,867	850	54	322	1,795	4,571	7,592
1998 [b]	0	0	0	0	0	0	684	0	388	2,009	6,192	9,273	684	0	388	2,009	6,192	9,273
1999 [b]	0	0	0	0	0	0	327	0	167	1,943	4,153	6,590	327	0	167	1,943	4,153	6,590
2000 [b]	0	0	0	0	0	0	397	2	267	2,255	4,714	7,635	397	2	267	2,255	4,714	7,635
2001 [b]	0	0	0	0	0	0	460	14	276	5,203	4,445	10,398	460	14	276	5,203	4,445	10,398
2002 [b]	0	0	0	0	0	0	557	0	509	6,049	3,971	11,086	557	0	509	6,049	3,971	11,086
2003 [b]	0	0	0	0	0	0	373	46	510	4,184	3,397	8,510	373	46	510	4,184	3,397	8,510
2004	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2005	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2006	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2007	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2008	7	0	600	1,232	507	2,346	187	2	1,084	4,489	3,330	9,092	194	2	1,684	5,721	3,837	11,438
2009	0	0	1,714	558	1,850	4,122	259	2	891	2,508	3,183	6,843	259	2	2,605	3,066	5,033	10,965
2010	0	7	1,606	2,597	6,007	10,217	341	21	461	3,115	3,180	7,118	341	28	2,067	5,712	9,187	17,335
2011	5	9	4,836	652	7,558	13,060	239	1	549	1,132	3,529	5,450	6	558	5,968	4,181	13,008	13,066
2012	10	16	4,378	49,970	8,417	62,791	103	0	310	2,623	2,721	5,757	113	16	4,688	52,593	11,138	68,548
2013	8	4	5,485	487	36,021	42,005	123	2	826	1,341	3,853	6,145	131	6	6,311	1,828	39,874	48,150
2014	71	22	9,562	28,393	13,436	51,484	163	1	1,219	2,321	4,431	8,135	234	23	10,781	30,714	17,867	59,619
2015	245	335	9,468	8,297	23,568	41,913	269	56	1,005	1,692	3,646	6,668	514	391	10,473	9,989	27,214	48,581
5-year avg. [c]	99	160	6,832	15,840	23,749	46,681	234	115	1,136	2,126	4,366	7,978	333	275	7,968	17,966	28,116	54,659
10-year avg. [d]	52	83	4,730	13,421	14,309	32,594	230	60	897	2,450	3,778	7,415	258	198	5,685	16,110	18,278	39,465

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	Norton Bay (Subdistrict 4)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
2016	111	174	6,656	38,357	14,069	59,367	297	289	1,142	2,432	3,349	7,509	408	463	7,798	40,789	17,418	66,876
2017	61	265	2,990	3,666	31,653	38,635	318	229	1,487	2,845	6,553	11,432	379	494	4,477	6,511	38,206	50,067
2018 [e]	52	158	1,513	1,007	14,548	17,278	69	100	596	1,367	1,469	3,601	121	258	2,109	2,374	16,017	20,879
5-year avg. [c]	99	160	6,832	15,840	23,749	46,681	234	115	1,136	2,126	4,366	7,978	333	275	7,968	17,966	28,116	54,659
10-year avg. [d]	52	83	4,730	13,421	14,309	32,594	230	60	897	2,450	3,778	7,415	258	198	5,685	16,110	18,278	39,465

Note: Commercial harvest numbers may include some salmon reported on fish tickets that were retained for personal use and not commercially sold.

[a] Norton Sound District subsistence salmon harvest surveys have been conducted sporadically since statehood, but no information is available.

[b] Subsistence harvests were estimated from Division of Subsistence household surveys.

[c] 2013–2017.

[d] 2008–2017.

[e] A limited survey took place.

Appendix A10.–Commercial and subsistence salmon catch by species, by year in Shaktoolik Subdistrict, Norton Sound District, 1990–2018.

	Shaktoolik (Subdistrict 5)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	2,644	49	4,695	0	21,748	29,136	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1991	1,324	55	11,614	0	31,619	44,612	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1992	1,098	56	14,660	0	27,867	43,681	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1993	2,756	20	11,130	106,743	20,864	141,513	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1994 [b]	885	8	22,065	502,231	5,411	530,600	1,175	1	2,777	9,133	1,221	14,307	2,060	9	24,842	511,364	6,632	544,907
1995 [b]	1,239	5	10,856	37,377	14,775	64,252	1,303	72	2,682	7,176	2,534	15,885	2,542	77	13,538	44,553	17,309	80,137
1996 [b]	1,340	1	13,444	304,982	3,237	323,004	1,114	31	3,615	8,370	4,425	17,555	2,454	32	17,059	313,352	7,662	340,559
1997 [b]	2,449	0	4,694	0	5,747	12,890	1,146	62	2,761	5,779	1,612	11,360	3,595	62	7,455	5,779	7,359	24,250
1998 [b]	910	0	3,624	236,171	7,080	247,785	982	92	1,872	6,270	1,034	10,250	1,892	92	5,496	242,441	8,114	258,035
1999 [b]	581	0	2,398	0	2,181	5,160	818	183	1,556	5,092	467	8,116	1,399	183	3,954	5,092	2,648	13,276
2000 [b]	160	3	7,779	85,493	2,751	96,186	440	20	2,799	5,432	2,412	11,103	600	23	10,578	90,925	5,163	107,289
2001 [b]	90	0	2,664	0	1,813	4,567	936	143	2,090	10,172	1,553	14,894	1,026	143	4,754	10,172	3,366	19,461
2002 [b]	1	0	680	0	261	942	1,230	4	2,169	8,769	800	12,972	1,231	4	2,849	8,769	1,061	13,914
2003 [b]	2	0	4,031	0	485	4,518	881	50	2,941	12,332	587	16,791	883	50	6,972	12,332	1,072	21,309
2004	0	0	12,734	0	1,372	14,106	943	12	1,994	7,291	139	10,379	943	12	14,728	7,291	1,511	24,485
2005	50	0	21,818	0	791	22,659	807	0	1,913	12,075	202	14,997	857	0	23,731	12,075	993	37,656
2006	8	0	32,472	0	3,321	35,801	382	36	1,968	4,817	351	7,554	390	36	34,440	4,817	3,672	43,355
2007	5	0	31,810	0	6,076	37,891	515	28	1,443	2,708	465	5,159	520	28	33,253	2,708	6,541	43,050
2008	6	24	37,624	8,219	6,042	51,915	422	2	1,504	4,920	201	7,049	428	26	39,128	13,139	6,243	58,964
2009	4	36	13,063	5,146	10,941	29,190	417	57	2,141	6,101	374	9,090	421	93	15,204	11,247	11,315	38,280
2010	4	18	11,868	4,622	40,483	56,995	327	115	1,940	6,406	1,680	10,468	331	133	13,808	11,028	42,163	67,463
2011	45	69	15,368	29	25,388	40,899	235	100	1,241	2,681	490	4,747	280	169	16,609	2,710	25,878	45,646
2012	25	29	7,828	19,253	20,141	47,276	214	9	1,110	4,609	634	6,576	239	38	8,938	23,862	20,775	53,852
2013	6	45	6,890	14	23,268	30,223	136	108	2,146	3,346	983	6,719	142	153	9,036	3,360	24,251	36,942
2014	16	47	19,753	33,137	29,455	82,408	158	82	1,159	3,961	682	6,042	174	129	20,912	37,098	30,137	88,450
2015	49	53	25,637	15,156	27,503	68,398	178	223	2,201	5,263	510	8,375	227	276	27,838	20,419	28,013	76,773
5-year avg. [c]	29	225	25,689	15,617	26,808	68,368	188	142	2,125	4,416	679	7,550	217	367	27,814	20,033	27,487	75,918
10-year avg. [d]	23	130	21,420	11,535	23,703	56,812	255	99	1,856	4,680	678	7,568	278	229	23,276	16,215	24,381	64,380

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	Shaktoolik (Subdistrict 5)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
2016	23	510	25,866	28,308	12,149	66,856	290	128	2,142	4,082	645	7,287	313	638	28,008	32,390	12,794	74,143
2017	52	470	50,299	1,470	41,664	93,955	177	169	2,979	5,427	576	9,328	229	639	53,278	6,897	42,240	103,283
2018	19	516	71,468	2,489	41,482	115,974	162	56	2,107	1,121	319	3,765	181	572	73,575	3,610	41,801	119,739
5-year avg. [c]	29	225	25,689	15,617	26,808	68,368	188	142	2,125	4,416	679	7,550	217	367	27,814	20,033	27,487	75,918
10-year avg. [d]	23	130	21,420	11,535	23,703	56,812	255	99	1,856	4,680	678	7,568	278	229	23,276	16,215	24,381	64,380

Note: Commercial harvest numbers may include some salmon reported on fish tickets that were retained for personal use and not commercially sold.

[a] Norton Sound District subsistence salmon harvest surveys have been conducted sporadically since statehood, but no information is available.

[b] Subsistence harvests were estimated from Division of Subsistence household surveys.

[c] 2013–2017.

[d] 2008–2017.

Appendix A11.–Commercial and subsistence salmon catch by species, by year in Unalakleet Subdistrict, Norton Sound District, 1990–2018.

	Unalakleet (Subdistrict 6)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	5,998	358	52,015	0	23,659	82,030	2,476	[a]	[a]	[a]	[a]	[a]	8,474	[a]	[a]	[a]	[a]	[a]
1991	4,534	147	52,033	0	39,609	96,323	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1992	3,409	229	84,449	6,284	52,547	146,918	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1993	5,944	251	26,290	42,061	28,156	102,702	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1994 [b]	4,400	71	71,019	480,158	12,288	567,936	3,035	404	11,386	27,163	3,325	45,313	7,435	475	82,405	507,321	15,613	613,249
1995 [b]	7,617	78	31,280	37,009	24,843	100,827	3,114	591	9,833	16,625	5,458	35,621	10,731	669	41,113	53,634	30,301	136,448
1996 [b]	3,644	0	52,200	113,837	7,369	177,050	3,023	181	11,187	18,026	4,227	36,644	6,667	181	63,387	131,863	11,596	213,694
1997 [b]	9,067	159	26,079	0	17,139	52,444	4,191	196	6,746	10,600	1,603	23,336	13,258	355	32,825	10,600	18,742	75,780
1998 [b]	6,413	7	24,534	99,412	6,210	136,576	4,066	201	7,489	13,654	3,038	28,448	10,479	208	32,023	113,066	9,248	165,024
1999 [b]	1,927	0	10,264	0	5,700	17,891	2,691	537	8,140	10,060	3,692	25,120	4,618	537	18,404	10,060	9,392	43,011
2000 [b]	582	11	29,803	17,278	2,700	50,374	2,429	212	5,878	10,540	3,000	22,059	3,011	223	35,681	27,818	5,700	72,433
2001 [b]	116	1	15,102	0	1,512	16,731	2,810	359	6,270	11,269	2,918	23,626	2,926	360	21,372	11,269	4,430	40,357
2002 [b]	4	1	1,079	0	339	1,423	2,367	280	4,988	15,915	3,877	27,427	2,371	281	6,067	15,915	4,216	28,850
2003 [b]	10	21	13,029	0	3,075	16,135	2,585	297	6,192	21,779	1,785	32,638	2,595	318	19,221	21,779	4,860	48,773
2004	22	47	29,282	0	4,924	34,275	2,829	417	6,653	22,755	2,154	34,808	2,851	464	35,935	22,755	7,078	69,083
2005	101	12	63,705	0	3,192	67,010	2,193	656	7,886	25,447	2,660	38,842	2,294	668	71,591	25,447	5,852	105,852
2006	12	3	98,336	0	6,721	105,072	2,537	326	9,905	22,547	2,712	38,027	2,549	329	108,241	22,547	9,433	143,099
2007	13	2	88,418	2,121	11,788	102,342	1,666	292	5,859	11,674	2,057	21,547	1,678	294	94,277	13,795	13,845	123,889
2008	65	36	77,227	48,839	17,648	143,815	1,402	137	7,452	15,116	2,805	26,912	1,467	173	84,679	63,955	20,453	170,727
2009	80	89	60,230	11,625	20,647	92,671	1,892	200	6,923	11,707	2,708	23,430	1,972	289	67,153	23,332	23,355	116,101
2010	124	71	32,839	10,641	30,588	74,263	1,257	297	3,780	9,002	3,159	17,495	1,381	368	36,619	19,643	33,747	91,758
2011	124	279	29,518	6,292	34,003	70,216	607	189	2,486	5,608	3,316	12,206	731	468	32,004	11,900	37,319	82,422
2012	157	74	22,274	52,445	28,161	103,111	808	192	4,558	9,460	3,973	18,991	965	266	26,832	61,905	32,134	122,102
2013	131	171	29,390	6,056	54,873	90,621	468	221	6,117	7,724	3,129	17,659	599	392	35,507	13,780	58,002	108,280
2014	70	232	63,308	83,312	32,313	179,235	442	146	7,232	12,707	3,476	24,003	512	378	70,540	96,019	35,789	203,238
2015	384	738	101,659	34,543	40,924	178,248	1,139	294	6,723	8,940	2,821	19,917	1,523	1,032	108,382	43,483	43,745	198,165
5-year avg. [c]	203	709	72,280	44,150	40,951	158,293	676	279	7,365	10,717	3,356	22,393	879	988	79,646	54,867	44,307	180,686
10-year avg. [d]	156	410	58,349	35,059	33,580	127,554	935	241	6,203	10,448	3,274	21,100	1,091	651	64,552	45,507	36,854	148,654

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	Unalakleet (Subdistrict 6)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
2016	101	1,309	55,173	86,466	12,229	155,278	837	429	8,074	13,145	3,728	26,213	938	1,738	63,247	99,611	15,957	181,491
2017	327	1,097	111,872	10,372	64,416	188,084	496	304	8,680	11,069	3,625	24,174	823	1,401	120,552	21,441	68,041	212,258
2018	648	1,966	155,649	19,378	108,305	285,946	810	235	5,204	5,017	2,227	13,493	1,458	2,201	160,853	24,395	110,532	299,439
5-year avg. [c]	203	709	72,280	44,150	40,951	158,293	676	279	7,365	10,717	3,356	22,393	879	988	79,646	54,867	44,307	180,686
10-year avg. [d]	156	410	58,349	35,059	33,580	127,554	935	241	6,203	10,448	3,274	21,100	1,091	651	64,552	45,507	36,854	148,654

Note: Commercial harvest numbers may include some salmon reported on fish tickets that were retained for personal use and not commercially sold.

[a] Norton Sound District subsistence salmon harvest surveys have been conducted sporadically since statehood, but no information is available.

[b] Subsistence harvests were estimated from Division of Subsistence household surveys.

[c] 2013–2017.

[d] 2008–2017.

Appendix A12.–Subsistence salmon catch by species and year for St. Michael in Norton Sound District, 1994–2018.

Year	Chinook	Chum	Pink	Sockeye	Coho	Total
1994	769	4,309	2,673	127	1,022	8,900
1995	1,267	5,778	391	45	2,235	9,716
1996	1,400	6,352	1,503	3	1,641	10,899
1997	970	2,816	84	41	547	4,458
1998	542	1,502	961	143	1,406	4,554
1999	1,053	3,036	365	111	798	5,363
2000	160	1,381	80	16	1,180	2,817
2001	282	2,246	229	17	490	3,264
2002	227	1,136	583	20	989	2,955
2003	295	1,994	577	89	1,438	4,393
2004	Subsistence surveys were not conducted.					
2005	998	3,614	1,742	61	1,497	7,912
2006	271	2,628	480	347	1,256	4,982
2007	452	2,119	265	9	622	3,467
2008	Subsistence surveys were not conducted.					
2009	825	921	169	24	1,088	3,027
2010	Subsistence surveys were not conducted.					
2011	Subsistence surveys were not conducted.					
2012	80	2,172	457	20	911	3,640
2013	Subsistence surveys were not conducted.					
2014	323	2,202	683	0	460	3,668
2015	475	4,634	237	33	762	6,141
2016	667	3,591	373	0	1,098	5,729
2017	Subsistence surveys were not conducted.					
2018	Subsistence surveys were not conducted.					

Note: Harvest numbers shown have been expanded to include households not contacted.

Appendix A13.–Subsistence salmon catch by species and year for Stebbins in Norton Sound District, 1994–2018.

Year	Chinook	Chum	Pink	Sockeye	Coho	Total
1994	1,525	5,989	5,552	288	3,948	17,302
1995	1,211	5,042	758	207	2,570	9,788
1996	1,030	7,401	2,375	424	3,746	14,976
1997	1,164	3,230	243	116	1,826	6,579
1998	1,410	3,909	3,125	295	3,116	11,855
1999	760	3,312	459	200	1,312	6,043
2000	298	2,913	364	341	2,429	6,345
2001	570	3,999	202	0	2,759	7,530
2002	450	3,586	7,459	300	2,324	14,119
2003	265	2,399	2,685	171	1,215	6,735
2004	Subsistence surveys were not conducted.					
2005	485	5,164	4,353	59	2,702	12,763
2006	355	4,236	4,321	140	4,856	13,908
2007	763	4,980	1,881	0	2,006	9,630
2008	Subsistence surveys were not conducted.					
2009	713	1,461	328	0	1,114	3,616
2010	Subsistence surveys were not conducted.					
2011	Subsistence surveys were not conducted.					
2012	109	3,456	3,659	0	1,256	8,480
2013	Subsistence surveys were not conducted.					
2014	209	5,104	1,124	0	1,492	7,929
2015	299	2,798	359	4	2,122	5,582
2016	778	4,383	2,245	38	2,268	9,712
2017	Subsistence surveys were not conducted.					
2018	Subsistence surveys were not conducted.					

Note: Harvest numbers shown have been expanded to include households not contacted.

Appendix A14.–Commercial, subsistence, and sport salmon catch by species, by year for Subdistricts 1–6 in Norton Sound District, 1990–2018.

	Subdistricts 1–6																	
	Commercial						Subsistence						Sport fish					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990 [a]	8,895	434	56,712	501	65,123	131,665	2,534	234	510	2,233	4,246	7,281	364	198	3,305	7,647	925	12,439
1991 [a]	6,068	203	63,647	0	86,871	156,789	395	166	3,432	3,749	6,375	14,117	404	237	5,800	1,738	1,415	9,594
1992 [a]	4,541	296	105,418	6,284	83,394	199,933	252	163	2,762	13,503	2,944	19,624	204	131	4,671	6,403	523	11,932
1993 [a]	8,972	279	43,283	157,574	53,562	263,670	420	80	3,287	2,599	3,401	9,787	595	10	3,783	2,250	691	7,329
1994	5,285	80	102,140	982,389	18,290	1,108,184	5,116	747	17,429	66,656	15,613	105,561	600	18	5,547	7,051	536	13,752
1995	8,860	128	47,863	81,644	42,898	181,393	5,367	908	17,867	37,515	31,761	95,536	438	104	3,705	928	394	5,569
1996	4,984	1	68,206	487,441	10,609	571,241	4,944	586	21,040	60,676	20,286	107,532	662	100	7,289	5,972	662	14,685
1997	12,573	161	32,284	20	34,103	79,141	6,760	839	11,922	24,233	16,906	60,660	1,106	30	4,393	1,458	278	7,265
1998	7,429	7	29,623	588,013	16,324	641,396	6,345	393	13,929	46,961	14,497	82,125	590	16	4,441	6,939	682	12,668
1999	2,508	0	12,662	0	7,881	23,051	4,331	866	12,233	19,186	13,049	49,665	630	0	5,582	3,039	211	9,462
2000	752	14	44,409	166,548	6,150	217,873	3,690	324	13,455	37,773	12,989	68,231	889	45	7,441	2,886	1,097	12,358
2001	213	44	19,492	0	11,100	30,849	4,724	750	11,293	29,812	13,963	60,542	271	39	4,802	360	1,709	7,181
2002	5	1	1,759	0	600	2,365	4,792	443	11,773	56,669	13,095	86,772	802	0	4,211	4,303	818	10,134
2003	12	21	17,060	0	3,560	20,653	4,728	536	11,446	46,338	9,498	72,546	239	572	3,039	2,222	292	6,364
2004 [a]	22	47	42,016	0	6,296	48,381	4,448	541	11,579	72,887	4,541	93,996	535	404	5,806	8,309	498	15,552
2005 [a]	151	12	85,523	0	3,983	89,669	3,383	857	12,783	57,785	6,115	80,923	216	0	3,959	473	36	4,684
2006 [a]	20	3	130,808	0	10,042	140,873	3,258	572	19,267	56,579	5,942	85,618	427	22	11,427	5,317	344	17,537
2007 [a]	19	2	126,136	3,769	22,431	152,357	2,647	938	11,879	20,954	12,011	48,428	147	15	6,179	1,331	96	7,768
2008	83	60	120,309	75,525	25,124	221,101	2,465	363	17,604	54,927	8,709	84,068	580	63	10,756	6,855	341	18,595
2009	84	126	87,041	17,364	34,122	138,737	3,382	369	14,898	26,112	8,946	53,707	277	0	6,664	1,321	417	8,679
2010	140	103	62,079	31,557	117,743	211,622	2,120	549	11,863	42,254	16,201	72,987	61	0	5,876	2,717	118	8,772
2011	185	369	58,917	7,141	110,555	177,167	1,359	414	8,538	17,166	14,556	42,033	61	58	3,582	566	139	4,406
2012	197	134	37,056	205,498	62,772	305,657	1,235	424	9,573	43,551	12,399	67,182	0	28	5,099	3,220	209	8,556
2013	151	247	53,802	8,338	118,709	181,247	861	572	13,372	18,045	15,504	48,354	0	23	7,567	1,806	2,267	11,663
2014	289	519	112,756	182,406	107,745	403,715	1,106	763	16,180	37,595	16,233	71,877	0	0	3,358	4,603	511	8,472
2015	1,288	4,119	153,929	62,935	147,497	369,768	1,952	1,879	13,968	25,346	14,767	57,912	0	271	3,720	1,381	331	5,703

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	Subdistricts 1–6																	
	Commercial						Subsistence						Sport fish					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
2016	321	2,888	102,890	208,961	51,176	366,236	1,648	1,536	15,640	43,192	12,818	74,834	78	83	5,554	8,368	486	14,569
2017	538	2,975	191,254	20,321	163,473	378,561	1,075	1,354	21,082	31,972	14,226	69,709	13	171	5,944	962	488	7,578
2018	906	3,623	260,707	40,449	238,029	543,714	1,161	845	15,873	29,595	6,572	54,046	[b]	[b]	[b]	[b]	[b]	[b]
5-yr avg. [c]	517	2,150	122,926	96,583	117,720	339,896	1,328	1,221	16,048	31,230	14,710	64,537	18	110	5,229	3,424	817	9,597
10-yr avg. [d]	328	1,154	98,003	82,000	93,892	275,376	1,720	822	14,272	34,016	13,436	64,266	107	70	5,812	3,180	531	9,699

Note: Commercial harvest may include some salmon reported on fish tickets that were retained for personal use and not commercially sold.

[a] Not all subdistricts were surveyed.

[b] Information is not yet available.

[c] 2013–2017.

[d] 2008–2017.

Appendix A15.–Sport salmon harvest by species, by year, for the Unalakleet River, 1990–2018.

Year	Chinook	Coho	Chum	Pink	Total
1990	276	1,826	298	1,180	3,580
1991	296	2,180	497	437	3,410
1992	117	1,555	379	779	2,830
1993	382	643	116	89	1,230
1994	379	2,425	220	402	3,426
1995	259	2,033	207	222	2,721
1996	384	3,411	463	59	4,317
1997	842	2,784	228	1,055	4,909
1998	513	2,742	447	434	4,136
1999	415	2,691	211	2,946	6,263
2000	345	4,150	403	961	5,859
2001	250	2,766	714	188	3,918
2002	544	2,937	607	1,378	5,466
2003	97	1,604	191	29	1,921
2004	356	3,524	47	2,003	5,930
2005	216	3,959	36	473	4,684
2006	394	4,985	224	891	6,494
2007	147	4,117	85	618	4,967
2008	580	6,029	175	2,077	8,861
2009	236	5,095	260	586	6,177
2010	61	3,006	59	535	3,661
2011	54	2,493	77	391	3,015
2012	0	3,283	118	20	3,421
2013	0	4,068	354	886	5,308
2014	0	1,432	377	352	2,161
2015	0	2,602	78	222	2,902
2016	78	3,748	28	974	4,828
2017	13	4,446	254	37	4,750
2018		Information is not yet available.			
Avg 2013–2017	18	3,259	218	494	3,990
Avg 2008–2017	102	3,620	178	608	4,508

Appendix A16.–Sport salmon harvest by species, by year for the Fish and Niukluk rivers, 1990–2018.

Year	Chinook	Coho	Chum	Pink	Total
1990	0	267	216	638	1,121
1991	14	977	272	356	1,619
1992	0	753	15	357	1,125
1993	9	1,185	514	278	1,986
1994	10	1,122	119	231	1,482
1995	18	818	27	136	999
1996	11	1,652	166	404	2,233
1997	71	462	0	58	591
1998	0	316	0	0	316
1999	44	1,365	0	80	1,489
2000	174	1,165	0	51	1,390
2001	0	969	439	161	1,569
2002	75	298	45	254	672
2003	39	216	101	196	552
2004	22	291	435	353	1,101
2005	37	400	0	58	495
2006	0	948	0	134	1,082
2007	0	786	11	30	827
2008	0	1,986	166	969	3,121
2009	30	939	72	25	1,066
2010	0	1,069	0	99	1,168
2011	0	700	29	10	739
2012	0	1,163	74	636	1,873
2013	0	1,227	0	0	1,227
2014	0	883	71	25	979
2015	0	302	0	39	341
2016	0	740	17	177	934
2017	0	82	12	12	106
2018	Information is not yet available.				
Avg 2013–2017	0	647	20	51	717
Avg 2008–2017	3	909	44	199	1,155

Appendix A17.–Sport salmon harvest by species, by year for the Nome River, 1990–2018.

Year	Chinook	Coho	Chum	Pink	Total
1990	39	407	122	2,651	3,219
1991	22	417	241	356	1,036
1992	16	713	0	4,397	5,126
1993	93	602	0	723	1,418
1994	0	326	0	4,103	4,429
1995	0	143	0	230	373
1996	0	598	0	3,280	3,878
1997	10	295	0	83	388
1998	0	189	0	1,985	2,174
1999	0	219	0	0	219
2000	0	342	0	578	920
2001	0	297	0	0	297
2002	0	217	0	312	529
2003	0	68	0	12	80
2004	0	270	0	3,369	3,639
2005	0	1,001	0	1,193	2,194
2006	0	2,768	0	2,422	5,190
2007	0	797	0	402	1,199
2008	0	1,793	0	2,954	4,747
2009	0	229	0	178	407
2010	13	602	0	1,716	2,331
2011	0	68	0	85	153
2012	0	259	0	1,264	1,523
2013	0	279	139	302	720
2014	0	458	52	2,162	2,672
2015	0	243	39	474	756
2016	0	747	208	2,737	3,692
2017	0	973	120	832	1,925
2018	Information is not yet available.				
Avg 2013–2017	0	540	112	1,301	1,953
Avg 2008–2017	1	565	56	1,270	1,893

Appendix A18.–Comparative salmon aerial survey escapement indices of Norton Sound streams unless noted otherwise, 1990–2018.

	Sinuk River				Nome River			
Year [a]	Chinook	Chum	Pink	Coho	Chinook	Chum	Pink	Coho
1990	ND	95	29,040	161	ND	541	13,085	377
1991	3	5,420	14,680	701	11	3,520	4,690	611
1992	1	470	292,400	422	3	813	255,700	691
1993	7	1,570	5,120	104	8	1,520	8,941	276
1994	10	1,140	492,000	307	2	350	265,450	631
1995	ND	3,110	1,250	290	ND	1,865	182	517
1996	5	1,815	74,100	367	1	799	34,520	723
1997	ND	2,975	1,200	57	4	956	65	544
1998	ND	630	372,850	322	3	335	179,680	515
1999	ND	1,697	180	217	ND	375	345	620
2000	ND	10	12,608	912	ND	658	6,380	1,032
2001	ND	3,746	115 [b]	750	ND	946 [b]	790 [b]	1,307 [b]
2002	ND	1,682	28,487	1,290 [b]	ND	127 [b]	295 [b]	1,796
2003	ND	677	9,885	190	8	337	2,841	604
2004	ND	100 [b]	1,267,100 [b]	2,085	ND	3 [b]	707,350 [b]	1,687
2005	ND	1,072 [b]	211,000 [b]	2,045	2 [b]	2,082 [b]	212,000 [b]	3,541
2006	0 [b]	1115 [b]	515,000 [b]	2,147	0 [b]	394 [b]	441,550 [b]	3,650
2007	3 [b]	7,210 [b]	6,810 [b]	668	4 [b]	1,449 [b]	3,378 [b]	1,442
2008	ND	ND	1,496,000 [b]	1,633	ND	106 [b]	528,000 [b]	2,051
2009	0 [b]	344 [b]	6,730 [b]	508 [b]	ND	ND	ND	877 [b]
2010	0 [b]	3,955 [b]	168,600 [b]	5,507 [b]	0 [b]	2,998 [b]	98,272 [b]	0 [b]
2011	0 [b]	6,265 [b]	21,100 [b]	479 [b]	0 [b]	1,317 [b]	9,575 [b]	870 [b]
2012	0 [b]	3,650 [b]	506,500 [b]	ND	No survey occurred.			
2013	0 [b]	19,500 [b]	23,000 [b]	1,054 [b]	No survey occurred.			
2014	0 [b]	9,050 [b]	115,000 [b]	1,275 [b]	No survey occurred.			
2015	1 [b]	17,615 [b]	57,050 [b]	1,280 [b]	No survey occurred.			
2016	ND	ND	405,200 [b]	1,610 [b]	ND	ND	ND	1,104 [b]
2017	ND	7,284 [b]	150,200 [b]	ND	No survey occurred.			
2018	ND	11,061 [b]	1,068,000 [b]	ND	ND	305 [b]	30,000 [b]	ND

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Year [a]	Flambeau River				Eldorado River			
	Chinook	Chum	Pink	Coho	Chinook	Chum	Pink	Coho
1990	ND	905	ND	96	17	884	2,050	44
1991	ND	2,828	7,180	ND	76	5,755	1,590	98
1992	ND	55	ND	42	2	4,887	6,615	113
1993	ND	819	640	11	38	2,895	120	111
1994	ND	3,612	4	213	ND	5,140	53,890	242
1995	ND	1,876	1,102	186	4	9,025	50	247
1996	ND	647	355	71	21	20,710	40,100	254
1997	ND	2,250 [b]	200 [b]	751	40	5,967	10	37
1998	ND	2,828	7,180	ND	ND	3,000	123,950	71
1999	ND	55	ND	42	2	1,741	6	45
2000	ND	819	640	11	2	3,383	16,080	24
2001	ND	3,612	4	213	2	4,450	8	232
2002	ND	1,876	1,102	186	8	139	58,700	463
2003	ND	647	355	71	12	1,257	821	71
2004	ND	2,250 [b]	200 [b]	751	ND	109 [b]	52,000 [b]	755
2005	ND	2,261 [b]	100 [b]	154	2 [b]	5,445 [b]	2,050 [b]	376
2006	0 [b]	16,000 [b]	8,800 [b]	ND	0 [b]	2,355 [b]	156,500 [b]	523
2007	1 [b]	4,452 [b]	0 [b]	38	2 [b]	6,315 [b]	318 [b]	34
2008	0 [b]	4,235 [b]	106,200 [b]	918	No survey occurred.			
2009	0 [b]	860 [b]	1,598 [b]	627 [b]	14 [b]	1,069 [b]	210 [b]	301 [b]
2010	0 [b]	13,600 [b]	36,000 [b]	ND	0 [b]	30,600 [b]	84,582 [b]	ND
2011	0 [b]	5,283 [b]	1,810 [b]	292 [b]	0 [b]	9,225 [b]	260 [b]	120 [b]
2012	0 [b]	7,911 [b]	ND	ND	No survey occurred.			
2013	0 [b]	16,088 [b]	ND	ND	4 [b]	16,859 [b]	52 [b]	ND
2014	0 [b]	10,776 [b]	25,000 [b]	ND	No survey occurred.			
2015	0 [b]	4,455 [b]	400 [b]	509 [b]	ND	ND	ND	356 [b]
2016	0 [b]	5,175 [b]	1,450 [b]	652 [b]	ND	ND	ND	907 [b]
2017	ND	17,738 [b]	1,320 [b]	ND	No survey occurred.			
2018	ND	12,823 [b]	1,320 [b]	1,470	ND	ND	ND	702 [b]

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	Fish River				Boston Creek			
Year [a]	Chinook	Chum	Pink	Coho	Chinook	Chum	Pink	Coho
1990	No survey occurred.				112	1,455	8,440	ND
1991	58	10,470	51,190	ND	152	2,560	3,210	ND
1992	4	390	1,387,000	ND	68	1,540	50,850	ND
1993	48	12,695	13,440	ND	227	4,563	1,930	ND
1994	55	16,500	910,000	ND	95	4,270	355,600	ND
1995	40	13,433	780	1,829	78	4,221	ND	230
1996	189	5,840 [c]	684,780	ND	ND	3,505 [c]	35,980	ND
1997	110	19,515	800	465	452	4,545	ND	ND
1998	96	28,010	663,050	ND	255	1,570	175,330	ND
1999	ND	50	20	821	ND	ND	ND	319
2000	ND	ND	ND	805	ND	ND	ND	414
2001	8	3,220	1,744	1,055	33	3,533	1,038	155
2003	95	3,200	1,014	ND	145	750	701	ND
2004	19	621	404,930	90	93	55	135,000	140
2005	0	6,875	319,170	ND	46	1,675	5,850	ND
2010	No survey occurred.				29 [b]	3,010 [b]	5,110 [b]	73 [b]
2013	15 [b]	2,550 [b]	ND	ND	19 [b]	16,100 [b]	ND	ND
2015	150 [b]	710 [b]	8,100 [b]	ND	519 [b]	4,550 [b]	2,500 [b]	ND
2016	No survey occurred.				75 [b]	ND	ND	ND
2017	No survey occurred.				No survey occurred.			
2018	No survey occurred.				7	40	81,100	ND

	Niukluk River								
Year [a]	Chinook	Chum	Pink	Coho	Year [a]	Chinook	Chum	Pink	Coho
1990	15	6,200	115,250	170	2004	15	173	277,900	828
1991	42	10,700	37,410	1,783 [d]	2005	6	3,225	154,000	ND
1992	ND	7,770	803,200	812	2006	ND	ND	ND	737 [e]
1993	15	19,910	2,840	2,104	2007	ND	ND	ND	ND
1994	7	16,470	1,294,100	274	2008	ND	ND	ND	1,715
1995	48	25,358	200	2,136	2009	No survey occurred.			
1996	25	9,732 [c]	153,150	2,047	2010	No survey occurred.			
1997	131	16,550	ND	983	2011	4 [b]	9,735 [b]	375 [b]	838 [b]
1998	51	2,556	205,110	593	2012	ND	ND	ND	928 [b]
1999	ND	640	ND	619	2013	68 [b]	17,203 [b]	9,700 [b]	2,279 [b]
2000	ND	ND	ND	3,812	2014	ND	ND	ND	2,342 [b]
2001	6	2,448	2,856	809	2015	No survey occurred.			
2002	ND	ND	ND	1,122	2016	ND	ND	ND	773 [b]
2003	55	2,315	272	146	2017	No survey occurred.			

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	Tubutulik River				North River			
Year [a]	Chinook	Chum	Pink	Coho	Chinook	Chum	Pink	Coho
1990	397	4,350	186,400	ND	255	1,345	25,685	ND
1991	661	7,085	26,870	ND	656	2,435	119,140	2,510
1992	260	2,595	138,600	ND	329	ND	631,140	398
1993	1,061	8,740	18,650	1,395	900	445	13,570	1,397
1995	377	16,158	4,020	930	622	1,370	18,300	690 [f]
1996	439	10,790	226,750	ND	106	270 [c]	125,500	917
1997	1,946	3,105	16,890	ND	1,605	9,045	17,870	ND
1998	894	10,180	1,124,800	ND	591	50	153,150	233
1999	No survey occurred.				18	1,480	3,790	533
2001	77	863	ND	ND	367	330	ND	ND
2002	42	180	182,000	ND	122	217	4,590	800
2003	50	1,352	60	292	131	222	11,010	ND
2004	321	1,117	391,000	779	189	283	264,000	1,386
2005	78	1,336	48,203	ND	156	310	381,150	1,963
2007	823	7,045	32,250	4,552	554	295	50,100	2,349
2008	ND	ND	ND	4,197	ND	ND	ND	2,774
2009	627	3,161	12,695	ND	438	3,263	189,939	2,830
2010	122	16,097	16,520	50	124	1,627	1,480	200
2011	141 [b]	14,127 [b]	3,875 [b]	1,606	433	9,785	20,920	898
2012	ND	ND	ND	2,889 [b]	No survey occurred.			
2013	2	4,532	700	ND	339	2,425	5,025	867
2015	874 [b]	9,835 [b]	16,495 [b]	ND	No survey occurred.			
2016	No survey occurred.				No survey occurred.			
2017	No survey occurred.				No survey occurred.			
2018	No survey occurred.				No survey occurred.			

Note: Years for which there are no survey or weir count data are excluded. ND is no data.

[a] Represents "high count" for season.

[b] Helicopter survey.

[c] Numerous pink salmon made enumerating of chum salmon difficult; pink count may include some chum.

[d] Includes counts from Casadepaga and Ophir Creeks.

[e] Includes counts from Ophir Creek.

[f] Poor survey conditions or partial survey, poor counting tower conditions.

Appendix A19.–Total Norton Sound escapement index for chum, pink, coho, and Chinook salmon from weir and tower projects at Kwiniuk, Niukluk, Nome, and Snake rivers (starting 1995), North River (starting 1996), and Eldorado River (starting 1997) to 2018.

Year	Chum	Pink	Coho [a]	Chinook
1995	138,320	49,411	7,334	626
1996 [b]	124,571	2,535,593	16,076	2,027
1997	109,961	163,728	11,434	5,550
1998	98,166	3,070,848	4,496	2,741
1999	55,352	73,077	10,069	1,846
2000	65,007	1,883,867	19,637	1,323
2001	70,451	79,706	30,645	1,718
2002	93,931	2,239,565	21,625	2,925
2003	49,749	392,827	13,761	2,466
2004	40,494	6,432,486	28,399	2,019
2005	68,585	2,594,334	44,351	1,530
2006	126,045	5,763,830	56,484	1,256
2007	123,394	708,669	37,112	2,324
2008	41,660	3,932,219	49,738	1,252
2009	41,812	275,834	39,262	3,052
2010	191,641	1,484,231	31,182	1,484
2011	102,870	207,017	13,003	933
2012 [c]	51,796	1,013,293	6,015	1,062
2013 [d]	50,529	73,928	16,686	621
2014 [d]	90,272	732,115	23,693	3,929
2015 [d]	96,843	626,383	19,741	2,322
2016 [d]	54,237	4,378,422	14,956	688
2017 [d]	143,139	2,789,554	23,925	1,143
2018 [d]	118,437	6,189,114	53,622	2,754

Note: Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015 and 2018.

[a] Most projects did not operate during the coho salmon season until 2001.

[b] In 1996 the majority of pink salmon for Nome River escaped through the pickets and were not counted.

[c] Most projects were only operational for a short duration during coho salmon season because of high water.

[d] Starting in 2013, there was no longer a counting tower at Niukluk.

Appendix A20.–Total escapement (4–6 rivers) and catch (commercial, subsistence, and sport fish) for chum, pink, coho, and Chinook salmon for Norton Sound District, 1995–2018.

Year [a, b]	Chum	Pink	Coho	Chinook
1995	213,373	169,498	76,769	15,291
1996 [c]	156,128	3,089,682	112,611	12,617
1997 [d]	161,248	189,439	60,033	25,989
1998 [d]	129,669	3,712,761	52,489	17,105
1999	76,493	95,302	40,546	9,315
2000	85,243	2,091,074	84,942	6,654
2001	97,223	109,878	66,232	6,926
2002	108,444	2,300,537	39,368	8,524
2003	63,099	441,387	45,306	7,445
2004	51,829	6,513,682	87,800	7,024
2005	78,719	2,652,592	146,616	5,280
2006	142,373	5,825,726	217,986	4,961
2007	157,932	734,723	181,306	5,137
2008	75,834	4,069,526	198,407	4,380
2009	85,297	320,631	147,865	6,795
2010	325,703	1,560,759	111,000	3,805
2011	228,120	231,890	84,040	2,538
2012	127,176	1,265,562	57,743	2,494
2013	187,009	102,117	91,427	1,633
2014	214,761	956,719	155,987	5,324
2015	259,438	715,998	191,357	5,562
2016	118,717	4,638,943	139,040	2,735
2017	321,326	2,842,809	242,205	2,769
2018 [e]	363,038	6,259,158	330,202	4,821

Note: Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015 and 2018.

[a] Kwiniuk, Niukluk, Nome, and Snake rivers (starting 1995), North River (starting 1996), and Eldorado River (starting 1997). Does not include Niukluk River after 2012.

[b] Not all subdistricts from 2004 to 2007 were surveyed for subsistence use.

[c] In 1996, the majority of pink salmon for Nome River escaped through the pickets and were not counted.

[d] Subsistence totals for 1997 and 1998 include data from Savoonga and Gambell.

[e] Information for 2018 does not include sport fish catch.

Appendix A21.–Nome Subdistrict chum salmon estimated escapement, 1999–2018.

Year	Rivers	Aerial survey counts	Estimated escapement [a]	Year	Rivers	Aerial survey counts	Estimated escapement [a]
1999	Nome		1,048	2000	Nome	658	4,056
	Snake[b]		484		Snake[b]		1,911
	Eldorado[b]		4,218		Eldorado[b]	3,383	11,617
	Flambeau	51	637		Flambeau	819	3,947
	Solomon	51	637		Solomon	150	1,294
	Sinuk	1,697	6,370		Sinuk[c]		7,198
	Bonanza	361	2,304		Bonanza	1,130	4,876
			15,698				34,899
2001	Nome	946	2,859	2002	Nome		1,720
	Snake[b]	752	2,182		Snake[b]	402	2,776
	Eldorado[b]	4,450	11,635		Eldorado[b]		10,215
	Flambeau	3,612	10,465		Flambeau	1,876	6,804
	Solomon	280	1,949		Solomon	325	2,150
	Sinuk	3,746	10,718		Sinuk	1,682	6,333
	Bonanza	1,084	4,745		Bonanza	595	3,199
			44,553				33,197
2003	Nome	888	1,957	2004	Nome		3,903
	Snake	440	2,201		Snake		2,146
	Eldorado	1,257	3,591		Eldorado		3,277
	Flambeau	647	3,380		Flambeau	2,250	7,667
	Solomon	73	806		Solomon[c]		1,436
	Sinuk	677	3,482		Sinuk[c]		3,198
	Bonanza	220	1,664		Bonanza[c]		2,167
			17,081				23,792
2005	Nome	2,082	5,584	2006	Nome	394	5,677
	Snake	1,842	2,967		Snake	840	4,160
	Eldorado	5,445	10,369		Eldorado	2,355	42,105
	Flambeau	2,261	7,692		Flambeau	16,000	27,828
	Solomon	775	3,806		Solomon	305	2,062
	Sinuk	1,072	4,710		Sinuk	1,115	4,834
	Bonanza	1,370	5,534		Bonanza	60	708
			40,662				87,374
2007	Nome	1,449	7,034	2008	Nome	106	2,607
	Snake	1,702	8,147		Snake		1,244
	Eldorado	6,315	21,312		Eldorado		6,746
	Flambeau	4,452	12,006		Flambeau	4,235	11,618
	Solomon	673	3,469		Solomon[c]		959
	Sinuk	7,210	16,481		Sinuk[c]		5,367
	Bonanza	2,628	8,491		Bonanza[c]		3,636
			76,940				32,177
2009	Nome		1,565	2010	Nome	2,998	5,877
	Snake		891		Snake	2,625	6,973
	Eldorado	1,069	4,943		Eldorado[d]	30,600	42,612
	Flambeau	860	4,075		Flambeau	13,600	25,009
	Solomon	89	918		Solomon	454	2,678
	Sinuk	344	2,232		Sinuk	3,955	11,107
	Bonanza	1,851	6,744		Bonanza	686	3,513
			21,368				97,769

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Year	Rivers	Aerial survey counts	Estimated escapement [a]	Year	Rivers	Aerial survey counts	Estimated escapement [a]
2011	Nome		3,578	2012	Nome		2,028
	Snake		4,352		Snake		978
	Eldorado		16,273		Eldorado		13,348
	Flambeau	6,283	15,056		Flambeau	7,911	17,517
	Solomon	1,010	4,529		Solomon	165	1,377
	Sinuk	6,265	15,028		Sinuk	3,650	10,537
	Bonanza	2,113	7,357		Bonanza	1,550	6,002
			66,173				51,787
2013	Nome		4,811	2014	Nome		5,589
	Snake		2,755		Snake		3,983
	Eldorado		26,131		Eldorado		27,054
	Flambeau	16,088	27,928		Flambeau	10,776	21,462
	Solomon[e]		1,377		Solomon[e]		1,502
	Sinuk	19,500	31,691		Sinuk	9,050	19,136
	Bonanza	5,284	13,437		Bonanza	8,602	18,508
			108,130				97,234
2015	Nome		6,111	2016	Nome		7,093
	Snake		4,260		Snake		3,666
	Eldorado		25,560		Eldorado		18,938
	Flambeau		12,011		Flambeau		13,254
	Solomon[e]		1,128		Solomon[e]		2,016
	Sinuk		29,643		Sinuk		9,408
	Bonanza		13,212		Bonanza		6,374
			91,925				60,749
2017	Nome		8,340	2018	Nome		5,240
	Snake		4,885		Snake		3,028
	Eldorado		73,882		Eldorado		42,361
	Flambeau		17,738		Flambeau		12,823
	Solomon[e]		3,931		Solomon[e]		2,917
	Sinuk		7,284		Sinuk		11,061
	Bonanza		7,734		Bonanza		7,903
			123,794				85,333

Note: Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015 and 2018.

[a] Escapement is estimated by adding Nome, Snake, and Eldorado weir counts and the aerial survey expansion estimates of the other 4 rivers. Aerial survey expansion is calculated as aerial survey count to 0.657142 power multiplied by 48.059 (Clark 2001), unless otherwise footnoted.

[b] Escapement was estimated by counting tower.

[c] Because of the lack of aerial survey estimates, method used (Clark 2001) was Solomon (0.368) multiplied by Nome escapement, Sinuk (1.476) multiplied by Bonanza escapement, and Bonanza (0.198) multiplied by Eldorado and Flambeau escapements combined.

[d] Weir was breached, and aerial survey expansion count was used.

[e] Solomon escapement was a weir count beginning in 2013.

Appendix A22.–Historical escapement of salmon and Dolly Varden at Eldorado River counting tower, 1997–2002 and weir, 2003–2018.

Year	Operating period	Chinook	Chum	Pink	Coho	Sockeye	Dolly Varden
1997	June 29–Aug 19	98	14,302	1,022	194	ND	ND
1998	June 29–Aug 12	8	13,808	137,283	21	ND	ND
1999	July 10–Sept 01	28	4,218	977	510	ND	ND
2000	June 29–Aug 25	33	11,617	55,992	192	ND	ND
2001	July 08–Sept 13	50	11,635	488	1,509	ND	ND
2002	June 24–Sept 10	26	10,215	119,098	540	10	377
2003	June 21–Sept 08	29	3,591	173	115	0	60
2004	June 22–Sept 09	25	3,277	60,866	1,151	39	0
2005	June 23–Sept 02	32	10,369	12,356	689	10	23
2006	June 26–Aug 03	41	42,105	222,348	55	1	65
2007	June 26–Aug 06	14	21,312	833	2	22	60
2008	June 27–July 31	36	6,746	244,641	38	3	14
2009	July 02–Aug 03	31	4,943	1,119	2	0	72
2010 [a]	June 30–July 24	23	42,612	48,136	2	8	72
2011	June 30–Aug 03	3	16,273	507	1	0	2
2012	July 04–Aug 15	0	13,348	59,318	1	0	30
2013	July 01–Aug 06	9	26,131	1,029	15	0	2
2014	June 23–July 27	18	27,054	46,746	0	0	4
2015	June 23–July 30	25	25,560	1,483	1	0	37
2016	June 26–Aug 02	0	18,938	42,699	41	16	57
2017	June 22–July 31	6	73,882	12,357	29	12	425
2018	June 28–July 31	31	42,361	197,119	47	3	98

Notes: ND is no data. Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015 and 2018.

[a] Numerous weir breaches during the season resulted in minimal counts, except for chum salmon count that was determined by aerial survey expansion from the aerial survey count.

Appendix A23.–Historical escapement of salmon and Dolly Varden at Snake River counting tower 1995–2002 and weir 2003–2018.

Year	Operating period	Chinook	Chum	Pink	Coho	Sockeye	Dolly Varden
1995	July 01–Aug 18	0	4,395	919	857	0	ND
1996	July 03–Aug 22	5	2,772	44,558	1,638	0	ND
1997	July 07–Aug 18	12	6,184	6,742	1,157	0	ND
1998	July 01–Aug 11	0	11,067	219,679	178	0	ND
1999	July 01–Aug 14	20	484	116	90	0	ND
2000	June 29–Aug 25	28	1,911	4,723	406	0	ND
2001	July 08–Sept 05	33	2,182	1,295	1,335	0	ND
2002	June 28–Sept 16	9	2,776	4,103	851 [a]	8	149
2003	June 26–Sept 11	50	2,201	2,856	489	84	111
2004	June 23–Sept 03	17	2,146	126,917	474	22	290
2005	June 27–Sept 11	31	2,967	13,813	2,948	275	28
2006	July 01–Sept 11	32	4,160	74,028	4,776	302	614
2007	July 01–Sept 14	61	8,147	4,634	1,781	1,354	121
2008	July 06–Sept 06	13	1,244	145,761	5,206	143	452
2009	July 08–Aug 30 [b]	6	891	769	50	2	14
2010	July 03–Sept 11	43	6,973	51,099	2,243	124	198
2011	July 08–Sept 11	1	4,352	7,090	343	14	5
2012	July 06–Aug 15 [c]	1	978	8,601	22	3	3
2013	July 19–Sept 10	8	2,755	1,333	1,203	163	1
2014	July 05–Sept 10	11	3,983	20,067	1,424	86	62
2015	July 04–Sept 14 [d]	6	4,260	16,321	1,638	56	67
2016	July 01–Sept 20 [e]	15	3,666	204,641	1,115	120	277
2017	July 01–Sept 11 [d]	8	4,885	22,252	2,974	269	116
2018	July 07–Sept 13 [d]	12	3,028	463,742	7,491	455	215

Notes: ND is no data. Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods were standardized in 2015 and 2018.

[a] Includes 442 coho salmon estimated by aerial survey to be holding below the weir site after the weir was removed.

[b] Weir was not fish tight last week of August and hundreds of coho salmon passed through the weir without being counted.

[c] Weir was knocked out for 13 days in late July and early August. An interpolation was made for chum salmon.

[d] Counts were interpolated because high water (or high carcass) events rendered the weir inoperable for several days during the season.

[e] Counts should be considered minimal because there were several partial day counts that were not interpolated.

Appendix A24.–Historical salmon escapement at Kwiniuk River counting tower, 1990–2018.

Year	Operating period	Chum	Pink	Chinook	Coho
1990	June 21–July 25	13,957	416,512	900	6
1991	June 18–July 27	19,801	53,499	708	2
1992	June 27–July 28	12,077	1,464,716	479	202
1993	June 27–July 27	15,824	43,063	600	0
1994	June 23–Aug 09	33,012	2,303,114	625	3,004
1995	June 21–July 26	42,500	17,511	498	114
1996	June 20–July 25	28,493	907,893	577	362
1997	June 18–July 27	20,119	9,535	974	0
1998	June 18–July 27	24,247	655,934	303	0
1999	June 25–July 28	8,763	607	116	0
2000	June 22–July 27	12,879	750,173	144	2
2001	June 27–Sept 15	16,598	8,423	261	9,532
2002	June 17–Sept 11	37,995	1,114,410	778	6,459
2003	June 15–Sept 15	12,123	22,329	744	5,490
2004	June 16–Sept 14	10,362	3,054,684	660	11,240
2005	June 17–Sept 13	12,083	341,048	342	12,950
2006	June 22–Sept 12	39,519	1,347,090	195	22,341
2007	June 21–Sept 10	27,756	54,255	258	9,429
2008	June 23–Sept 07	9,483	1,444,231	237	10,462
2009	June 24–Sept 13	8,739	42,963	444	8,705
2010	June 25–Sept 07	71,403	634,169	138	8,058
2011	June 20–Sept 11	32,239	30,913	57	3,290
2012	June 23–Aug 16	5,577	393,030	60	781
2013	June 24–Sept 11	5,631	13,212	15	3,729
2014	June 15–Sept 08	39,774	322,830	438	14,637
2015	June 15–Sept 03	37,812	67,295	318	6,252
2016	June 17–Sept 16	8,526	1,909,949	135	9,210
2017	June 15–Sept 12	32,551	506,593	63	13,593
2018	July 04–Sept 16	41,658	1,804,752	87	17,172

Note: Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015 and 2018.

Appendix A25.–Historical salmon escapement at Niukluk River counting tower, 1995–2012.

Year	Operating period	Chum	Pink	Chinook	Coho
1995	June 29–Sept 12	86,332	17,088	123	4,713
1996	June 23–Sept 12	80,178	1,154,922	243	12,781
1997	June 28–Sept 09	57,305	10,468	259	3,994
1998	July 04–Aug 13	45,588	1,624,438	260	840
1999	July 04–Sept 04	35,239	20,351	40	4,260
2000	July 04–Aug 27	29,573	961,603	48	11,382
2001	July 10–Sept 08	30,662	41,625	30	3,468
2002	June 25–Sept 10	35,307	645,141	621	7,391
2003	June 25–Sept 10	20,018	75,855	179	1,282
2004	June 25–Sept 08	10,770	975,895	141	2,064
2005	June 28–Sept 09	25,598	270,424	41	2,727
2006	June 26–Sept 08	29,199	1,371,919	39	11,169
2007	July 01–Sept 04	50,994	43,617	30	3,498
2008	July 01–Sept 06	12,078	669,234	33	13,779
2009	July 03–Sept 02	15,879	24,204	204	6,861
2010	July 01–Sept 01	48,561	434,205	15	9,042
2011	June 28–Sept 06	23,607	15,425	18	2,405
2012	July 04–Aug 17	19,576	249,212	21	1,729

Notes: The Niukluk River counting tower project was discontinued after 2012. Starting with 2008, some numbers might have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015.

Appendix A26.–Historical salmon escapement at Nome River counting tower, 1993–1995, and weir, 1996–2018.

Year	Operating period	Chum	Pink	Chinook	Coho	Sockeye
1993	July 25–Aug 28	1,859	13,036	63	4,349	ND
1994	June 24–Aug 15	2,969	142,604	55	726	ND
1995	June 22–Sept 06	5,093	13,893	5	1,650	ND
1996	June 26–July 23	3,339	95,681 [a]	5	66	ND
1997	June 27–Aug 27	5,147	8,035	22	321	ND
1998	July 01–Aug 11	1,930	359,469	70	96	ND
1999	July 02–Aug 25	1,048	2,033	3	417	6
2000	June 29–Aug 25	4,056	41,673	24	696	19
2001	July 08–Sept 11	2,859	3,138	7	2,418	55
2002	June 29–Sept 11	1,720	35,057	7	3,418	29
2003	July 05–Sept 10	1,957	11,402	12	548	47
2004	June 25–Sept 12	3,903	1,051,146	51	2,283	114
2005	June 27–Sept 11	5,584	285,759	69	5,848	381
2006	July 02–Sept 07	5,677	578,555	43	8,308	188
2007	July 03–Sept 16	7,034	24,395	13	2,437	534
2008	July 02–Sept 17	2,607	1,186,554	28	4,605	90
2009	July 01–Sept 20	1,565	16,490	10	1,370	103
2010	June 30–Sept 16	5,877	165,934	9	4,114	43
2011	July 01–Sept 12	3,578	14,384	12	1,831	22
2012	July 04–Aug 15	2,028	151,791	6	237	48
2013	July 05–Sept 16	4,811	10,257	9	2,624	38
2014	July 05–Sept 11	5,589	96,397	8	2,637	34
2015	July 01–Sept 20 [b]	6,111	75,603	23	2,418	96
2016	July 01–Sept 20 [b]	7,093	1,175,723	25	2,331	254
2017	June 28–Sept 25	8,340	717,770	21	4,983	429
2018	July 06–Sept 25 [b]	5,240	3,246,072	56	8,902	245

Note: ND is no data. Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015.

[a] In 1996 the majority of pink salmon escaped through the pickets and was not counted.

[b] Counts were interpolated because high water (or high carcass) events rendered the weir inoperable for several days during the season.

Appendix A27.–Salmon escapement at Solomon River weir, 2013–2018.

Year	Operating period	Chum	Pink	Chinook	Coho	Sockeye
2013	July 05–Aug 26	1,377	2,733	0	178	3
2014	July 02–Aug 20	1,502	20,691	0	79	0
2015	June 26–Aug 24	1,128	18,764	5	46	3
2016	June 30–Aug 18	2,016	128,046	6	215	11
2017	June 26–Aug 11	3,931	63,988	9	190	5
2018	July 08–Aug 09	2,917	456,036	11	161	18

Note: The Solomon River weir was initiated in 2013.

Appendix A28.–Historical sockeye salmon escapement at Glacial Lake weir, 2000–2015.

Year	Operating period	Chum [a]	Pink [b]	Sockeye
2000	July 11–July 30			884
2001	July 02–July 28	1		2,487
2002	June 25–July 26			1,047
2003	June 24–July 28			2,004
2004	June 18–July 25	1		8,115
2005	June 20–July 25			11,135
2006	July 04–July 18			6,849
2007	July 05–July 20			4,533
2008	June 27–July 28	10	614	1,794
2009	June 20–July 27			826
2010	June 26–July 28			1,047
2011	June 28–July 26	4		1,697
2012 [c]	July 01–Aug 09	25	165	1,636
2013 [d]	June 20–Aug 12	35	2	2,544
2014 [e]	June 30–Aug 07			4,211
2015 [e]	June 24–July 12			9,257

Note: The Glacial Lake weir was discontinued after 2015.

[a] Chum salmon will pass upstream through the Glacial Lake weir and often exit the lake back downstream through the weir.

[b] Pink salmon have been observed often in even-numbered years, but 2008 was the first year the crew was instructed to enumerate pink salmon passage.

[c] A video project was tested during 2012 and was in operation for 11 days (July 31 to August 9) after human occupation of the weir site. Included in totals are 34 sockeye, 12 pink, and 10 chum salmon that were counted by camera during that time.

[d] A video project was in operation from July 14 to August 12. Included in totals are 657 sockeye, 2 pink, and 33 chum salmon that were counted by camera during that time.

[e] A video project was in operation for the entire duration.

Appendix A29.–Historical salmon escapement at Inglutalik River counting tower, 2011–2018.

Year	Operating period	Chum	Pink	Chinook [a]	Coho
2011 [b]	June 24–Aug 14	65,010	547,453	1,469	1,400
2012 [b]	June 23–Aug 23	33,123	90,831	1,159	1,431
2013 [c]	June 21–Aug 11	51,099	201,438	3,411	4,488
2014 [b]	June 20–July12	62,153	61,752	1,676	978
2015 [b]	June 23–Aug 21	82,156	1,041,693	1,543	8,247
2016 [b]	June 16–July 17	43,694	78,916	3,300	693
2017 [b,d]	June 12–July 31	93,273	1,625,743	2,256	2,424
2018 [b]	June 21–Aug 22	28,736	20,231	207	2,367

Note: The Inglutalik River tower was initiated in 2013. Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015 and 2018.

[a] ADF&G considers the Chinook count prior to 2018 to be suspect based on reported Chinook salmon catches in the same-year commercial and subsistence fisheries.

[b] Counts were interpolated because high water prevented counts for a few to many days during the season.

[c] Due to speciation problems, the Chinook and coho salmon counts are probably inaccurate.

[d] Three aerial surveys were flown with a highest count of only 206 for Chinook salmon.

Appendix A30.–Historical salmon escapement at North River counting tower, 1996–2018.

Year	Operating period	Chum	Pink	Chinook	Coho
1996	June 16–July 25	9,789	332,539	1,197	1,229
1997	June 16–Aug 21	6,904	127,926	4,185	5,768
1998	June 15–Aug 12	1,526	74,045	2,100	3,361
1999	June 30–Aug 31	5,600	48,993	1,639	4,792
2000	June 17–Aug 12	4,971	69,703	1,046	6,959
2001	July 05–Sept 15	6,515	24,737	1,337	12,383
2002	June 19–Aug 29	5,918	321,756	1,484	2,966
2003	June 15–Sept 13	9,859	280,212	1,452	5,837
2004	June 15–Sept 14	10,036	1,162,978	1,125	11,187
2005	June 15–Sept 15	11,984	1,670,934	1,015	19,189
2006	June 18–Sept 11	5,385	2,169,890	906	9,835
2007	June 16–Sept 05	8,151	580,935	1,948	19,965
2008	June 19–Sept 13	9,502	241,798	905	15,648
2009	June 19–Sept 11	9,795	190,289	2,357	22,274
2010	June 19–Sept 07	16,215	150,688	1,256	7,723
2011	June 17–Sept 08	21,396	138,542	841	4,975
2012	June 21–Aug 19	9,120	137,012	972	3,258
2013	July 01–Aug 05	11,201	48,097	580	9,115
2014	June 14–Sept 01	13,872	246,075	3,454	4,995
2015	June 14–Aug 25	23,100	465,681	1,950	9,432
2016 [a]	June 13–Sept 07	16,014	1,045,410	513	2,259
2017 [a]	June 14–Sept 12	23,481	1,530,582	1,045	2,346
2018 [b]	June 26–Aug 26	26,150	477,429	2,568	20,010

Note: Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015 and 2018.

[a] Tower was not operational for several weeks during the season due to high water and counts were not interpolated.

[b] Tower was not operational for a limited time during the season due to high water and counts were interpolated.

Appendix A31.–Historical salmon escapement at Unalakleet River weir, 2010–2018.

Year	Operating period	Chum	Pink	Chinook	Coho	Sockeye
2010	June 22–July 31	70,811	832,904	1,021	5,382	130
2011	June 17–Aug 07	104,050	354,361	1,030	10,231	181
2012	June 24–Aug 15	70,859	674,250	823	17,548	237
2013	June 20–Aug 22	106,715	143,250	667	25,550	217
2014 [a]	June 28–Aug 27	55,341	1,194,708	1,126	44,524	206
2015	June 18–Aug 15	97,885	1,616,042	2,789	40,964	996
2016	June 11–July 20	31,756	4,752,639	505	132	580
2017	June 09–Aug 10	146,449	6,094,350	2,934	21,453	1,199
2018	July 02–Aug 08	128,253	[b]	3,326	58,755	630

Note: The Unalakleet River weir was initiated in 2010. Some numbers might have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015.

[a] Weir was flooded out July 21–25.

[b] Starting in 2018, the weir picket spacing was increased to allow pink salmon to pass through; therefore, pink salmon are no longer enumerated.

Appendix A32.–Chum salmon escapement by river, Nome Subdistrict, 1993–2018.

	Rivers west of Cape Nome			Rivers east of Cape Nome			
Year	Sinuk [a]	Snake [b]	Nome [c]	Eldorado [d]	Bonanza [a]	Solomon [a]	Total [e]
1993	6,052	2,115	5,925	9,048	3,007	2,525	34,775
1994	4,905	3,519	2,969	13,202	5,178	1,066	43,728
1995	9,464	4,395	5,093	18,955	11,182	2,106	67,669
1996	6,658	2,772	3,339	32,970	7,049	2,141	68,542
1997	9,212	6,184	5,147	14,302	4,140	2,111	50,551
1998	6,720	11,067	1,930	13,808	4,552	925	48,131
1999	6,370	484	1,048	4,218	2,304	637	15,698
2000	7,198	1,911	4,056	11,617	4,876	1,294	34,899
2001	10,718	2,182	2,859	11,635	4,745	1,949	44,553
2002	6,333	2,776	1,720	10,215	3,199	2,150	33,197
2003	3,482	2,201	1,957	3,591	1,664	806	17,081
2004	3,197	2,146	3,903	3,277	2,166	1,436	23,792
2005	4,710	2,967	5,584	10,369	5,534	3,806	40,662
2006	4,834	4,160	5,677	42,105	708	2,062	87,374
2007	16,481	8,147	7,034	21,312	8,491	3,469	76,940
2008	5,367	1,244	2,607	6,746	3,636	959	32,177
2009	2,232	891	1,565	4,943	6,744	918	21,368
2010	11,107	6,973	5,877	42,612	3,513	2,678	97,769
2011	15,028	4,352	3,578	16,273	7,357	4,529	66,173
2012	10,537	978	2,028	13,348	6,002	1,377	51,787
2013	31,691	2,755	4,811	26,131	13,437	1,377	108,130
2014	19,136	3,983	5,589	27,054	18,508	1,502	97,234
2015	29,643	4,260	6,111	25,560	13,212	1,128	91,925
2016	9,408	3,666	7,093	18,938	6,374	2,016	60,749
2017	7,284	4,885	8,340	73,882	7,734	3,931	123,794
2018	11,061	3,028	5,240	42,361	7,903	2,917	85,333
Total	258,828	94,041	111,080	518,472	163,215	51,815	1,524,031

Note: Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015 and 2018.

[a] Sinuk, Flambeau, Bonanza, and Solomon rivers' escapements are estimated by aerial survey, but beginning in 2013, Solomon River escapement was a weir count, and beginning in 2018, Bonanza River escapement was also a weir count.

[b] Snake River escapements are estimated by aerial survey (1993–1994), tower counts (1995–2002), and weir counts (2003–2018). Escapement goal range is 1,600–2,500 chum salmon.

[c] Nome River escapements are estimated by aerial survey expansion (1993), tower counts (1994–1995), and weir counts (1996–2018). Escapement goal range is 2,900–4,300 chum salmon.

[d] Eldorado River escapements are estimated by aerial survey (1993–1996), tower counts (1997–2002), and weir counts (2003–2018). Escapement goal range is 6,000–9,200 chum salmon.

[e] Subdistrict 1 BEG is 23,000–35,000 chum salmon.

Appendix A33.–Pink salmon escapement by year and river, Nome Subdistrict, 1993–2018.

	Rivers west of Cape Nome			Rivers east of Cape Nome			
Year	Sinuk [a]	Snake [b]	Nome [c]	Eldorado [d]	Bonanza [a]	Solomon [a]	Total
1993	5,120	ND	13,036	120	ND	ND	23,860
1994	492,100	63,860	142,604	53,890	20	ND	771,676
1995	1,250	919	13,893	4,243	619	350	29,360
1996	74,400	44,558	95,681	46,100	40,510	15,230	333,661
1997	1,200	6,742	8,035	1,022	ND	80	19,196
1998	342,100	219,679	359,469	137,283	167,130	45,175	1,279,556
1999	180	116	2,033	977	245	90	4,892
2000	12,175	4,723	41,673	55,992	12,410	2,899	132,031
2001	115	1,295	3,138	488	221	ND	6,181
2002	28,487	4,103	35,057	119,098	17,095	9,170	215,243
2003	9,907	2,856	11,402	173	1,540	157	26,229
2004	1,267,100	126,917	1,051,146	60,866	185,000	109,000	2,807,380
2005	211,285	13,813	285,759	12,356	55,000	11,100	590,186
2006	515,000	74,028	578,555	222,348	268,500	165,215	1,830,202
2007	6,810	4,634	24,395	833	1,360	2,400	40,768
2008	1,496,000	145,761	1,186,554	244,641	212,000	81,000	3,369,466
2009	6,740	769	16,490	1,119	3,276	1,565	30,134
2010	168,600	51,099	165,934	48,136	106,000	21,804	566,370
2011	21,100	7,090	14,384	507	11,050	5,580	59,769
2012	506,500	8,601	151,791	59,318	54,700	15,000	798,567
2013	143,921	1,333	10,257	1,029	800	2,733	160,073
2014	115,000	20,067	96,397	46,746	71,000	20,691	394,901
2015	57,050	16,321	75,603	1,483	10,500	18,764	180,121
2016	405,200	204,641	1,175,723	42,699	139,200	128,046	2,096,959
2017	150,200	22,252	717,770	12,357	19,490	63,988	987,377
2018	1,068,000	463,742	3,246,072	197,119	885,735	456,035	6,318,023
Total	7,105,540	1,509,919	9,522,851	1,370,943	2,263,401	1,176,072	23,072,181

Notes: ND is no data. Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015 and 2018.

[a] Sinuk, Flambeau, Bonanza, and Solomon rivers' escapements are estimated by aerial survey, but beginning in 2013, Solomon River escapement was a weir count, and beginning in 2018, Bonanza River escapement was also a weir count.

[b] Snake River escapements are estimated by aerial survey (1993–1994), tower counts (1995–2002), and weir counts (2003–2018).

[c] Nome River escapements are estimated by tower counts (1993–1995) and weir counts (1996–2018). Escapement goal range is 13,000 pink salmon in even-numbered years and 3,200 pink salmon in odd-numbered years.

[d] Eldorado River escapements are estimated by aerial survey (1993–1996), tower counts (1997–2002), and weir counts (2003–2018).

Appendix A34.–Number of customary trade permits issued, Norton Sound District and Port Clarence District, 2007–2018.

	Norton Sound District									Port Clarence District			Total	
Year	Nome	White Mountain	Golovin	Elim	Koyuk	Shaktoolik	Unalakleet	St. Michael	Stebbins	Teller	Brevig Mission	Wales	(both districts)	Value
2007	3	0	0	2	0	0	0	0	0	0	0	0	5	$200.00
2008	3	0	0	0	0	0	0	0	0	1	0	0	4	$0.00
2009	1	0	0	0	0	0	1	0	0	1	0	0	3	$100.00
2010	1	0	0	0	0	0	0	0	0	0	0	0	1	Confidential
2011	0	0	0	0	0	0	0	1	0	0	0	0	1	Confidential
2012	2	0	0	0	0	0	0	0	0	0	0	0	2	Confidential
2013	4	0	4	1	0	0	0	0	0	3	6	0	18	$1,790.00
2014	6	1	1	0	0	0	1	0	0	0	11	0	20	$1,885.00
2015	4	1	1	0	0	0	0	0	0	0	8	0	14	$1,255.00
2016	4	0	1	0	0	0	1	0	0	1	5	0	12	$575.00
2017	11	1	0	0	0	0	0	0	0	0	8	0	20	$2,245.00
2018	4	1	0	0	0	0	0	0	0	0	7	0	12	$1,375.00

APPENDIX B: PORT CLARENCE FISHERIES

Appendix B1.–Comparative sockeye salmon aerial survey indices, Port Clarence District, 1990–2018.

Year	Salmon Lake	Central Grand River	Total
1990	2,834	926	3,760
1991	3,790	1,570	5,360
1992	1,500	[a]	1,500
1993	2,885	216	3,092
1994	3,740	1,230	4,970
1995	5,433	628 [b]	6,061
1996	6,610	770	7,380
1997	8,760	1,520	10,280
1998	5,210	1,977	7,187
1999	31,720	1,780	33,500
2000	12,772	[a]	12,772
2001	9,400	155	9,555
2002	3,520	71	3,591
2003	19,275	1,015	20,290
2004	23,005	2,855	25,860
2005	41,500	740	42,240
2006	39,400	2,380	41,780
2007	14,920	5,692	20,612
2008	9,420	2,252	11,672
2009	136	50	186
2010	73	711	784
2011	4,604	540	5,144
2012	4,730	1,100	5,830
2013	5,820	1,151	6,971
2014	4,535	768	5,303
2015	3,030	7,500	10,530
2016	6,155	2,403	8,558
2017	25,004	15,300	40,304
2018	20,627	5,900	26,527

[a] No survey occurred.

[b] Early count.

Appendix B2.–Historical escapement of salmon and Dolly Varden at Pilgrim River counting tower (1997–2002) and weir (2003–2018).

Year	Operating period	Chinook	Chum	Pink	Coho	Sockeye	Dolly Varden
1997	July 12–Aug 21	356	15,652 [a]	5,557	452	15,652 [a]	ND
1998	Did not operate						
1999	July 13–Aug 06	6	2,617	35,577	104	4,650	ND
2000	July 05–Aug 18	72	861	374	21	12,141	ND
2001	Did not operate						
2002	July 04–Aug 04	150	5,590	3,882	246	3,888	ND
2003	June 21–Sept 14	1,016	15,200	14,100	677	42,729	550
2004	June 21–Sept 14	925	10,239	50,760	1,573 [b]	85,417	264
2005	June 24–Sept 05	216	9,685	13,218	304	55,951	112
2006	June 30–Sept 09	275	45,361	17,701	973	52,323	505
2007	June 29–Sept 10	501	35,334	3,616	605	43,432	339
2008 [c]	June 25–Sept 01	133	25,008	92,641	260	20,452	409
2009	June 26–Aug 31	52	5,427	483	18	953	130
2010	June 24–Sept 01	44	25,379	29,239	272	1,654	285
2011	June 28–Sept 01	44	41,740	3,364	269	8,449	229
2012 [d]	June 26–Aug 18	65	25,733	46,201	95	7,090	65
2013 [c]	June 27–Sept 08	37	47,557	1,060	890	12,428	27
2014 [c]	June 25–Aug 27	48	25,634	4,197	425	9,719	66
2015 [c]	July 02–Aug 25	99	41,121	2,807	296	36,052	76
2016 [c]	June 23–Aug 25	34	21,379	2,986	554	15,066	135
2017	June 21–Aug 22	101	50,189	80,124	665	55,764	450
2018	July 04–Aug 16	88	33,135	46,490	239	33,802	294

Note: ND is no data.

[a] Chum and sockeye salmon escapements were combined due to species identification problems during 1997.

[b] Coho salmon were misidentified. Nearly 30% of scale samples in 2004 were actually sockeye salmon.

[c] Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because of postseason updating.

[d] Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods in calculating escapement counts were standardized in 2015.

Appendix B3.–Estimated number of subsistence fishing families and harvest in Port Clarence District, 1994–2018.

Year	Number of fishing families interviewed	Chinook	Sockeye	Coho	Pink	Chum	Total
1994 [a]	127	203	2,220	1,892	4,309	2,294	10,918
1995 [a]	122	76	4,481	1,739	3,293	6,011	15,600
1996 [a]	117	194	2,634	1,258	2,236	4,707	11,029
1997 [a]	126	158	3,177	829	755	2,099	7,018
1998 [a]	138	289	1,696	1,759	7,815	2,621	14,180
1999 [a]	155	89	2,392	1,030	786	1,936	6,233
2000 [a]	134	72	2,851	935	1,387	1,275	6,520
2001 [a]	160	84	3,692	1,299	1,183	1,910	8,168
2002 [a]	159	133	3,732	2,194	3,394	2,699	12,152
2003 [a, b]	204	177	4,495	1,434	4,113	2,430	12,649
2004 [c]	376 [d]	278	8,688	1,131	5,918	2,505	18,520
2005 [c]	335 [d]	152	8,492	726	6,615	2,479	18,464
2006 [c]	345 [d]	102	9,940	1,061	4,939	4,353	20,395
2007 [c]	363 [d]	85	9,484	705	1,468	4,454	16,196
2008 [c]	408 [d]	125	5,069	512	7,527	2,449	15,682
2009 [c]	326 [d]	40	1,643	804	1,882	3,060	7,429
2010 [c]	290 [d]	63	824	596	5,202	5,232	11,917
2011 [c]	270 [d]	57	1,611	393	2,610	4,338	9,008
2012 [c]	335 [d]	44	1,422	703	5,200	7,802	15,171
2013 [c]	431 [d]	38	5,243	651	1,788	6,588	14,308
2014 [c]	430 [d]	21	3,969	564	5,040	5,085	14,679
2015 [c]	549 [d]	64	13,872	550	2,982	4,231	21,699
2016 [c]	664 [d]	40	12,140	627	4,322	4,303	21,432
2017 [c]	665 [d]	39	15,424	697	5,365	6,886	28,411
2018 [c]	689 [d]	55	12,381	764	4,556	5,625	23,381

[a] Harvest estimate from ADF&G Division of Subsistence survey.

[b] Includes harvest reported from 59 Pilgrim River permits. In total, 101 permits were issued and 79 were returned.

[c] Beginning in 2004 a permit was required for Port Clarence District (including Pilgrim River and Salmon Lake) that replaced household surveys.

[d] The number is all permits issued for the Port Clarence District (including Pilgrim River and Salmon Lake permits).

Appendix B4.–Application of 20-05-00 liquid blend of phosphorous and nitrogen fertilizer to Salmon Lake, 1997–2018.

Year	Fertilizer (tons)	Organization
1997	40	NSEDC/ADF&G/BLM
1998	40	NSEDC/ADF&G/BLM
1999	40	NSEDC/ADF&G/BLM
2000	40	NSEDC/ADF&G/BLM
2001	40	NSEDC/ADF&G/BLM
2002	0	
2003	0	
2004	27	NSEDC/ADF&G
2005	0	
2006	0	
2007	16	NSEDC
2008	8	NSEDC
2009	28	NSEDC
2010	19	NSEDC
2011	11	NSEDC
2012	10	NSEDC
2013	11	NSEDC
2014	20	NSEDC
2015	21	NSEDC
2016	30	NSEDC
2017	35.5	NSEDC
2018	35	NSEDC

APPENDIX C: KOTZEBUE FISHERIES

Appendix C1.–Kotzebue District chum salmon catch statistics, 1990–2018.

Year	Chum salmon		Other [a]	Number of fishermen	Season catch per fisherman
	Number of fish	Pounds			
1990	163,263	1,453,040	538	153	1,067
1991	239,923	1,951,041	714	142	1,690
1992	289,184	2,397,302	2,714	149	1,941
1993 [b]	73,071	613,968	1,507	114	641
1994 [c]	153,452	1,166,494	73	109	1,408
1995	290,730	2,329,898	93	92	3,160
1996 [d]	82,110	657,224	1,204	55	1,493
1997	142,720	1,141,741	649	68	2,099
1998	55,907	447,256	2,971	45	1,242
1999	138,605	1,108,898	87	60	2,310
2000	159,802	1,370,637	106	64	2,497
2001	211,672	1,847,361	64	66	3,207
2002	8,390	74,341	0	3	2,797
2003	25,423	218,091	0	4	6,356
2004	51,038	419,059	1,450	43	1,187
2005	75,971	621,573	1,258	41	1,853
2006	137,961	1,040,023	0	42	3,285
2007	147,087	1,209,842	0	46	3,198
2008	190,550	1,541,922	0	48	3,970
2009	187,562	1,505,734	0	62	3,025
2010	270,343	2,160,264	0	67	4,035
2011	264,225	2,158,365	0	89	2,969
2012	227,965	1,751,473	0	83	2,747
2013	319,062	2,555,304	0	66	4,834
2014	636,187	5,330,144	0	94	6,768
2015	305,383	2,626,607	0	105	2,908
2016	400,417	3,284,097	0	86	4,656
2017	463,749	3,832,578	0	100	4,637
2018	695,153	5,642,859	28	95	7,317
Avg 1998–2017	213,865	1,755,178	297	61	3,614

[a] Chinook and pink salmon, and Dolly Varden.

[b] Includes 11,160 pounds from the Sikusuilaq Springs Hatchery terminal fishery.

[c] Includes 31,500 pounds commercially caught but not reported on fish tickets.

[d] Includes 17,600 pounds commercially caught but not sold on fish tickets.

Appendix C2.–Kotzebue District mean prices paid per pound in dollars to salmon fishermen by species, 1990–2018.

Year	Chum salmon		Chinook salmon	Inconnu	Dolly Varden
	Average weight	Average price			
1990	8.9	0.31	2.00	[a]	0.25
1991	8.1	0.22	1.64	0.50	0.18
1992	8.3	0.22	1.89	0.58	0.10
1993	8.5	0.38	2.37	0.50	0.10
1994	7.8	0.20	1.14	[a]	0.17
1995	8.0	0.13	1.00	0.50	0.20
1996	8.0	0.09	1.00	0.44	0.25
1997	8.0	0.16	1.02	[a]	0.20
1998 [b]	8.0	0.15	1.00	[a]	0.20
1999 [b]	8.0	0.16	1.00	[a]	0.20
2000	8.6	0.18	1.00	[a]	0.20
2001	8.7	0.17	1.00	[a]	[a]
2002	8.9	0.10	[a]	[a]	[a]
2003	8.6	0.12	[a]	[a]	0.50
2004	8.2	0.15	0.72	[a]	0.26
2005	8.2	0.20	0.50	[a]	0.30
2006	7.5	0.22	[a]	[a]	[a]
2007	8.2	0.20	[a]	[a]	[a]
2008	8.1	0.25	[a]	[a]	[a]
2009	8.0	0.25	[a]	[a]	[a]
2010	8.0	0.40	[a]	[a]	[a]
2011	8.2	0.40	[a]	[a]	[a]
2012	7.7	0.32	[a]	[a]	[a]
2013	8.0	0.27	[a]	[a]	[a]
2014	8.4	0.54	[a]	[a]	[a]
2015	8.6	0.33	[a]	[a]	[a]
2016	8.4	0.33	[a]	[a]	[a]
2017	8.3	0.48	[a]	[a]	[a]
2018	8.1	0.40	[c]	[a]	[a]

[a] Did not purchase.

[b] Each chum salmon was assumed to weigh 8 pounds, but no fish were weighed individually.

[c] Information was not available.

Appendix C3.–Kotzebue District commercial fishery dollar value estimates, 1990–2018.

Year	Gross value of catch to fishermen [a]	Number of fishermen	Average value per fisherman
1990	$438,044	153	$2,863
1991	$437,948	142	$3,084
1992	$533,731	149	$3,582
1993 [b]	$235,061	114	$2,062
1994	$233,512	109	$2,142
1995	$316,031	92	$3,435
1996	$56,310	55	$1,024
1997	$187,978	68	$2,764
1998	$70,587	45	$1,569
1999	$179,781	60	$2,996
2000	$246,786	64	$3,856
2001	$322,650	66	$4,889
2002	$7,572	3	$2,524
2003	$26,377	4	$6,594
2004	$64,420	43	$1,498
2005	$124,820	41	$3,044
2006	$229,086	42	$5,454
2007	$243,149	46	$5,286
2008	$385,270	48	$8,026
2009	$376,554	62	$6,073
2010	$860,125	67	$12,838
2011	$867,085	89	$9,743
2012	$567,664	83	$6,839
2013	$689,163	66	$10,442
2014	$2,879,016	94	$30,628
2015	$867,583	105	$8,263
2016	$1,123,248	86	$13,061
2017	$1,839,637	98	$18,772
2018	$2,279,477	95	$23,994
Avg 1998–2017	$598,529	61	$8,120

[a] Values represent chum salmon value and incidental species such as char, whitefish, and other salmon.

[b] Includes $3,648 from Sikusuilaq Springs Hatchery terminal fishery.

Appendix C4.–Kotzebue District commercial and subsistence salmon catches, 1990–2018.

	Commercial catch			Subsistence catch [a]			
Year	Chum [b]	Other [c]	Total	Chum	Number of fishermen interviewed	Average catch per fisherman	Total documented catch
1990	163,263	32	163,295	8,268	[d]	[d]	171,563
1991	239,923	44	239,967	14,740	[d]	[d]	254,707
1992	289,184	204	289,388	14,303	[d]	[d]	303,691
1993	73,071 [e]	131	73,202	15,430	[d]	[d]	88,632
1994	153,452 [f]	3	153,455	36,226	375	97	189,681
1995	290,730	5	290,735	102,881 [g]	593	173	393,616
1996	82,110 [h]	3	82,113	99,740 [g]	596	167	181,853
1997	142,720	45	142,765	57,906 [g]	530	109	200,671
1998	55,907	210	56,117	48,980 [g]	592	83	105,097
1999	139,120	5	139,125	94,342 [g]	353	267	233,467
2000	159,802	10	159,812	65,975 [g]	422	156	225,787
2001	211,672	6	211,678	49,232 [g]	408	121	260,910
2002	8,390	0	8,390	16,880 [i]	191	88	25,270
2003	25,423	0	25,423	19,201	446	43	44,624
2004	51,038	116	51,154	24,637	440	56	75,791
2005	75,971	7	75,978	Subsistence surveys were not conducted.			
2006	137,961	17	137,978	Subsistence surveys were not conducted.			
2007	147,087	20	147,107	Subsistence surveys were not conducted.			
2008	190,550	742	191,292	Subsistence surveys were not conducted.			
2009	187,562	106	187,668	Subsistence surveys were not conducted.			
2010	270,343	583	270,926	Subsistence surveys were not conducted.			
2011	264,321	166	264,487	Subsistence surveys were not conducted.			
2012	227,965	476	228,441	26,693	360	74	255,134
2013	319,062	114	319,176	42,216	386	109	361,392
2014	636,187	475	636,662	37,217	401	93	673,879
2015	305,391	30	305,421	Subsistence surveys were not conducted.			

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	Commercial catch				Subsistence catch [a]			
Year	Chum [b]	Other [c]	Total		Chum	Number of fishermen interviewed	Average catch per fisherman	Total documented catch
2016	400,435	1,548	401,983		Subsistence surveys were not conducted.			
2017	463,749	1,319	465,068		Subsistence surveys were not conducted.			
2018	695,153	1,480	696,633		Subsistence surveys were not conducted.			
Average 1998–2017	213,897	298	214,194	Average 1998–2014	42,537	400	109	226,135

[a] Villages surveyed are Ambler, Kiana, Kobuk, Noatak, Noorvik, and Shungnak.

[b] May include chum salmon reported on fish tickets that were retained for personal use and not commercially sold.

[c] Includes Chinook, coho, pink, and sockeye salmon that were not sold but retained for personal use.

[d] Information not available.

[e] Includes 2,000 chum salmon from the Sikusuilaq Springs Hatchery terminal fishery.

[f] Includes 4,000 chum salmon commercially harvested on August 5 but not sold.

[g] Includes the town of Kotzebue.

[h] Includes 2,200 chum salmon commercially harvested on July 29 but not sold.

[i] Only 2 of 6 villages surveyed.

Appendix C5.–Kotzebue District subsistence chum salmon catches by village, 1990–2014.

	Village					Kobuk River villages	Noatak village	Village					District total
Year	Noorvik	Kiana	Ambler	Shungnak	Kobuk			Kotzebue	Deering	Kivalina	Buckland	Shishmaref	
1990	4,353	[a]	[a]	[a]	[a]	4,353	3,915	[a]	[a]	[a]	[a]	[a]	8,268
1991	6,855	[a]	[a]	4,248	[a]	11,103	3,637	[a]	[a]	[a]	[a]	[a]	14,740
1992	8,370	[a]	[a]	3,890	[a]	12,260	2,043	[a]	[a]	[a]	[a]	[a]	14,303
1993	8,430	[a]	[a]	3,730	[a]	12,160	3,270	[a]	[a]	[a]	[a]	[a]	15,430
1994	8,157	1,891	2,860	7,982	5,722	26,612	6,126	[a]	3,488	[a]	[a]	[a]	36,226
1995	15,485	5,985	8,558	5,880	2,959	38,867	6,359	50,708	[a]	[a]	[a]	6,947	102,881
1996	13,611	5,935	9,062	8,649	1,819	39,076	10,091	50,573	[a]	[a]	[a]	[a]	99,740
1997	14,323	3,064	2,713	5,513	629	26,242	5,309	26,355	[a]	[a]	[a]	[a]	57,906
1998	9,845	3,414	2,432	4,676	1,031	21,398	2,614	24,968	[a]	[a]	[a]	[a]	48,980
1999	17,843	3,788	590	3,868	1,869	27,958	1,616	64,768	[a]	[a]	[a]	[a]	94,342
2000	10,391	2,876	5,009	2,944	318	21,538	7,293	37,144	[a]	[a]	[a]	[a]	65,975
2001	16,540	5,500	[a]	4,310	2,843	29,193	2,326	17,713	[a]	[a]	[a]	[a]	49,232
2002	13,943	[b]	[b]	[b]	[b]	[b]	2,937	[b]	[a]	[a]	[a]	[a]	16,880
2003	7,982	3,010	1,719	2,860	1,453	17,024	2,177	[a]	[a]	[a]	[a]	[a]	19,201
2004	6,025	3,896	3,446	4,186	3,087	20,640	3,997	[a]	[a]	[a]	[a]	[a]	24,637
2012	9,584	2,442	1,621	2,595	2,637	18,879	7,814	[a]	[a]	[a]	[a]	[a]	26,693
2013	19,972	2,969	4,320	7,257	2,076	36,594	5,655	[a]	[a]	[a]	3,104	[a]	45,353
2014	16,668	2,849	4,182	5,101	1,840	30,640	6,577	21,144	[a]	[a]	4,188	[a]	62,549

Note: No subsistence surveys were conducted 2005–2011 and after 2014.

[a] Not surveyed.

[b] The Kotzebue Sound communities of Ambler, Kiana, Kobuk, Kotzebue, and Shungnak, although normally included, were not surveyed in 2002 (Georgette et al. 2003).

Appendix C6.–Kotzebue District average subsistence chum salmon harvest per household by village, 1990–2014.

Year	Kotzebue	Noatak	Noorvik	Kiana	Ambler	Shungnak	Kobuk	Deering
1990	[a]	135	198	[a]	[a]	[a]	[a]	[a]
1991	[a]	145	311	[a]	[a]	283	[a]	[a]
1992	[a]	89	310	[a]	[a]	243	[a]	[a]
1993	[a]	136	312	[a]	[a]	196	[a]	[a]
1994	[a]	90	133	32	99	154	260	92
1995	71	69	123	59	110	111	110	[a]
1996	73	115	117	58	111	154	76	[a]
1997	41	71	125	35	39	117	28	[a]
1998	35	27	79	34	30	84	41	[a]
1999	78	18	151	42	8	76	81	[a]
2000	48	72	93	33	72	64	11	[a]
2001	23	24	152	62	[a]	94	109	[a]
2002	[a]	29	121	[a]	[a]	[a]	[a]	[a]
2003	[a]	21	58	32	26	57	43	[a]
2004	[a]	50	56	46	56	75	111	[a]
2012	[a]	94	115	38	31	56	88	[a]
2013	[a]	45	151	32	63	112	67	[a]
2014	26	53	134	29	57	82	56	[a]

Note: No subsistence surveys were conducted 2005–2011 and after 2014.

[a] Not surveyed.

Appendix C7.–Kotzebue District chum salmon aerial survey counts, 1990–2018.

Stream [a]	1990 [b]	1991 [b]	1992 [b]	1993	1994 [c]	1995	1996	1997	1998	1999
Noatak drainage										
Noatak River below Kelly River	23,345 [b]	82,750	34,335	25,415		147,260	306,900 [c]	[c]	[b]	
Eli River	3,000	2,940	701	4,795		7,860	30,040 [c]	[c]	[b]	
Kelly River and Lake	325 [d]	654	726	9		8,384	1,427	2,792	2,631	
Noatak River system total	26,670	86,344	35,762	30,219		163,504	338,367		[b]	84,085
Kobuk drainage										
Kobuk to Pah River	4,610	9,840	1,030	3,896		12,190	20,700	2,248 [b]	[b]	
Pah River to just below Selby River	305	2,780	3,820	1,535		4,537	4,600	404 [b]	[b]	
Selby River mouth & slough	420	1,040	1,500	1,800		1,250	4,100	662 [b]	[b]	
Selby River	7,505	1,460	868	824		3,364	14,950	853 [b]	730	
Selby River mouth to Beaver Creek		5,250	3,845	929		10,898	15,480	2,582 [b]		
Beaver Creek mouth	2,515							914 [b]	[b]	
Above Beaver Creek		4,155	740	3,174		3,486	14,940	850 [b]	[b]	
									[b]	
Upper Kobuk River total	15,355	24,525	11,803	12,158		35,725	74,770	8,513 [b]		27,340
									[b]	
Squirrel River	5,500	4,606	2,765	4,463		10,605	10,740	4,779 [b]		13,513
Salmon River	6,335	5,845	1,345	13,880		13,988	23,790	1,181 [b]	[b]	4,989
Tutuksuk River	2,275	744	1,162	1,196		3,901	21,805	163 [b]	[b]	2,906
Kobuk River system total	29,465	35,720	17,075	31,697		64,219	131,105	14,636	[b]	48,748

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Appendix C7.–Page 2 of 2.

Stream [a]	2001	2002	2003	2004	2006	2008	2009	2014	Goals [e]
Noatak drainage									
Noatak River below Kelly River		700	34,575	49,541	36,125 [b]	257,695	67,265	414,235	
Eli River				2,917	1,285 [b]	13,052	2,607	32,174	
Kelly River & Lake		1,116	1,566	2,987	2,375 [b]	1,865	3,986	37,530	
Noatak River system total			36,141	55,445	39,785 [b]	272,612	73,858	483,939	42,000–91,000
Kobuk drainage									
Kobuk to Pah River	2,790		5,501	7,493	8,525 [b]	19,421	7,468		
Pah River to just below Selby River	1,380	857	828	1,885		5,795	10,852		
Selby River mouth & slough	1,780	2,100	1,110	3,846				2,113	
Selby River			427	3,760	500 [b]	1,750	208		
Selby R. mouth to Beaver C.	7,470		1,274	6,215		13,201	26,627		
Beaver Creek mouth									
Above Beaver Creek		490	2,462			3,180			
					39,725 [f]			63,540 [f]	
Upper Kobuk River total	13,420	3,447	11,602	23,199	48,750 [b]	43,347	45,155	65,653	9,700–21,000
Squirrel River			[b]						4,900–10,500
Salmon River			[b]						3,300–7,200
Tutuksuk River			[b]						1,400–3,000
Kobuk River system total	13,420	3,447	11,602	23,199	48,750 [b]	43,347	45,155	65,653	19,600–39,200

Note: No surveys were flown in 2000, 2005, 2007, 2010–2013, and after 2014.

[a] Three aerial surveys may be attempted yearly at different intervals for each tributary to assess escapements prior to the peak, at the peak, and after the peak of the run. Indices listed in this table are the largest survey observed for each tributary during the given year.

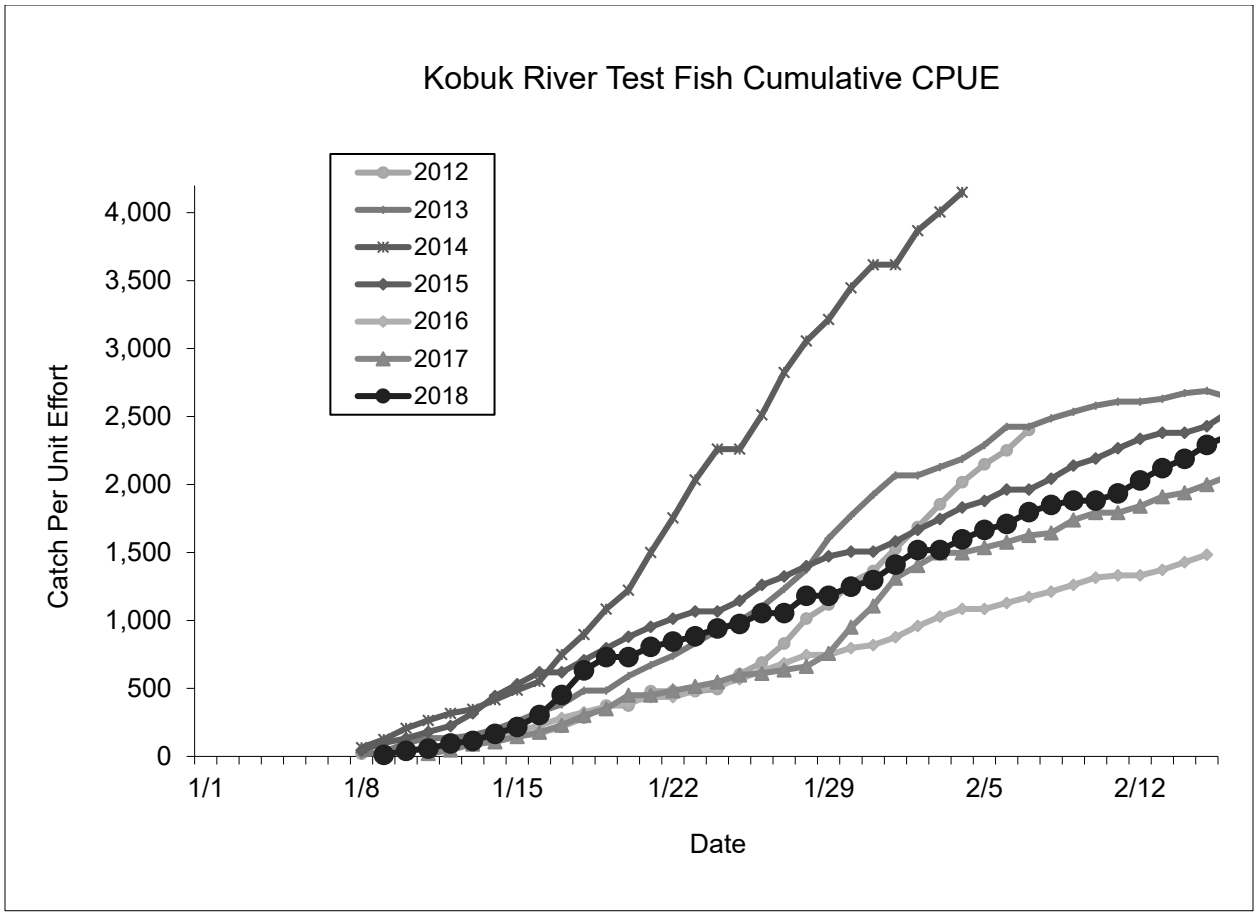
[b] Poor survey conditions or incomplete, early, or late survey.

[c] Unacceptable survey conditions.

[d] Surveyed well before peak of migration.

[e] Aerial survey goals were revised in 2007.

[f] Unclear where these fish were observed.



Appendix C8.–Kobuk River chum salmon drift test fishery cumulative catch per unit effort (CPUE), 2009–2018.

APPENDIX D: HERRING FISHERIES

Appendix D1.–Norton Sound herring and spawn-on-kelp harvests (in short tons) by U.S. commercial fishermen, 1990–2018.

Year [a]	Sac roe herring	Food or bait herring	Total herring	Spawn on kelp
1990	5,253	1,026	6,279	0
1991	5,465	207	5,672	0
1992 [b]	0	0	0	0
1993	4,713	321	5,034	0
1994	958	2	960	0
1995	6,647	116	6,763	0
1996 [c]	6,061	109	6,220	0
1997 [d]	3,709	262	3,976	0
1998	2,623	8	2,631	9.04 [e]
1999	2,693 [f]	53	2,751	3.74
2000	4,487 [g]	0	4,487	2.25
2001	2,245	0	2,245	2.20
2002	1,059	64	1,123	0
2003	1,587	21	1,608	0.88
2004 [b]	0	11	11	0
2005	1,951	0	1,951	0
2006	646	25	671	0.57
2007 [b]	0	33	33	0.14
2008 [b]	0	91	91	0.18
2009 [b]	0	28	28	0
2010	623	65	688	0
2011	739	67	806	0
2012 [b]	0	7	7	0
2013	490	2	492	0
2014 [b]	0	1	1	0
2015 [b]	0	73	73	0
2016 [b]	0	14	14	0
2017 [b]	0	55	55	0
2018 [b]	0	81	81	0

[a] From 1990 to present, the fishery has occurred in southeastern Norton Sound.

[b] No commercial fishery took place in 1992, and no sac roe fishery took place in 2004, 2007–2009, 2012, and after 2013.

[c] Total includes an estimated 50 short tons (st) of wastage.

[d] Total includes an estimated 5 st of wastage and approximately 1,000 lb taken as bait.

[e] Includes 2,100 lb of wild kelp and 16,083 lb of *Macrocystis* kelp.

[f] Includes an estimated 5 st of wastage.

[g] Includes an estimated 15 st of wastage.

Appendix D2.–Commercial herring fishery summary information, Norton Sound District, 1990–2018.

Year	Estimated biomass (tons)	Catch gillnet (tons)	Beach seine (tons)	Wild kelp (tons)	*Macrocystis* kelp (lb)	Number of fishermen	Dollar value (millions)	Number of buyers	Average roe %	Peak catch day	Fishery duration
1990	39,384	6,032	347	0	0	365	3.60	8	8.8	5/29	5/28–05/30
1991	42,854	5,150	522	0	0	279	2.40	8	9.3	5/25	5/23–05/25
1992	57,974	0 [a]	0 [a]	0	0	[a]	0.00	[a]	[a]	6/20 [b]	[a]
1993	46,549	4,291	742	0	0	264	1.50	5	9.9	5/25	5/24–06/05
1994	31,088	921	40	0	0	215	0.30	6	10.3	6/8	6/05–06/09
1995	37,779	6,033	614	0	0	215	4.20	6	10.4	5/24	5/23–05/30
1996	26,596	5,581	589	0	0	287	4.50	10	10.6	5/25	5/24–05/25
1997	47,748	3,459	513	0	0	220	0.61	9	9.9	5/22	5/20–05/24
1998	52,033	2,632	0	1.00	16,083	47	0.20	2	9.2	5/25	5/22–06/09
1999	34,314	2,755	0	0	7,482	122	0.61	4	10.5	6/17	6/13–06/22
2000	32,680	4,390	81	0	4,500	97	0.89	4	9.5	6/11	6/07–06/15
2001	26,305	2,245	0	0	4,400	76	0.35	3	12.3	6/12	6/12–06/16
2002	27,068	1,123	0	0	0	46	0.16	2	10.6	5/24	5/22–06/03
2003	32,918	1,608	0	0	1,750	32	0.22	2	10.5	5/18	5/16–05/25
2004 [a]	34,180	11 [c]	0	0	0	4	0.00	0	[a]	5/24 [b]	[c]
2005	43,013	1,951	0	0	0	56	0.32	1	11.4	6/04	6/03–06/10
2006	38,833 [d]	671 [e]	0	0.57	0	41	0.14	1	10.2	6/09	6/08–06/11
2007 [a]	38,415 [d]	33	0	0.14	0	7	0.02	1	[a]	6/09	6/09–06/15
2008 [a]	37,401 [d]	91	0	0	0	14	0.18	1	[a]	6/11	6/10–06/24
2009 [a]	36,917 [d]	28	0	0	0	6	0.02	1	[a]	6/12	6/12–06/15
2010	42,889 [d]	688	0	0	0	30	0.19	1	13.5	6/17	6/11–06/19
2011	53,786	807	0	0	0	35	0.27	1	14.8	6/04	6/01–06/10
2012 [a]	52,949 [d]	7	0	0	0	8	0.01	1	[a]	6/25	6/16–06/25
2013	58,594 [d]	492	0	0	0	40	0.15	1	13.2	6/15	6/14–06/20
2014 [a]	52,138	1	0	0	0	1 confidential		1	[a]	6/04	6/04–06/07
2015 [a]	51,582	73	0	0	0	11	0.04	1	[a]	5/25	5/23–05/26
2016 [a]	35,355 [f]	14	0	0	0	6	0.01	1	[a]	5/16	5/16–05/22
2017 [a]	33,924 [f]	55	0	0	0	6	0.03	1	[a]	5/18	5/17–05/30
2018 [a]	33,924 [f]	81	0	0	0	6	0.05	1	[a]	5/16	5/15–05/19

[a] No or very limited fishery due to late sea ice breakup in 1992, 2012, and 2014, and no sac roe fishery in 2004, 2007–2009, and after 2014 due to lack of a buyer.

[b] Date of peak aerial survey biomass estimate, typically 1 or 2 days prior to peak catch. The 2004 catch was by king crab permit holders for bait.

[c] All fish caught were kept as bait; none were sold.

[d] Conditions did not allow for a peak survey; therefore, biomass was estimated by extrapolation.

[e] 25 tons out of total sac roe herring catch was sold off as bait to NSEDC.

[f] Estimated biomass is an average of the long-term biomass estimates from 1981 to 2014, including only years when the aerial surveys were rated 3 or higher.

Appendix D3.–Norton Sound commercial herring harvest (tons) by subdistrict, by year, 1990–2018.

	Subdistricts							
Year [a]	1	2	3	4	5	6	7	Totals
1990	4,498	950	931	0	0	0	0	6,379 [b]
1991	0	880	4,792	0	0	0	0	5,672 [c]
1992 [d]	0	0	0	0	0	0	0	0
1993	2,288	587	1,881	0	278	0	0	5,034 [e]
1994	250	36	634	0	40	0	0	960
1995	2,359	604	1,524	0	2,108	167	0	6,762
1996	3,074	111	2,831	0	153	0	0	6,170 [f]
1997	2,046	62	1,864	0	0	0	1 [g]	3,976 [h]
1998	1,543	0	1,081	0	0	0	0	2,624
1999	285	323	2,050	0	0	0	8	2,746 [i]
2000 [j]	2,623	81	1,767	0	0	0	0	4,471
2001 [j]	898	0	1,347	0	0	0	0	2,245
2002 [j]	373	0	750	0	0	0	0	1,123
2003 [j]	283	0	1,325	0	0	0	0	1,608
2004	0	0	0	0	0	0	11	11
2005 [j]	783	9	1,149	0	10	0	0	1,951
2006	191	0	480	0	0	0	0	671
2007	0	33	0	0	0	0	0	33
2008	0	91	0	0	0	0	0	91
2009	0	28	0	0	0	0	0	28
2010	314	300	74	0	0	0	0	688
2011	600	84	123	0	0	0	0	807
2012	6	0	0	0	0	0	1	7
2013	107	84	302	0	0	0	0	492
2014	0	1	0	0	0	0	0	1
2015	0	73	0	0	0	0	0	73
2016	0	14	0	0	0	0	0	14
2017	0	55	0	0	0	0	0	55
2018	0	81	0	0	0	0	0	81

[a] Includes herring taken for sac roe and bait.

[b] Does not include an estimated wastage of 60 short tons (st) in abandoned gillnets.

[c] Does not include an estimated wastage of 125 st in abandoned gillnets.

[d] No commercial fishery in 1992.

[e] Does not include an estimated wastage of 45 st in abandoned beach seine sets.

[f] Does not include an estimated 50 st of wastage.

[g] Approximately 1,000 lb of herring bait was taken under 5 AAC 27.971 in June (not during sac roe fishery).

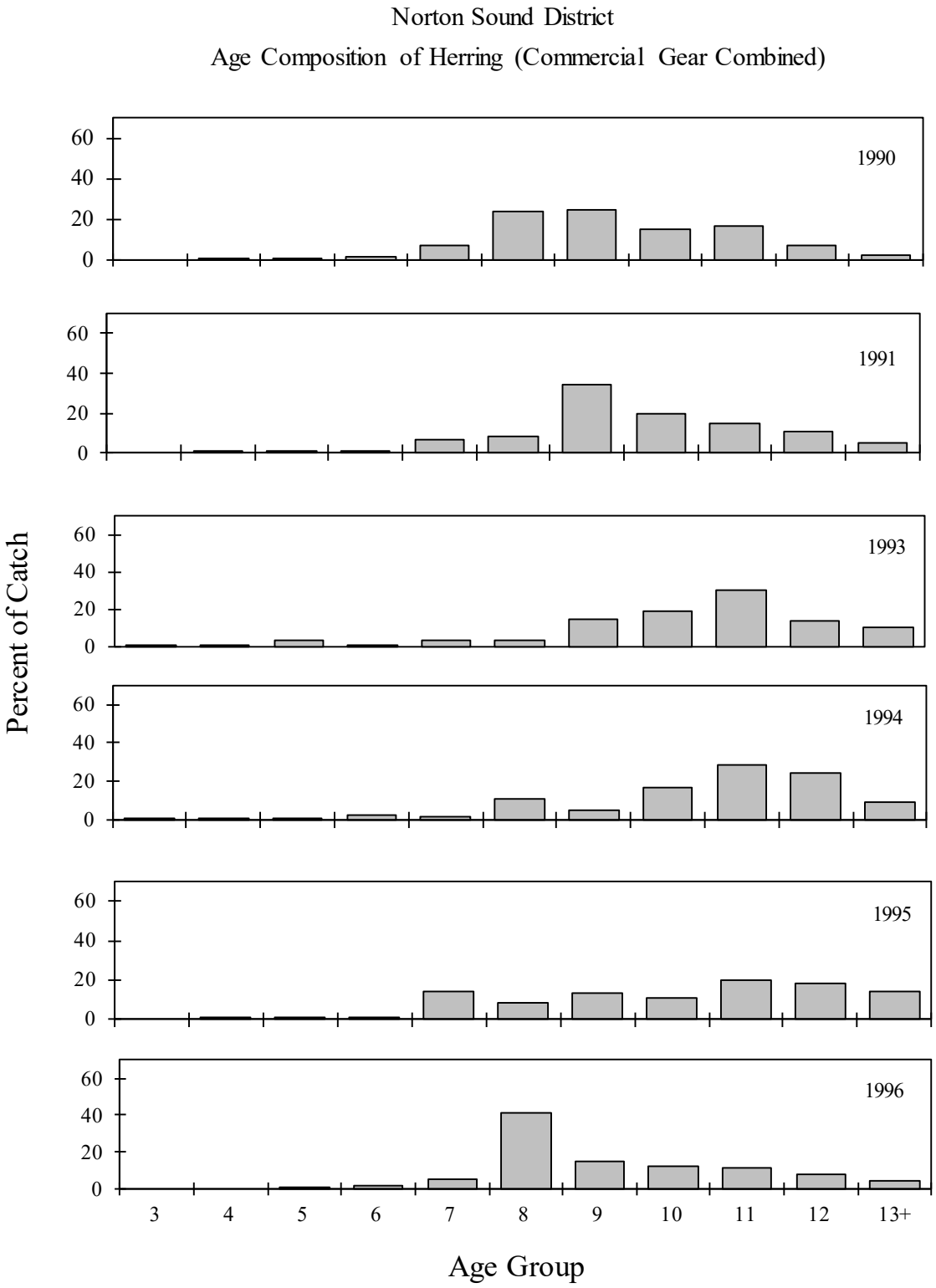
[h] Does not include an estimated 5 st of wastage.

[i] There were 75.8 tons added to the sac roe total due to dewatering by buyers. Three tons were added to the bait total due to dewatering by the buyer. Does not include an estimated 5 st of wastage.

[j] There was 10% added to sac roe total due to dewatering by buyers.

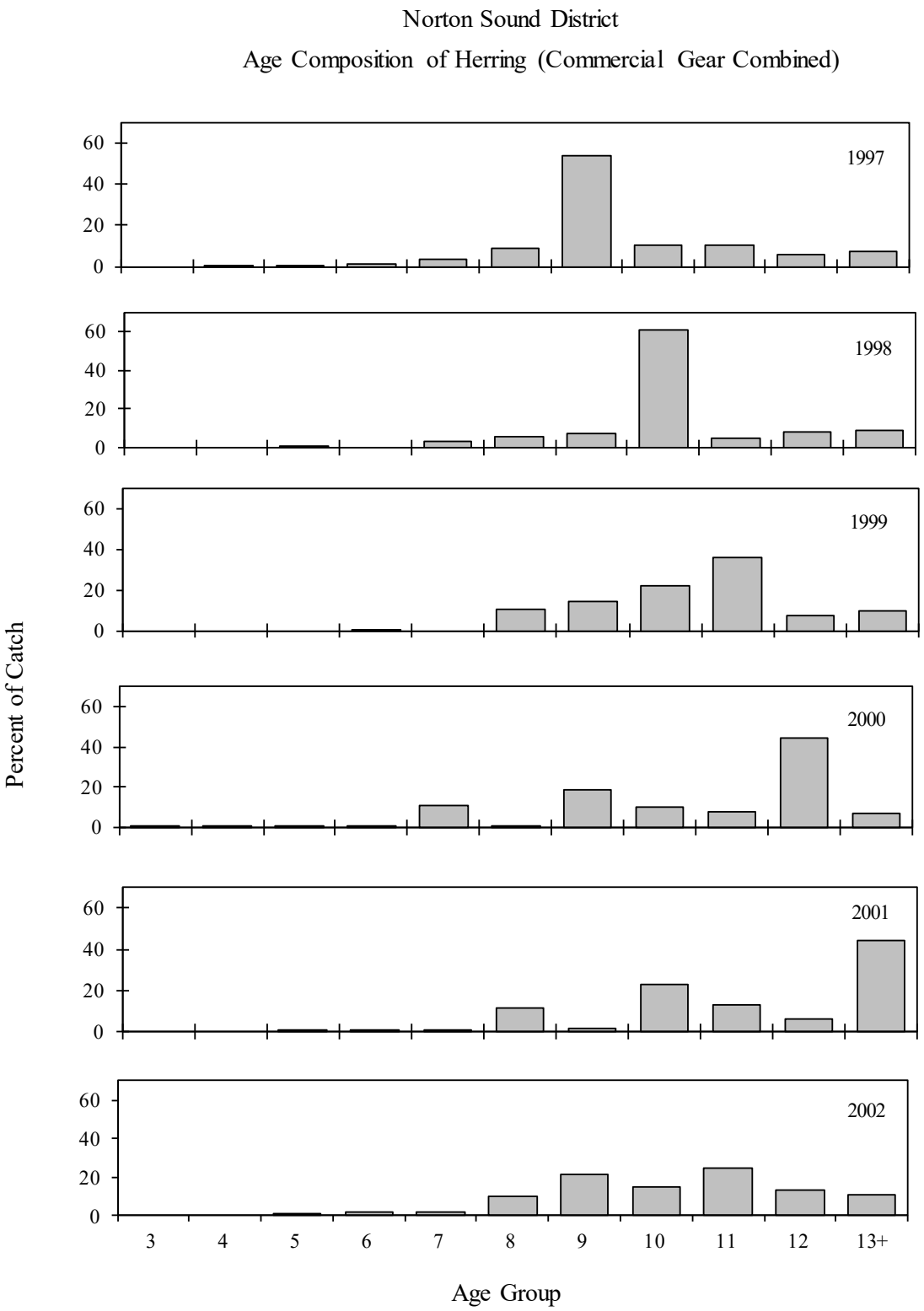
Appendix D4.–Port Clarence District commercial herring fishery, 1986–1996.

Year	Fishery	Gillnet permits	Purse Seine permits	Harvest (pounds)
1986	Fall bait	1		130
1987	Sac roe	3	3	291,000
1987	Fall bait	Unknown		1,100
1988	Sac roe	3	3	160,000
1994	Fall bait	4		8,706
1995	Spring bait	8		19,193
1995	Fall bait	2		9,119
1996	Spring bait	4		5,546



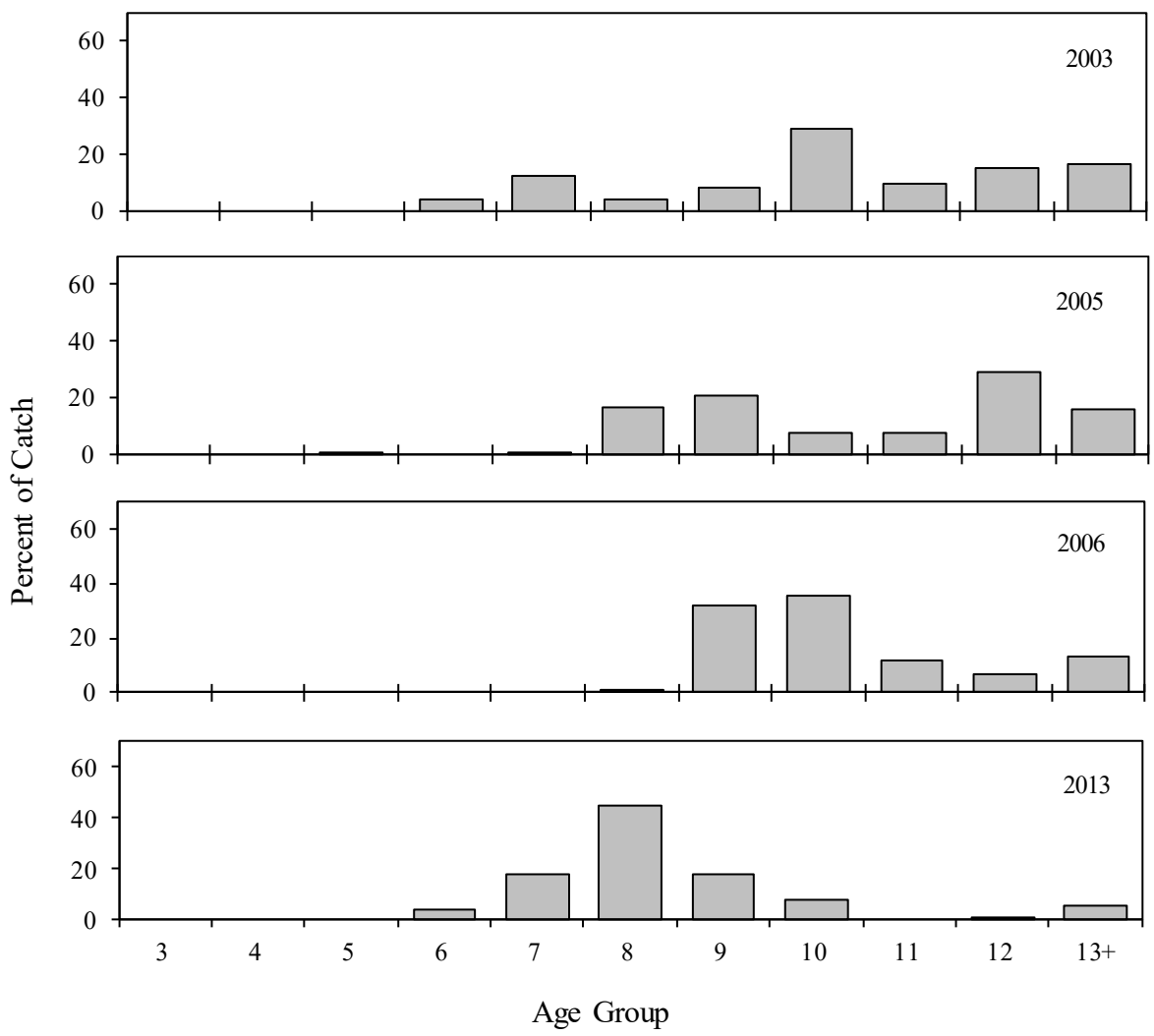
Appendix D5.–Norton Sound herring age class composition by percentage of commercial catch, commercial gear combined (beach seine and gillnet), 1990–1996.

Note: No commercial fishing occurred in 1992.



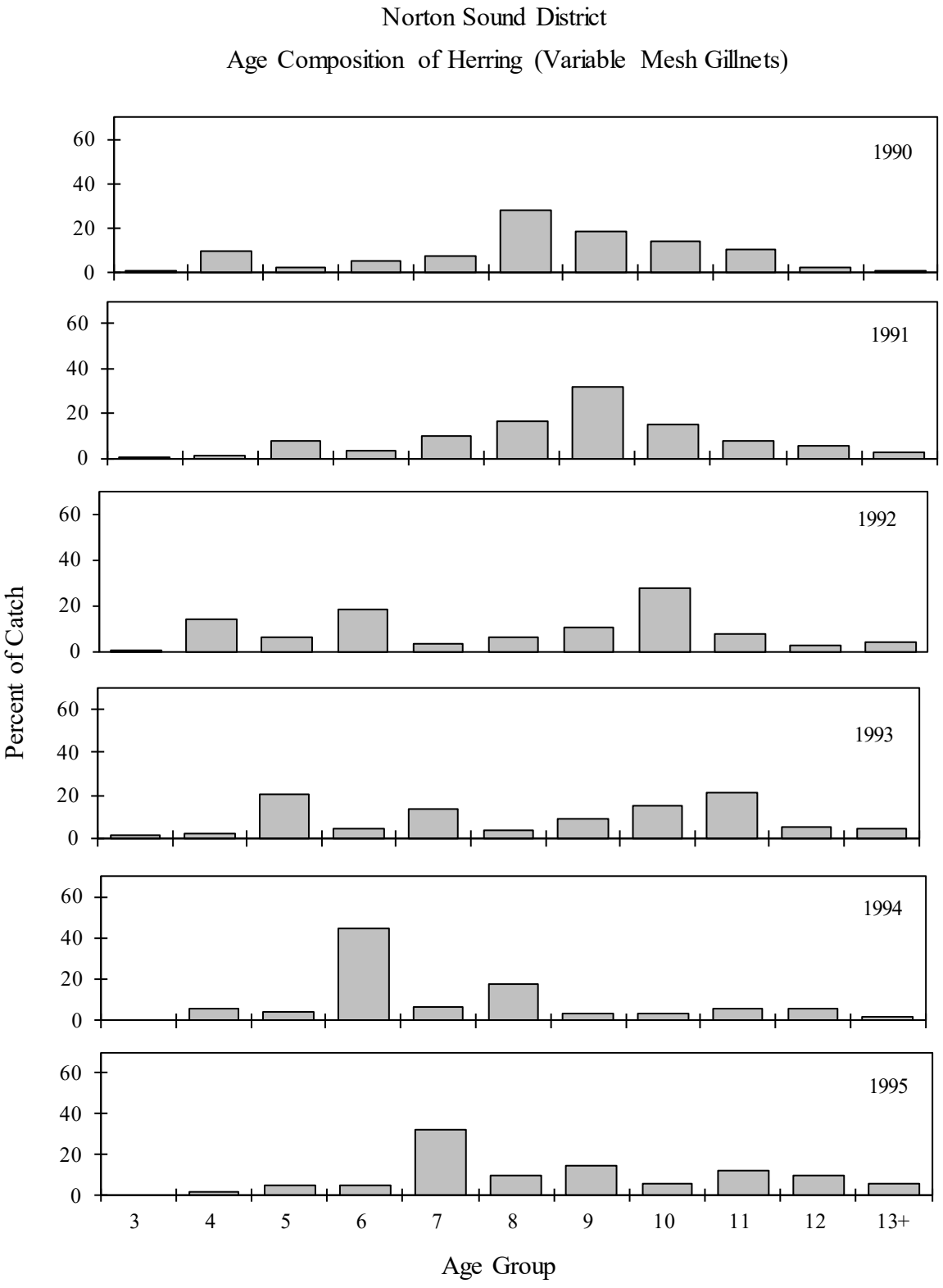
Appendix D6.–Norton Sound herring age class composition by percentage of commercial catch, commercial gear combined (beach seine and gillnet), 1997–2002.

Note: No commercial catch from beach seine gear in 1998 and 1999, and since 2000.

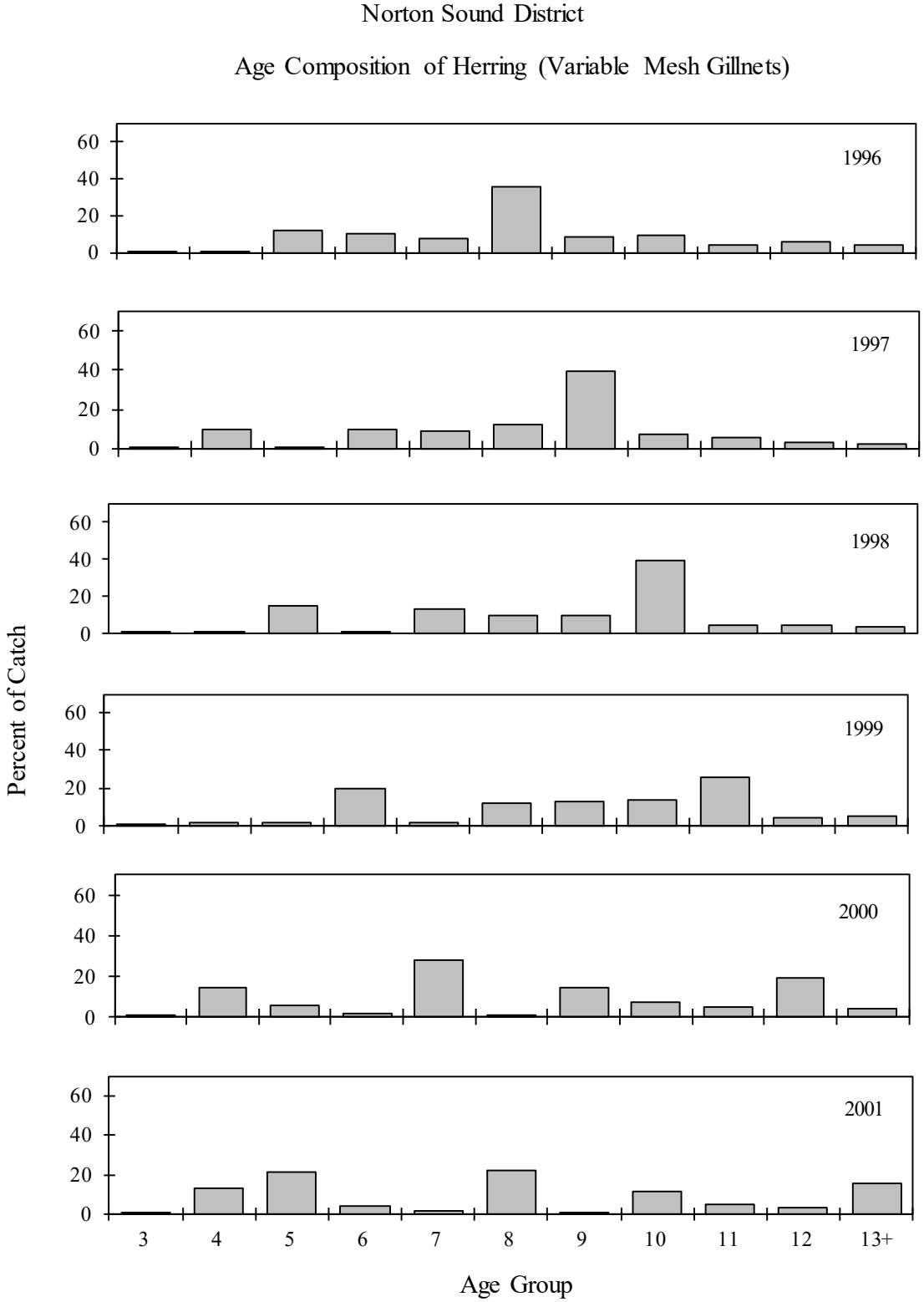


Appendix D7.–Norton Sound herring age class composition by percentage of commercial catch, gillnet only, 2003–2013.

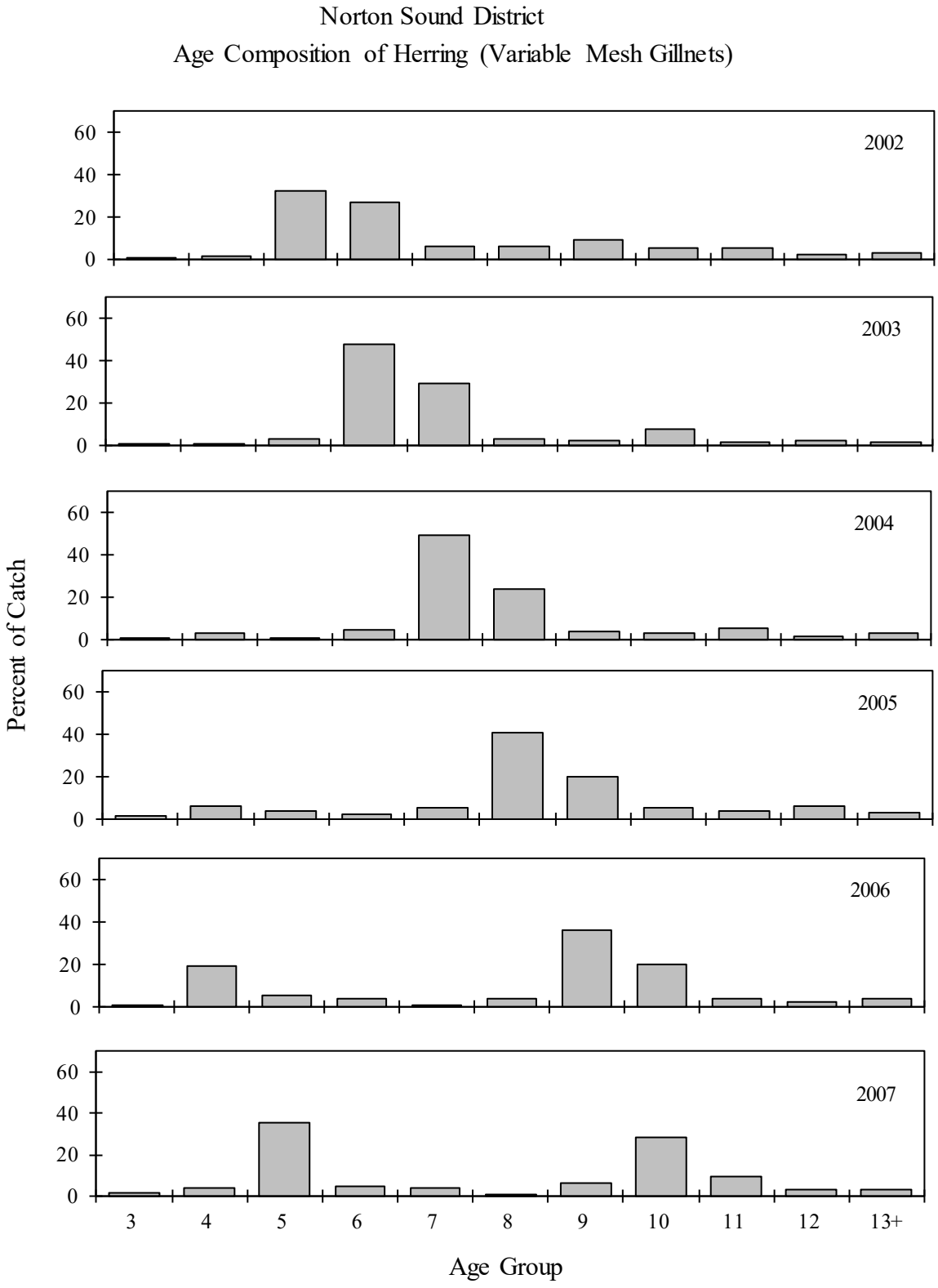
Note: No fishery in 2004. No commercial samples were available 2007–2012 and after 2013.



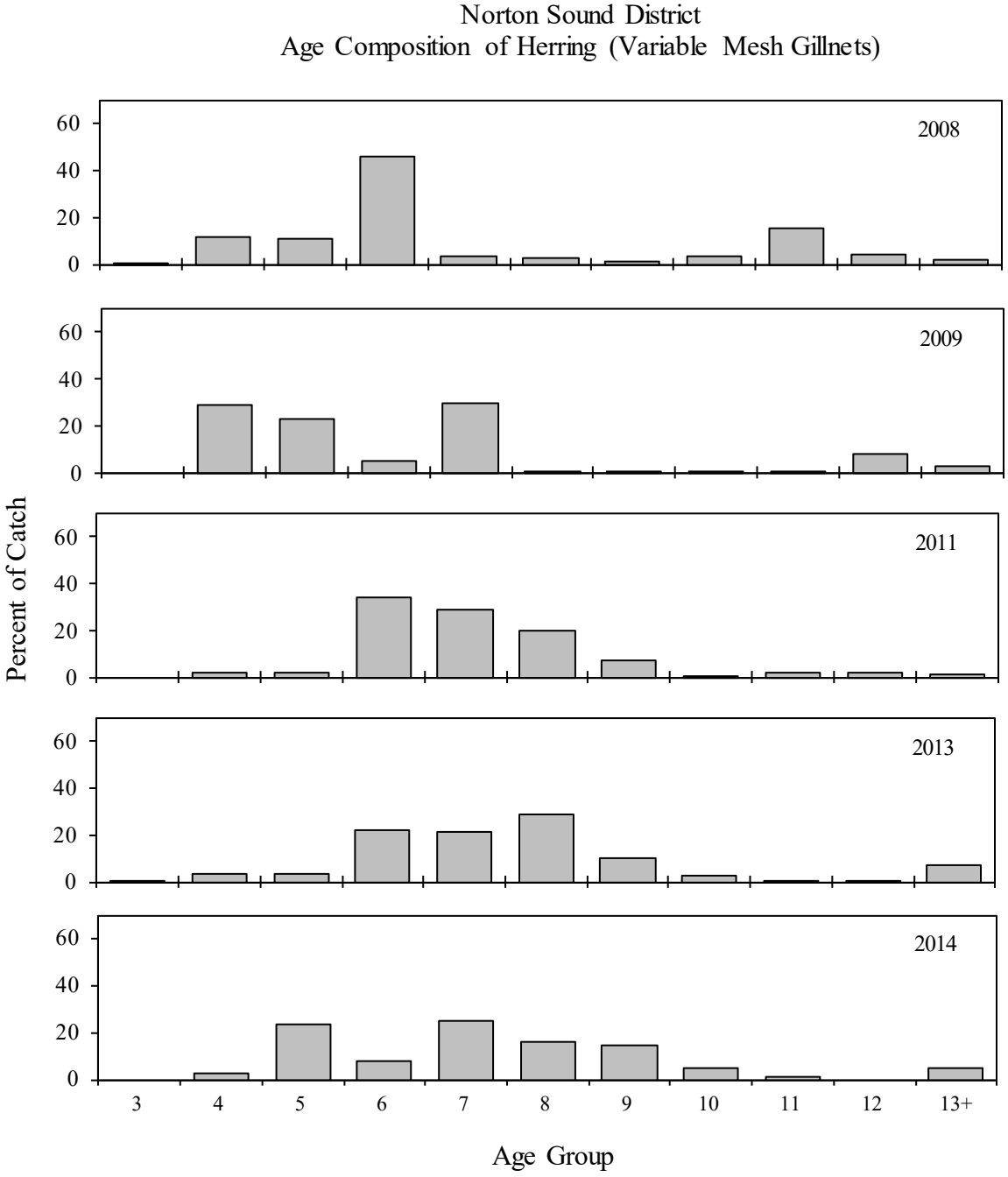
Appendix D8.–Norton Sound herring age class composition by percentage of total catch, variable mesh gillnets, 1990–1995.



Appendix D9.–Norton Sound herring age class composition by percentage of total catch, variable mesh gillnets, 1996–2001.



Appendix D10.–Norton Sound herring age class composition by percentage of total catch, variable mesh gillnets, 2002–2007.



Appendix D11.–Norton Sound herring age class composition by percentage of total catch, variable mesh gillnets, 2008–2014.

Note: Herring age class composition by percentage of total catch for 2010, 2012, and after 2014 are not available.

APPENDIX E: KING CRAB FISHERIES

Appendix E1.–Historical summer commercial red king crab fishery catch statistics and economic performance, Norton Sound Section, Eastern Bering Sea, 1990–2018.

		Commercial harvest (lb)[a,b]										Season length	dates	
	GHL	Open		Number of			Number of pots		Avg weight	Exvessel	Fishery value		Open	
Year	(lb) [b]	access	CDQ	Vessels	Permits	Landings	Registered	Pulls	(lb)	price/lb	(millions $)	Days	access	CDQ
1990	0.20	0.19		4	4	[c]	1,388	3,172	3.1	[c]	[c]	4	8/01–8/05	[d]
1991	0.34							No summer fishery						
1992	0.34	0.07		27	27	[c]	2,635	5,746	3.0	1.75	0.130	2	8/01–8/03	[d]
1993	0.34	0.33		14	20	208	560	7,063	2.9	1.28	0.430	52	7/01–8/28 [e]	[d]
1994	0.34	0.32		34	52	407	1,360	11,729	3.0	2.02	0.646	31	7/01–7/31	[d]
1995	0.34	0.32		48	81	665	1,900	18,782	3.0	2.87	0.926	67	7/01–9/05	[d]
1996	0.34	0.22		41	50	264	1,640	10,453	3.0	2.29	0.519	57	7/01–9/03 [f]	[d]
1997	0.08	0.09		13	15	100	520	2,982	2.8	1.98	0.184	44	7/01–8/13 [g]	[d]
1998	0.08	0.03	0.00	8	11	50	360	1,639	2.8	1.47	0.041	65	7/01–9/03 [h]	[d]
1999	0.08	0.02	0.00	10	9	53	360	1,630	2.7	3.08	0.073	66	7/01–9/04 [i]	[d]
2000	0.33	0.29	0.01	15	22	201	560	6,345	2.7	2.32	0.715	91	7/01–8/29	9/01–9/29
2001	0.30	0.28	0.00	30	37	319	1,200	11,918	2.9	2.34	0.674	97	7/01–9/01	9/01–9/09
2002	0.24	0.24	0.01	32	49	201	1,120	6,491	3.0	2.81	0.729	77	7/01–8/06	6/15–28; 8/9–9/3
2003	0.25	0.25	0.01	25	43	236	960	8,494	2.8	3.09	0.823	68	7/01–8/13	6/15–28; 8/15–24
2004	0.35	0.31	0.03	26	39	227	1,120	8,066	2.8	3.12	1.063	51	7/01–8/08	6/15–6/28
2005	0.37	0.37	0.03	31	42	255	1,320	8,867	2.9	3.14	1.264	73	7/01–8/15	6/15–28; 8/17–27
2006	0.45	0.42	0.03	28	40	249	1,120	8,867	3.0	2.26	1.021	68	7/01–8/22	6/15–6/28
2007	0.32	0.29	0.02	38	30	251	1,200	9,118	2.8	2.49	0.750	52	7/01–8/17	6/15–6/28
2008	0.41	0.36	0.03	23	30	248	920	8,721	2.8	3.20	1.231	73	6/23–8/18	8/17–9/03
2009	0.38	0.37	0.03	22	27	359	920	11,934	2.8	3.17	1.225	98	6/15–9/20 [j]	6/15–7/28 [j]
2010	0.40	0.39	0.03	23	32	286	1,040	9,698	2.8	3.73	1.528	58	7/01–8/24	6/28–7/16
2011	0.36	0.37	0.03	24	25	173	1,040	6,808	2.8	5.23	2.016	33	6/28–7/30	6/28–7/08
2012	0.47	0.44	0.03	40	29	312	1,200	10,041	2.9	5.41	2.556	72	6/29–8/11	6/29–9/08
2013	0.50	0.37	0.02	37	33	460	1,420	15,058	3.0	5.63	2.165	74	7/03–9/14	7/03–9/14 [h]
2014	0.38	0.36	0.03	52	33	309	1,560	10,127	3.0	5.12	1.960	52	6/25–8/02	6/25–8/15
2015	0.39	0.37	0.03	42	36	251	1,480	8,356	2.8	5.40	2.130	26	6/29–7/24	6/29–7/24 [k]

-continued-

Appendix E1.–Page 2 of 2.

Year	GHL (lb) [b]	Commercial harvest (lb) [a,b] Open access	Commercial harvest (lb) [a,b] CDQ	Number of Vessels	Number of Permits	Number of Landings	Number of pots Registered	Number of pots Pulls	Avg weight (lb)	Exvessel price/lb	Fishery value (millions $)	Season length dates Days	Season length dates Open access	Season length dates CDQ
2016	0.52	0.46	0.04	36	38 [l]	229 [l]	1,520	8,009 [l]	3.0	6.50	2.710	25	6/27–7/21	6/27–7/08
2017	0.50	0.45	0.04	36	36	270	1,640	9,440	3.0	6.25	2.560	30	6/26–7/25	winter only
2018	0.32	0.30	0.02	33	33	256	1,400	8,797	3.3	6.25	1.846	34	6/24–7/28	winter only

Note: Starting in 2016, the guideline harvest level (GHL) and the harvests include the winter commercial fishery, but all other information is for the summer only.

[a] Deadloss included in total.

[b] Millions of pounds.

[c] Information not available.

[d] No CDQ harvest was allocated until 1998, and no harvest occurred until 2000.

[e] Fishing began July 8.

[f] Fishing began July 9 due to fishermen strike.

[g] First delivery was made July 10.

[h] First delivery was made July 16.

[i] The season was extended 24 hours due to bad weather.

[j] NSSP stopped buying crab from June 29 to July 6 due to poor meatfill.

[k] Final delivery was made July 17.

[l] Includes 1 permit, 2 landings, and 52 pot pulls from the CDQ fishery.

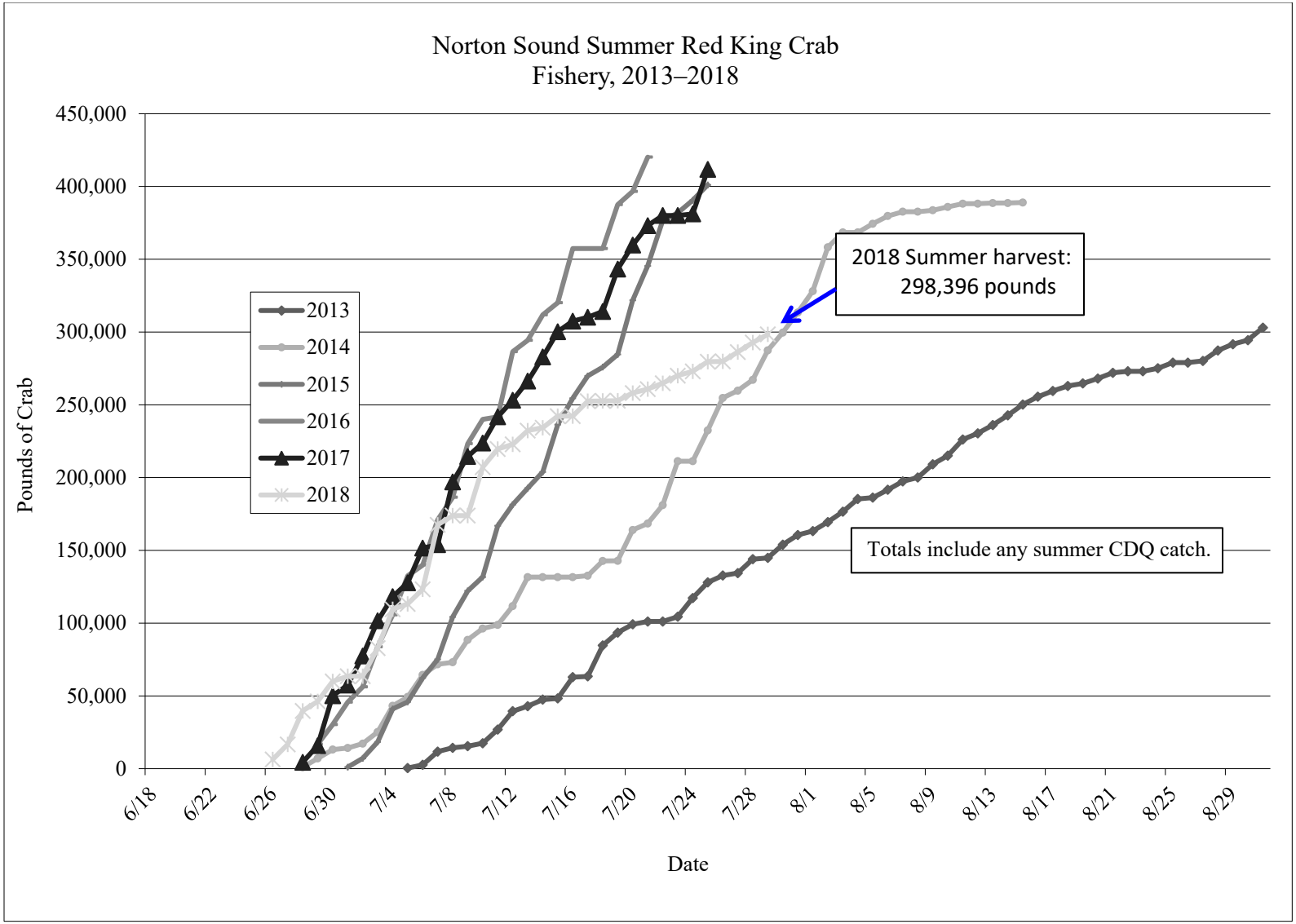
Appendix E2.–Average length and percentage of recruit and postrecruit male red king crab from summer commercial fishery catch samples in Norton Sound Section, Eastern Bering Sea, 1990–2018.

Year	Average length (mm)	Recruits [a]	Postrecruits [b]
1990	121	21	79
1991 [c]			
1992	120	28	72
1993	119	31	69
1994	119	20	80
1995	118	36	64
1996	117	30	70
1997	116	49	51
1998	117	32	68
1999	118	42	58
2000	116	41	60
2001	119	33	67
2002	120	33	67
2003	117	48	52
2004	117	49	51
2005	118	36	64
2006	119	25	75
2007	117	45	55
2008	115	45	55
2009	116	43	57
2010	115	49	51
2011	116	43	57
2012	118	33	67
2013	120	32	68
2014	120	35	65
2015	115	58	42
2016	118	36	64
2017	120	25	75
2018	123	16	84

[a] Recruits are all new-shell, legal size, male king crab of carapace length less than 116 mm.

[b] Postrecruits are all other male king crab of legal size.

[c] No summer commercial fishery.



Appendix E3.–Current and historical cumulative catch for the Norton Sound summer commercial crab fishery, 2012–2018.

Appendix E4.–Historical winter commercial red king crab fishery catch statistics and economic performance, Norton Sound Section, Eastern Bering Sea, 1990–2018.

Year	Commercial harvest (lb) [a]	Permits fished	Landings	Pot pulls	CPUE	Average weight (lb)	Exvessel price/lb	Fishery value ($)	Season dates [b]
1990 [c]	9,792	12	199	257	14	2.8	5.33 [d]	19,327 [d]	11/15–5/15
1991 [c]	10,064	11	187	609	6	2.7	5.00 [d]	19,000 [d]	11/15–5/15
1992	21,177	13	287	1,823	4	2.8	3.60	76,283	11/15–5/15
1993 [c]	4,926	8	66	[c]	[c]	2.8	2.84 [d]	14,000 [d]	11/15–5/15
1994	17,214	25	183	1,018	6	3.0	3.01	51,709	11/15–5/15
1995	21,813	42	345	3,302	2	2.9	3.09	66,190	11/15–5/15
1996	5,064	9	68	292	7	2.5	3.16	14,838	11/15–5/15
1997	[d]	2	[d]	[d]	[d]	[d]	2.81	[d]	11/15–5/15
1998	2,349	5	31	749	1	2.4	3.57	8,168	11/15–5/15
1999	7,041	5	61	425	6	2.6	3.69	24,777	11/15–5/15
2000	7,894	10	90	1,230	2	2.6	3.72	29,300	11/15–5/15
2001	2,943	3	21	534	2	2.7	3.60	10,582	11/15–5/15
2002	6,860	11	68	1,247	2	2.7	3.53	22,682	11/15–5/15
2003	16,827	13	128	1,960	3	2.5	3.52	57,577	11/15–5/15
2004 [e]	1,293	2	16	397	1	2.5	3.95	5,110	11/15–5/15
2005	5,619	4	51	1,076	2	2.7	4.52	25,054	11/15–5/15
2006	[d]	1	[d]	[d]	[d]	[d]	3.98	[d]	11/15–5/15
2007	8,023	8	106	926	4	2.4	3.06	24,464	11/15–5/15
2008	14,676	9	129	1,008	6	2.5	3.03	43,664	11/15–5/15
2009	12,348	7	130	1,282	4	2.5	3.01	32,649	11/15–5/15
2010	12,028	10	184	1,848	3	2.5	3.54	41,265	11/15–5/15
2011	8,669	5	129	1,747	2	2.6	3.59	30,776	11/15–5/15
2012	24,142	35	319	1,668	5	2.6	6.47	150,569	11/15–5/15
2013	62,179	26	495	6,093	4	2.8	6.73	402,256	11/15–5/15
2014	34,587	21	323	4,037	4	2.3	6.94	234,291	11/15–5/15
2015	98,750	44	664	7,314	6	2.4	6.57	617,434	11/15–4/30
2016 [f]	79,986	48	471	5,459	5	2.7	7.22	559,803	2/15–4/21
2017 [f]	77,843	88	435	3,225	8	3.0	6.73	483,797	2/07–3/22
2018 [f]	29,118	43	322	2,566	4	3.2	6.95	186,044	3/03–4/30
Average 2013–2017	70,669	45	478	5,226	5	2.6	6.84	459,516	
Average 2008–2017	42,521	29	328	3,368	5	2.6	5.38	259,650	

Note: Starting in 2016, catch information include data from the winter CDQ fishery.

[a] Deadloss included in total.

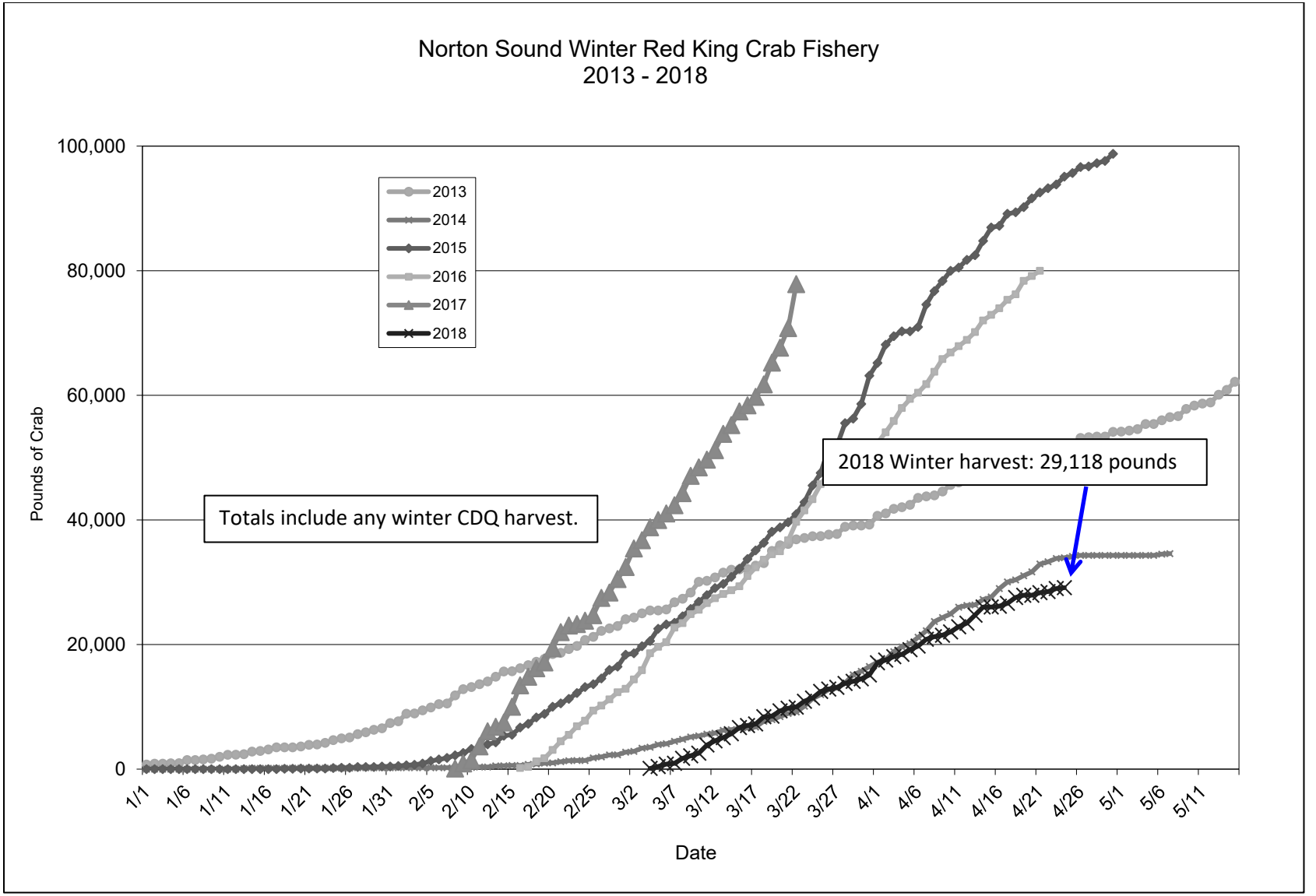
[b] Prior to 2015, season dates were from November 15 of the previous year to May 15 of the current year. In 2015, season dates were from November 15, 2014 to April 30, 2015.

[c] Information is not available.

[d] Information is confidential because less than 3 permit holders delivered.

[e] Confidentiality was waived by the fishermen.

[f] Information includes catch statistics and fishery values from the winter CDQ fishery.



Appendix E5.–Current and historical catch performance for the Norton Sound winter commercial crab fishery, 2012–2018.

Note: Starting in 2016, catch information includes data from the winter CDQ fishery.

Appendix E6.–Summer subsistence red king crab harvests, Norton Sound, Eastern Bering Sea, 2004–2018.

Year [a]	Permits issued	Permits returned	Permits fished	Crab caught [b]	Crab harvested [c]	Multiplier [d]	Pounds harvested [d]	Average number kept/ permits fished
2004	38	18	5	996	350	2.3	805	70
2005	14	12	4	753	304	2.4	727	76
2006	6	4	3	67	62	2.5	155	21
2007	19	19	5	1,425	1,008	2.3	2,318	202
2008	30	30	14	1,816	1,176	2.3	2,705	84
2009	20	20	13	1,874	653	2.3	1,502	50
2010	27	27	15	1,086	660	2.3	1,518	44
2011	43	42	27	4,026	2,658	2.3	6,193	98
2012	45	44	13	1,346	912	2.4	2,189	70
2013	47	46	26	3,102	1,865	2.5	4,663	72
2014	40	40	25	2,185	1,210	2.5	3,025	48
2015	31	30	14	5,812	2,862	2.3	6,525	204
2016	29	29	16	2,952	1,930	2.5	4,825	121
2017	39	39	17	2,164	1,777	2.5	4,443	105
2018	32	32	14	828	673	2.8	1,884	48
Average 2013–2017	37	37	20	3,243	1,929	2.5	4,696	110
Average 2008–2017	35	35	18	2,636	1,570	2.4	3,759	90

Note: There were no recorded summer subsistence harvests prior to 2004.

[a] The summer subsistence fishery is open June through November.

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

[c] The number of crab harvested is the number of crab retained.

[d] Multiplier is the average weight of crab from the commercial fishery of the same year minus 0.5 pound. Pounds harvested are derived by multiplying the total number of harvested crab by the multiplier.

Appendix E7.–Winter subsistence red king crab harvest statistics, Norton Sound, Eastern Bering Sea, 1989–2018.

Winter [a]	Permits issued	Permits returned	Permits fished	Crab caught [b]	Crab harvested [c]	Multiplier [d]	Pounds harvested [d]	Average number kept/ permits fished
1989–1990	136	118	107	16,635	12,152	2.3	27,464	114
1990–1991	119	104	79	9,295	7,366	2.2	15,911	93
1991–1992	158	105	105	15,051	11,736	2.3	27,345	112
1992–1993	88	79	37	1,193	1,097	2.3	2,479	30
1993–1994	118	95	71	4,894	4,113	2.5	10,241	58
1994–1995	166	131	97	7,777	5,426	2.4	12,968	56
1995–1996	84	44	35	2,936	1,679	2.0	3,408	48
1996–1997	38	22	13	1,617	745	2.0	1,512	57
1997–1998	94	73	64	20,327	8,622	1.9	16,296	135
1998–1999	95	80	71	10,651	7,533	2.1	15,744	106
1999–2000	98	64	52	9,816	5,723	2.1	11,961	110
2000–2001	50	27	12	366	256	2.2	558	21
2001–2002	114	101	67	8,805	3,669	2.2	7,888	55
2002–2003	107	73	64	9,052	4,140	2.0	8,114	65
2003–2004	96	77	41	1,775	1,181	2.0	2,338	29
2004–2005 [e]	170	102	60	6,496	3,973	2.2	8,542	66
2005–2006	98	97	67	2,083	1,239	2.4	2,974	18
2006–2007	129	127	116	21,444	10,690	1.9	20,525	92
2007–2008	139	137	108	18,621	9,485	2.0	19,255	88
2008–2009	105	105	70	6,971	4,752	2.0	9,456	68
2009–2010	125	123	85	9,004	7,044	2.0	14,018	83
2010–2011	148	148	95	9,183	6,640	2.1	13,811	70
2011–2012	204	204	138	11,341	7,371	2.1	15,774	53
2012–2013	149	148	104	21,752	7,662	2.3	17,240	74
2013–2014	103	103	75	5,421	3,252	1.8	5,886	43
2014–2015	155	154	108	9,849	7,660	1.9	14,631	72
2015–2016	139	139	92	6,584	5,408	2.2	11,898	59
2016–2017	163	163	109	7,185	6,039	2.5	15,098	55
2017–2018	123	121	82	5,767	4,424	2.7	11,945	54
Average 2013–2017	142	141	98	10,158	6,004	2.1	12,950	61
Average 2008–2017	143	142	98	10,591	6,531	2.1	13,707	66

[a] The winter subsistence fishery is open December through May.

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

[c] The number of crab harvested is the number of crab retained.

[d] Multiplier is the average weight of crab from the commercial fishery of the same year minus 0.5 pound. Pounds harvested are derived by multiplying the total number of harvested crab by the multiplier.

[e] Permits were only given out of the Nome ADF&G office, except during the 2004–2005 season, when permits were given out in Elim, Golovin, Shaktoolik, and White Mountain.

Appendix E8.–Summer and winter, commercial and subsistence red king crab harvests in pounds, Norton Sound, Eastern Bering Sea, 1990–2018.

	Commercial					Subsistence				
Year	Summer harvest	Winter harvest	Winter/ total harvest	Total harvest	Guideline harvest level	Summer harvest [a]	Winter harvest [a]	Winter/ total harvest (%)	Total harvest	Combined total harvest [b]
1990	192,831	9,792	5	202,623	200,000	[c]	27,464	100	27,464	230,087
1991	[d]	10,064	100	10,064	[d]	[c]	15,911	100	15,911	25,975
1992	74,029	21,177	22	95,206	340,000	[c]	27,345	100	27,345	122,551
1993	335,790	4,926	1	340,716	340,000	[c]	2,479	100	2,479	343,195
1994	327,858	17,214	5	345,072	340,000	[c]	10,241	100	10,241	355,313
1995	322,676	21,813	6	344,489	340,000	[c]	12,968	100	12,968	357,457
1996	224,231	5,064	2	229,295	340,000	[c]	3,408	100	3,408	232,703
1997	92,988	[e]	[e]	92,988	80,000	[c]	1,512	100	1,512	94,500 [f]
1998	29,684	2,349	7	32,033	80,000	[c]	16,296	100	16,296	48,329
1999	23,553	7,041	23	30,594	80,000	[c]	15,744	100	15,744	46,338
2000	312,524	7,894	2	320,418	336,000	[c]	11,961	100	11,961	332,379
2001	288,199	2,943	1	291,142	303,000	[c]	558	100	558	291,700
2002	259,601	6,860	3	266,461	248,000	[c]	7,888	100	7,888	274,349
2003	267,207	16,827	6	284,034	253,000	[c]	8,114	100	8,114	292,148
2004	340,746	1,293	0	342,039	326,500	805	2,338	74	3,143	345,182
2005	400,804	5,619	1	406,423	370,000	727	8,542	92	9,269	415,692
2006	451,748	[e]	[e]	451,748	454,000	155	2,974	95	3,129	454,877 [f]
2007	312,875	8,023	3	320,898	315,000	2,318	20,525	90	22,843	343,741
2008	395,135	14,676	4	409,811	412,000	2,705	19,255	88	21,959	431,770
2009	397,587	12,348	3	409,935	375,000	1,502	9,456	86	10,958	420,893
2010	417,304	12,028	3	429,332	400,000	1,518	14,018	90	15,536	444,868
2011	400,840	8,669	2	409,509	358,000	6,193	13,811	69	20,004	429,513
2012	475,990	24,142	5	500,132	465,450	2,189	15,774	88	17,963	518,095
2013	391,863	62,179	14	454,042	495,600	4,663	17,240	79	21,902	475,944
2014	389,008	34,587	8	423,595	382,800	3,025	5,886	66	8,911	432,506
2015	401,115	98,750	20	499,865	394,600	6,525	14,613	69	21,138	514,478
Average 2013–2017	402,777	70,669	15	473,446	457,400	4,696	12,947	72	17,643	489,784
Average 2008–2017	410,074	42,521	9	452,595	429,745	3,759	13,705	78	17,464	469,406

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	Commercial					Subsistence				
Year	Summer harvest	Winter harvest	Winter/ total harvest (%)	Total harvest	Guideline harvest level	Summer harvest [a]	Winter harvest [a]	Winter/ total harvest (%)	Total harvest	Combined total harvest [b]
2016	420,159	79,986	16	500,145	517,200	4,825	11,898	71	16,723	516,868
2017	411,739	77,843	16	489,582	496,800	4,443	15,098	77	19,541	509,123
2018	298,396	29,118	9	327,514	319,410	1,884	11,945	86	13,829	341,343
Average 2013–2017	402,777	70,669	15	473,446	457,400	4,696	12,947	72	17,643	489,784
Average 2008–2017	410,074	42,521	9	452,595	429,745	3,759	13,705	78	17,464	469,406

[a] Harvest in pounds is derived by multiplying number of crab by 0.5 pound less than the average weight from the respective commercial fishery.

[b] Combined total harvest is from summer and winter, commercial and subsistence red king crab harvests.

[c] There were no recorded summer subsistence harvests prior to 2004.

[d] There was no summer commercial fishery, therefore no GHL was set.

[e] Information is confidential.

[f] Does not contain winter commercial harvest because it is confidential information.

Appendix E9.–The results of the population assessment trawl surveys conducted for red king crab in Norton Sound since 1991.

Year	Date	Research agency	Population abundance estimates [a] (number of crab)			Legal male biomass (pounds) [d]	Standard error (number of crab)		
			Pre-2 males [b]	Pre-1 males [b]	Legal males [c]		Pre-2 males [b]	Pre-1 males [b]	Legal males [c]
1991	8/22–08/30	NMFS	386,338	408,241	1,545,558	4,636,674	297,059	157,018	450,814
1996	9/07–09/18	ADF&G	395,888	277,595	528,431	1,585,293	243,594	78,712	157,909
1999	7/28–08/07	ADF&G	96,295	582,799	1,542,589	4,627,767	56,017	165,689	318,731
2002	7/27–08/06	ADF&G	393,689	482,815	740,450	2,221,350	85,797	81,271	81,271
2006	7/25–08/08	ADF&G	937,083	571,890	718,379	2,155,137	551,144	153,272	105,487
2008	7/24–08/11	ADF&G	795,777	689,843	811,727	2,435,181	187,516	120,153	152,145
2011	7/18–08/15	ADF&G	431,153	311,550	1,310,634	3,931,902	151,713	87,866	123,310
2014	7/18–07/30	ADF&G	1,547,538	2,110,274	1,747,720	5,243,160	643,563	1,474,574	912,399
2017	7/28–08/08	ADF&G	258,235	288,615	941,797	2,825,391	78,381	100,434	270,551
2018	7/22–08/09	ADF&G	212,664	151,903	303,806	911,418	58,798	61,909	93,597

[a] Population estimates are valid for the date of the survey (i.e., either before or after the summer commercial fishery). All historical abundances were updated based on newly recovered data in 2015.

[b] Pre-2 male crab were defined as 76–89 mm in carapace length (CL), and pre-1 male crab were defined as sublegal crab greater than or equal to 90 mm in CL.

[c] Legal male red king crab were defined as greater than or equal to 121 mm (4.75 inch) in carapace width (CW) for all ADF&G trawl surveys (except for 1996, when legal male crab were defined as at least 105 mm CL), and greater than or equal to 104 mm CL for the NMFS trawl survey.

[d] Legal male biomass is estimated by multiplying the population abundance estimate of legal males by an average weight of 3.0 pounds.

Appendix E10.–Size composition by percent of red king crab from winter research pots near Nome, Norton Sound, Bering Sea, 1990–2012.

	Undersized [a]			Legal [a]		
Year	Prerecruit 2	Prerecruit 1	Total	Recruits	Post recruits	Total
1990	16	33	49	25	26	51
1991	5	30	36	34	31	65
1992	[b]	[b]	[b]	[b]	[b]	[b]
1993	3	9	12	17	71	88
1994	[b]	[b]	[b]	[b]	[b]	[b]
1995	10	11	23 [c]	32	45	77
1996	22	33	64 [c]	10	26	36
1997	32	21	64 [c]	14	22	36
1998	36	44	82 [c]	9	9	18
1999	7	42	50 [c]	39	11	50
2000	16	20	37 [c]	39	25	64
2001	23	16	39 [c]	14	48	61
2002	43	26	79 [c]	9	12	21
2003	20	42	66 [c]	20	14	34
2004	9	40	50 [c]	37	13	50
2005	16	24	41 [c]	25	34	59
2006	29	33	63 [c]	16	22	38
2007	16	53	78 [c]	11	11	22
2008	36	31	71 [c]	18	12	30
2009	11	42	54 [c]	24	22	46
2010	10	32	43 [c]	30	27	57
2011	15	26	44 [c]	23	33	56
2012	25	29	57 [c]	14	29	43

Note: No winter study has occurred since 2012.

[a] Undersized crab are male crab less than 4.75-inch carapace width (CW). Legal crab are male king crab greater than or equal to 4.75-inch CW.

[b] No winter crab research study occurred in 1992 or 1994.

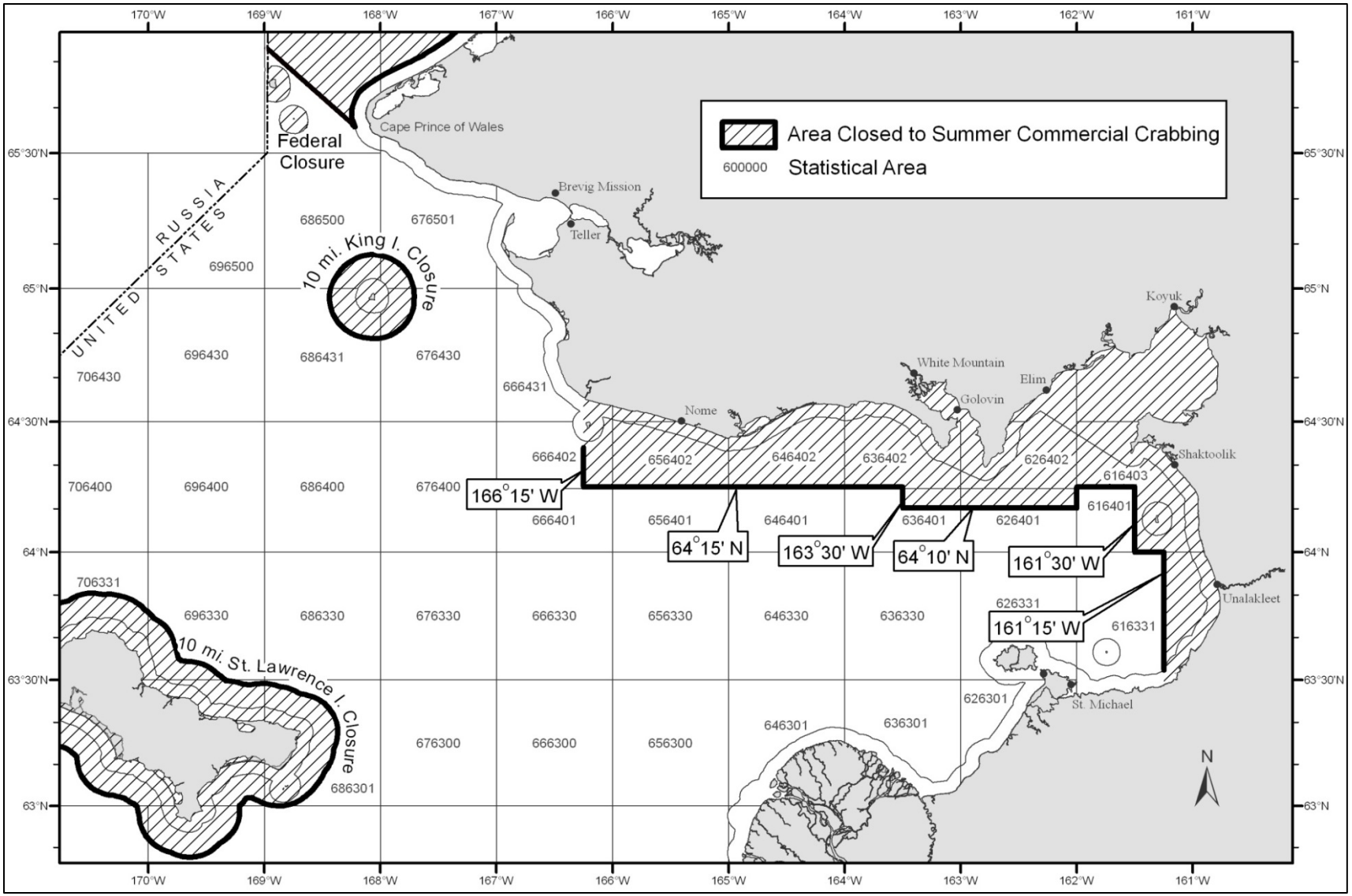
[c] Includes Prerecruit 3.

Appendix E11.–Reported number of crab pots lost during the commercial and subsistence winter crab fisheries, and ADF&G studies/surveys, 2005–2018.

Year	Commercial [a]	Subsistence	ADF&G winter study and spring/fall tagging studies [b]	Total
2005–2006	ND	50	6	56
2006–2007	ND	132	7	139
2007–2008	ND	6	4	10
2008–2009	ND	8	2	10
2009–2010	30	23	2	55
2010–2011	3	8	0	11
2011–2012	64	19	4	87
2012–2013	23	4	3	30
2013–2014	105	16	1	122
2014–2015	104	16	0	120
2015–2016	38	20	No tagging studies done	58
2016–2017	201	11	No tagging studies done	212
2017–2018	179	33	No tagging studies done	212

[a] Prior to the 2009–2010 season, lost pots were not tracked for the winter commercial fishery.

[b] The 2011–2012 winter season was the last time the winter study took place. The spring/fall tagging studies took place 2012–2015.



Appendix E12.–Closed waters area in effect for the Norton Sound summer commercial crab fishery.

Note: Line drawn around the coastline delineates the 3-mile state waters zone.

Appendix E13.–Historical commercial summer harvest of red king crab from Norton Sound Section, Eastern Bering Sea, by statistical areas, 1990–2018 (catch in pounds).

Statistical area	1990	1992	1993	1994	1995	1996 [a]	1997	1998	1999
616331	0	0	0	48	0	0	0	0	633
616401	0	0	0	0	35	0	0	0	0
626331	0	0	0	0	0	61	0	0	0
626401	0	0	0	0	18,971	45,045	18,066	8,065	508
626402	0	0	0	0	0	0	0	0	0
636330	0	0	0	0	0	4,560	3,838	2,449	0
636401	0	1,159	1,373	3,340	24,329	70,677	59,206	10,771	14,201
636402	0	0	0	1,754	3,466	0	0	0	0
646301	0	0	0	0	4,628	13,888	0	0	0
646330	0	0	0	0	1,493	2,894	314	0	3,021
646401	0	0	1,963	37,510	105,045	22,834	1,052	3,194	221
646402	0	0	730	139,661	66,821	0	0	0	0
656300	0	0	0	0	0	0	0	0	0
656330	0	4,814	265	0	19,745	15,446	4,661	4,078	1,300
656401	171	53,119	105,341	34,686	32,289	9,985	4,035	1,127	2,739
656402	0	0	193,079	110,289	44,000	0	0	0	0
666230	0	0	0	0	0	0	0	0	0
666300	0	0	0	0	0	25,519	0	0	0
666330	27,185	4,305	31,758	0	730	0	0	0	0
666401	162,263	10,632	746	396	0	3,001	1,816	0	930
666402	0	0	535	1,221	0	0	0	0	0
666431	0	0	0	0	1,124	0	0	0	0
676300	0	0	0	0	0	546	0	0	0
676330	0	0	0	0	0	0	0	0	0
676400	3,212	0	0	0	0	9,775	0	0	0
676430	0	0	0	0	0	0	0	0	0
676501	0	0	0	0	0	0	0	0	0
686330	0	0	0	0	0	0	0	0	0
686431	0	0	0	0	0	0	0	0	0
Total	192,831	74,029	335,790	328,905	322,676	224,231	92,988	29,684	23,553
(tons)	96	37	168	164	161	112	46	15	12

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Appendix E13.–Page 2 of 3.

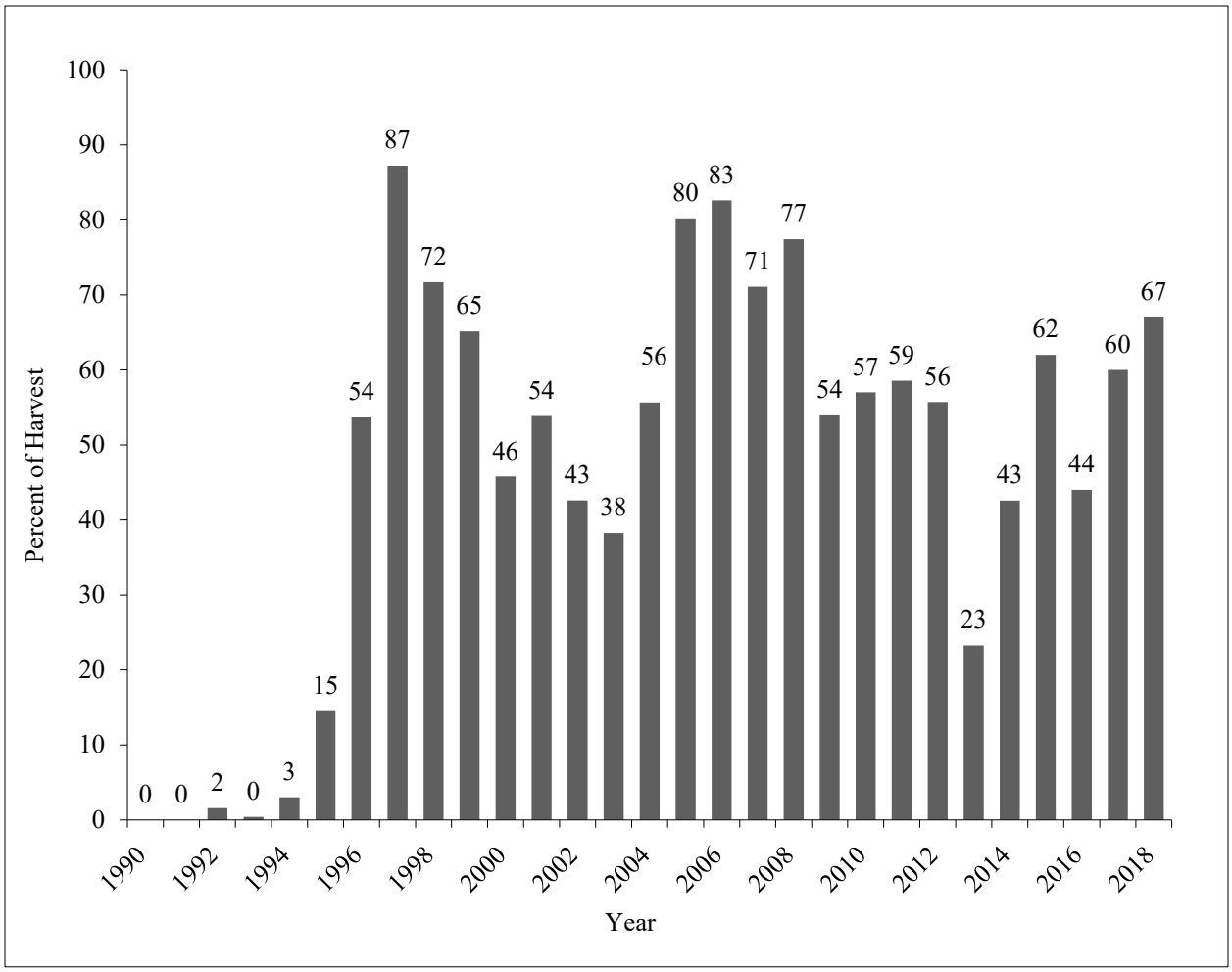
Statistical area	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
616331	4,557	0	3,506	646	0	0	2,357	0	5,658	888
616401	0	0	0	0	0	0	0	231	416	6,170
626331	0	0	2,455	0	0	0	1,415	27,018	3,235	3,047
626401	4,689	61,620	53,722	15,899	23,113	94,130	118,202	61,704	96,327	103,043
626402	0	0	0	1,352	0	0	0	0	0	0
636330	0	2,253	0	0	0	126	26,680	10,253	2,350	5,026
636401	130,463	91,343	50,906	83,949	166,489	227,204	224,531	123,092	197,948	96,279
636402	0	0	0	0	0	0	0	0	0	0
646301	0	0	0	0	0	0	0	0	0	0
646330	0	1,868	1,955	0	2,226	4,097	2,629	5,290	1,505	933
646401	0	4,287	0	3,952	1,964	149	1,660	0	18,728	46,264
646402	0	0	0	0	0	0	0	0	0	0
656300	0	0	0	14	932	0	284	1,909	0	0
656330	1,990	20,869	12,374	21,176	46,288	47,411	17,752	4,911	0	10,617
656401	95,979	55,158	63,038	40,566	21,579	9,405	28,434	70,065	68,968	107,557
656402	0	0	0	1,441	0	380	807	2,254	0	0
666230	0	0	0	0	0	0	1,721	0	0	0
666300	0	0	0	0	0	0	18,245	0	0	0
666330	5,839	7,030	1,332	1,296	12,359	142	5,041	511	0	1,514
666401	69,007	43,771	35,970	83,998	42,452	727	600	2,498	0	10,021
666402	0	0	30,070	12,873	23,344	16,025	1,050	2,959	0	6,228
666431	0	0	4,274	45	0	0	0	0	0	0
676300	0	0	0	0	0	0	0	0	0	0
676330	0	0	0	0	0	0	0	0	0	0
676400	0	0	0	0	0	0	0	180	0	0
676430	0	0	0	0	0	0	0	0	0	0
676501	0	0	0	0	0	1,008	0	0	0	0
686330	0	0	0	0	0	0	0	0	0	0
686431	0	0	0	0	0	0	340	0	0	0
Total	312,524	288,199	259,602	267,207	340,746	400,804	451,748	312,875	395,135	397,587
(tons)	156	144	130	134	170	200	226	156	198	199

-continued-

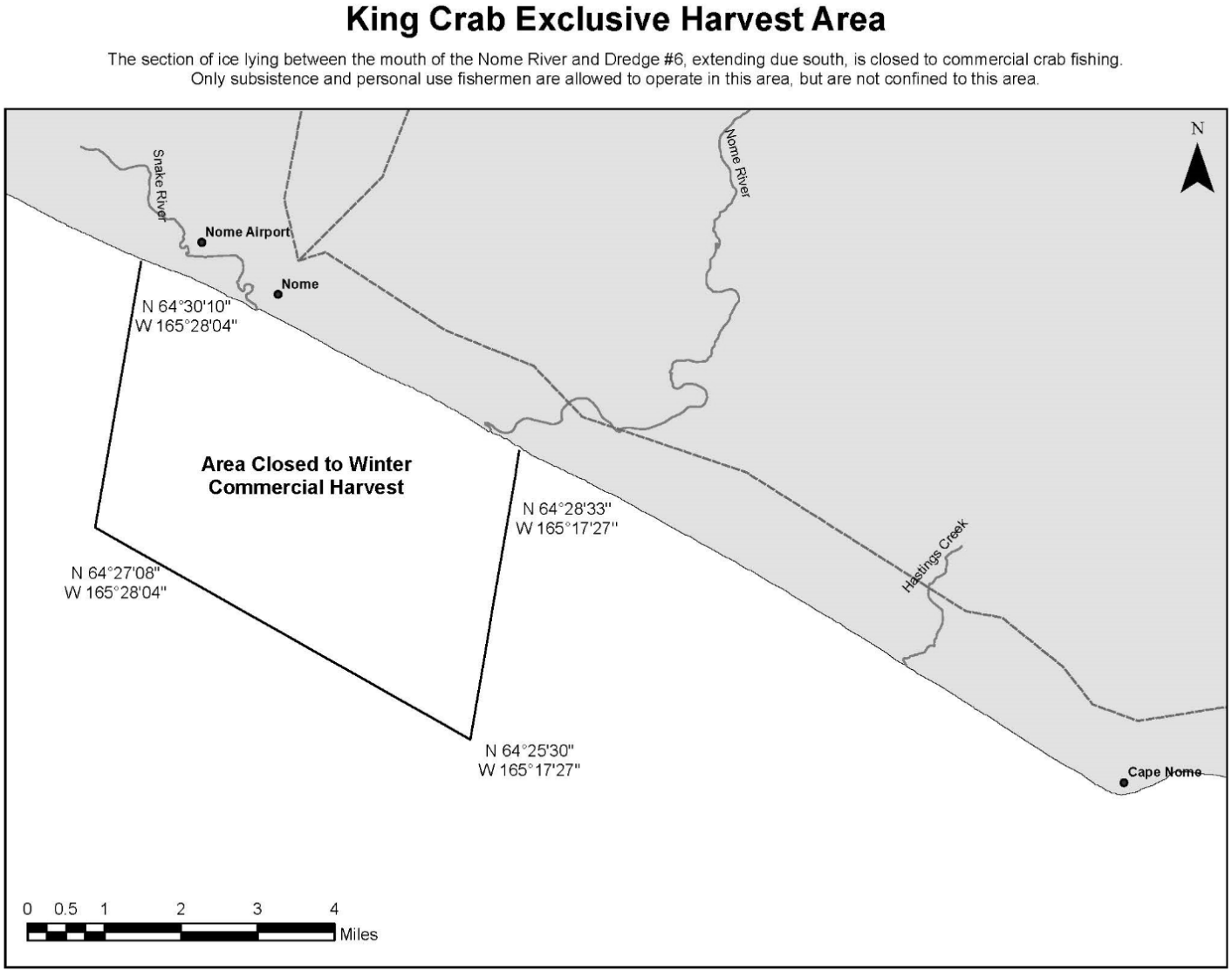
Statistical Area	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
616331	0	0	0	0	4,923	3,410	0	0	1,110	27,735
616401	0	0	0	7,729	4,692	1,929	0	2,368		23,570
626331	0	2,489	0	686	0	0	0	3,366	956	44,728
626401	52,054	85,271	115,524	36,802	69,936	103,881	19,488	53,398	22,520	1,281,978
626402	0	0	0	0	0	0	0	0		1,352
636330	2,584	0	1,454	12,035	7,565	2,680	10,122	3,429	949	98,353
636401	182,040	146,973	148,183	34,027	78,572	137,285	154,502	185,444	174,811	2,819,097
636402	0	0	0	0	0	0	0	0		5,220
646301	0	0	0	0	0	0	0	0		18,516
646330	1,205	0	1,204	4,195	5,390	1,812	0	388		42,418
646401	77,437	83,099	98,811	59,737	36,409	58,929	126,906	101,796	60,162	952,109
646402	0	0	0	5,271	0	0	0	0		212,483
656300	0	0	0	0	0	0	0	0		3,139
656330	17,660	1,546	8,168	8,515	0	4,828	307	2,317		277,037
656401	82,747	77,149	85,920	147,569	122,631	69,355	97,414	44,007	4,885	1,535,915
656402	0	0	0	37,743	0	0	0	0		389,993
666230	0	0	0	0	0	0	0	0		1,721
666300	0	0	0	0	0	0	0	0		43,764
666330	0	2,042	1,000	0	0	0	0	1,469	595	104,148
666401	0	0	15,726	33,469	38,099	9,308	6,030	12,412	9,963	593,835
666402	1,577	2,271	0	1,419	18,968	7,699	5,391	1,347	22,445	155,421
666431	0	0	0	2,669	1,825	0	0	0		9,937
676300	0	0	0	0	0	0	0	0		546
676330	0	0	0	0	0	0	0	0		0
676400	0	0	0	0	0	0	0	0		13,167
676430	0	0	0	0	0	0	0	0		0
676501	0	0	0	0	0	0	0	0		1,008
686330	0	0	0	0	0	0	0	0		0
686431	0	0	0	0	0	0	0	0		340
Total	417,304	400,840	475,990	391,863	389,008	401,115	420,160	411,739	298,396	8,657,529
(tons)	209	200	238	196	195	201	210	206	149	4,329

Note: No commercial fishery occurred in 1991.

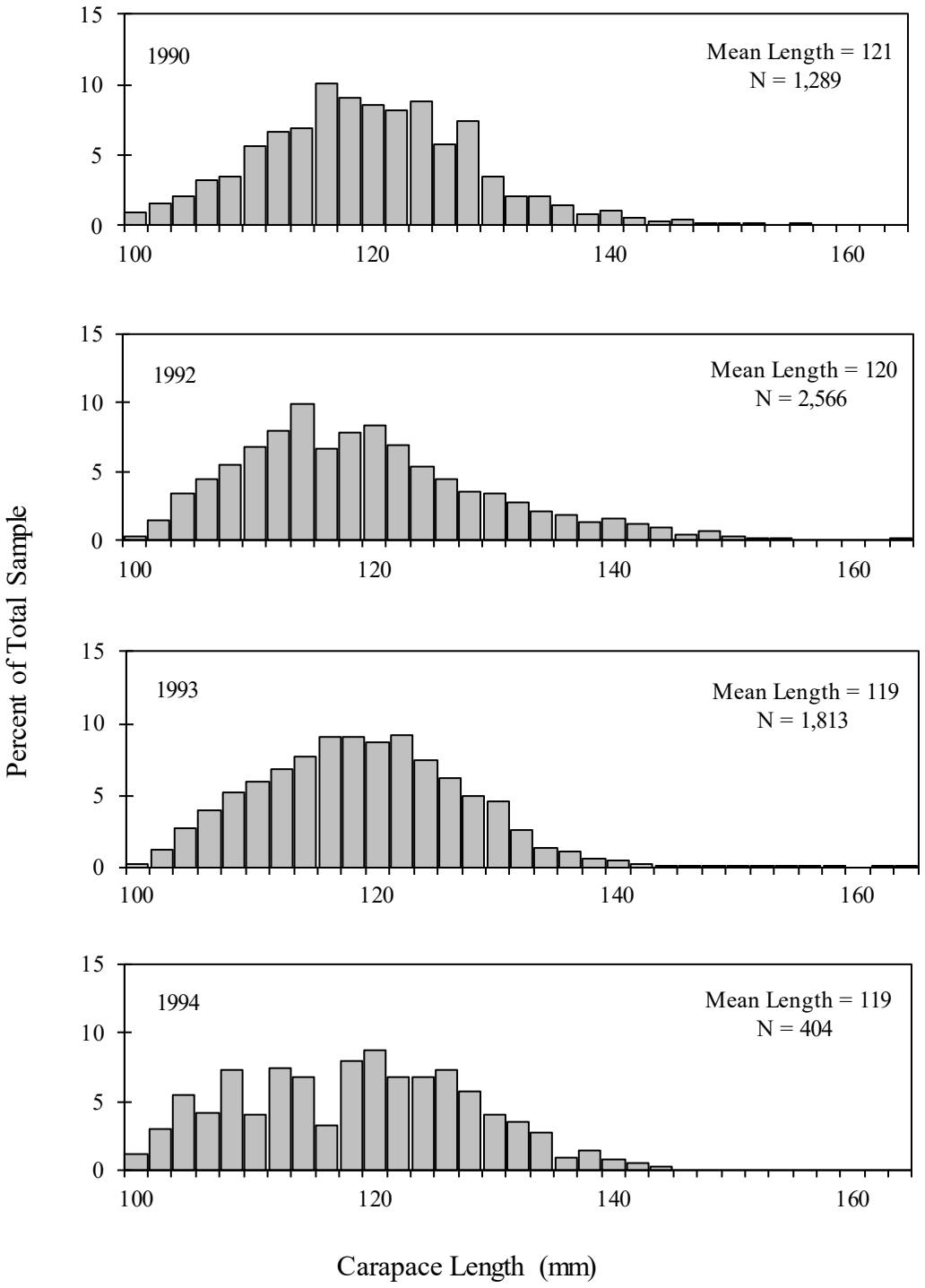
[a] Does not include approximately 2,490 lb not reported on fish tickets.



Appendix E14.–The percent of crab harvested during the Norton Sound summer commercial red king crab fishery east of 164 degrees W longitude, 1990–2018.

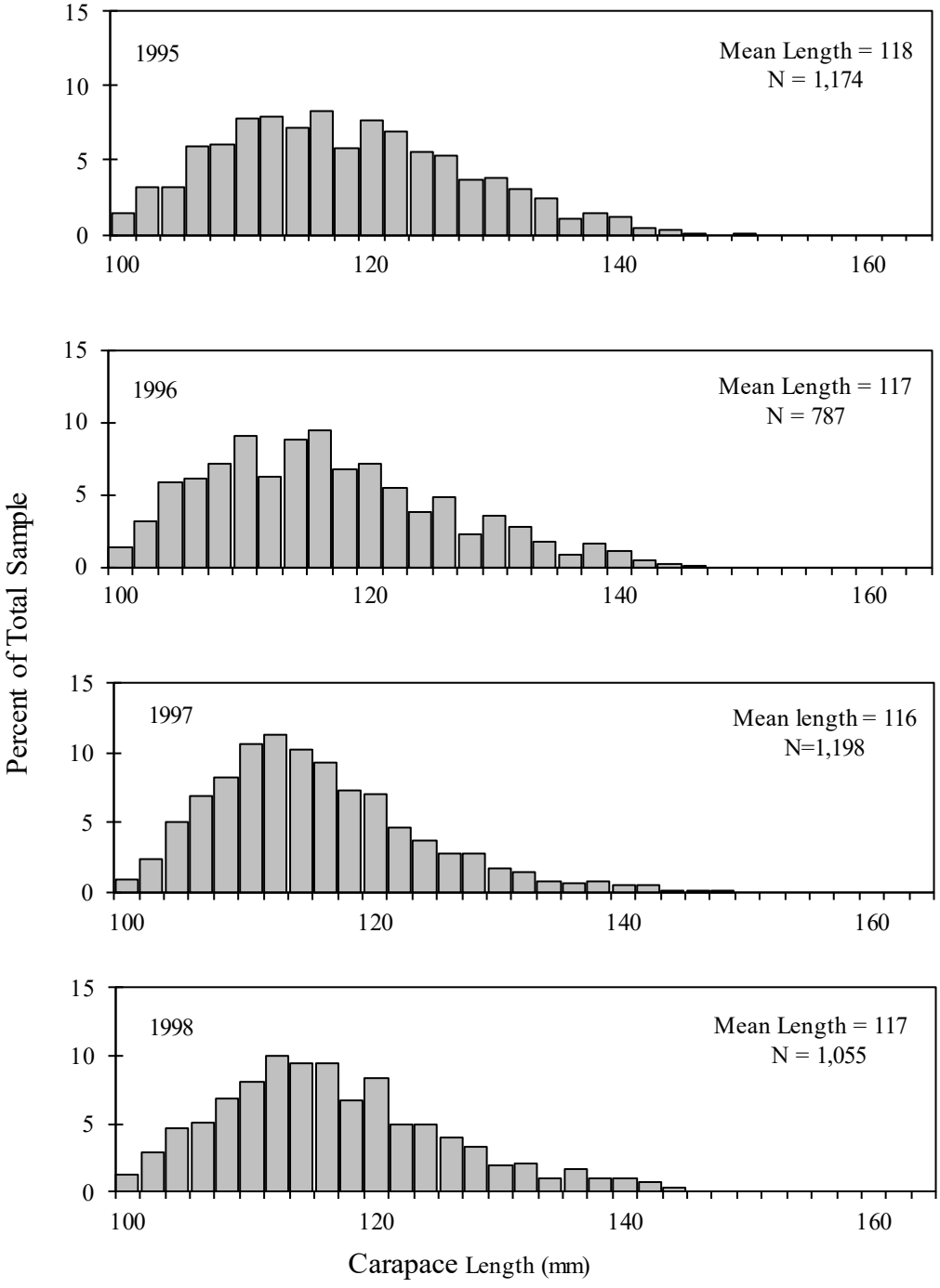


Appendix E15.–Closed waters area in effect for the Norton Sound winter commercial crab fishery.

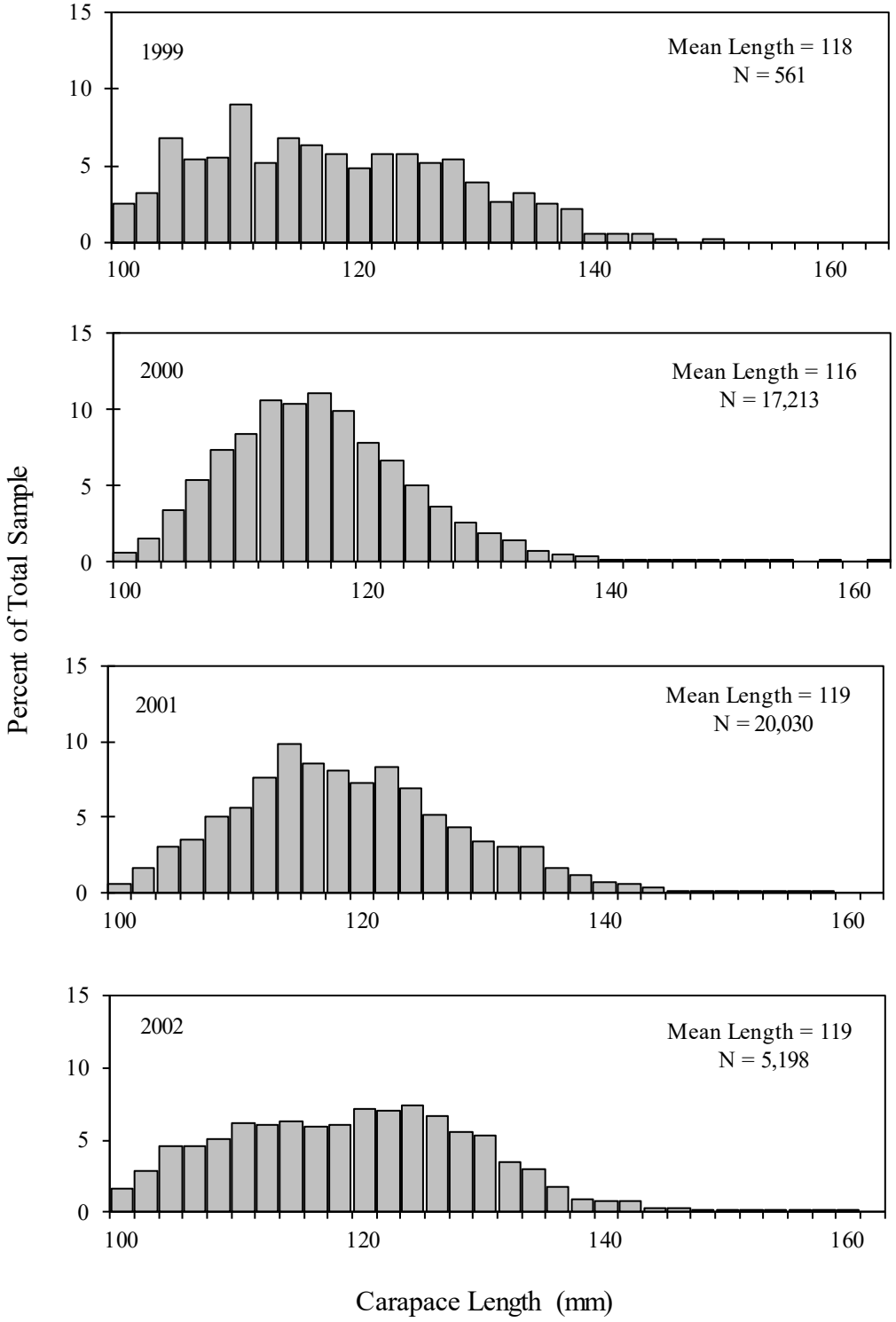


Appendix E16.–Length composition of Norton Sound red king crab summer commercial harvests, 1990–1994.

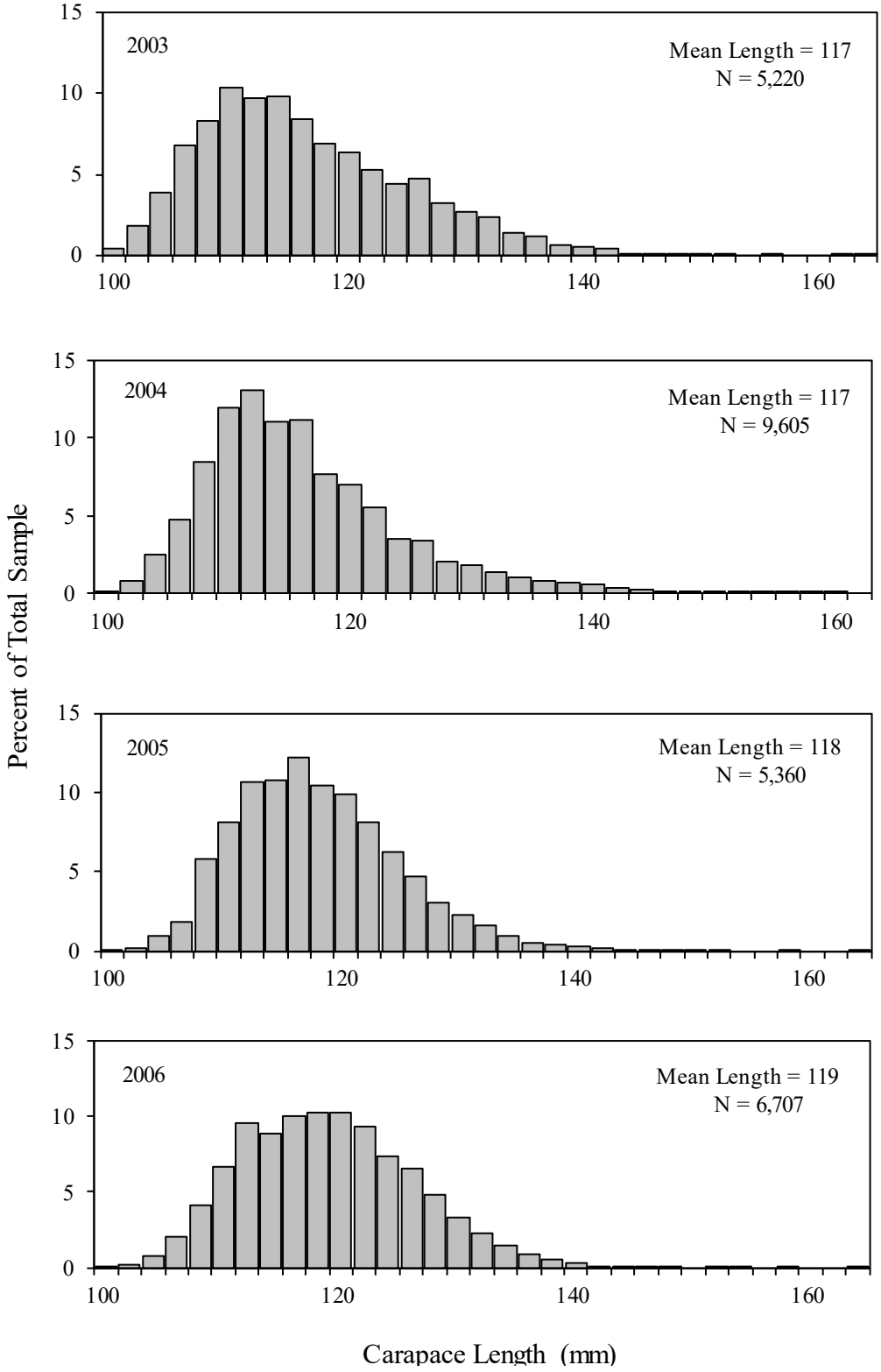
Note: No fishery in 1991.



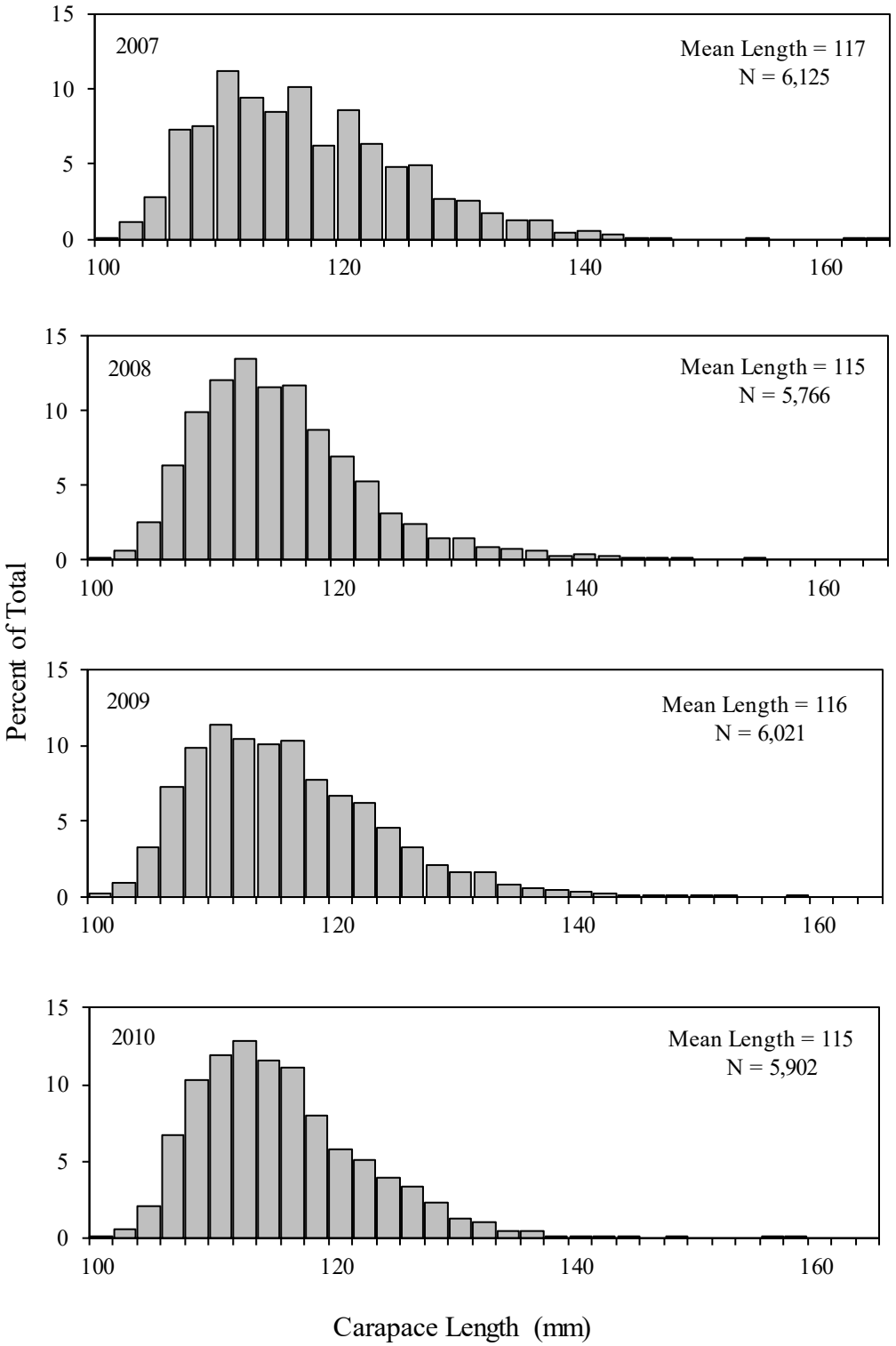
Appendix E17.–Length composition of Norton Sound red king crab summer commercial harvests, 1995–1998.



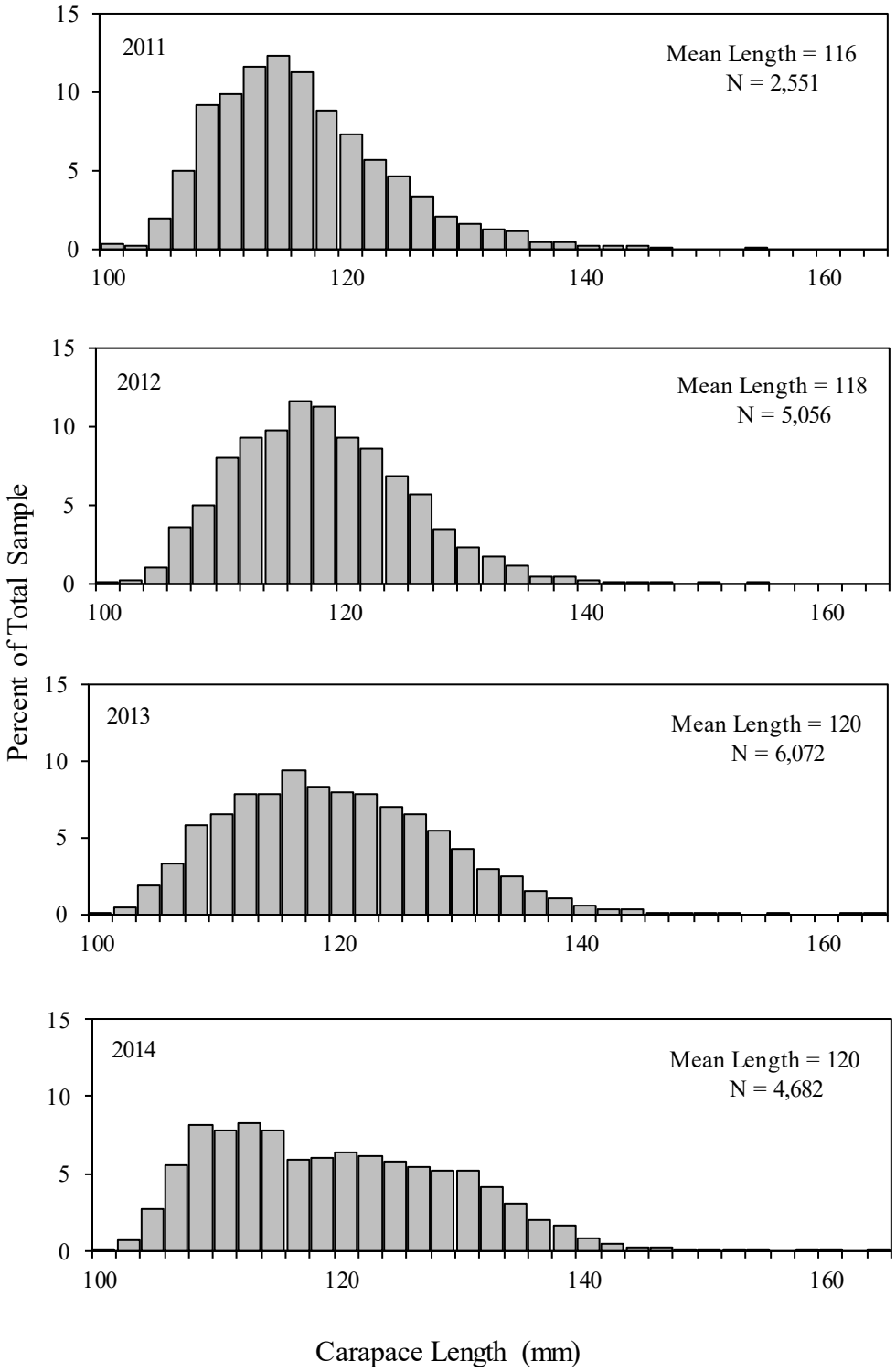
Appendix E18.–Length composition of Norton Sound red king crab summer commercial harvests, 1999–2002.



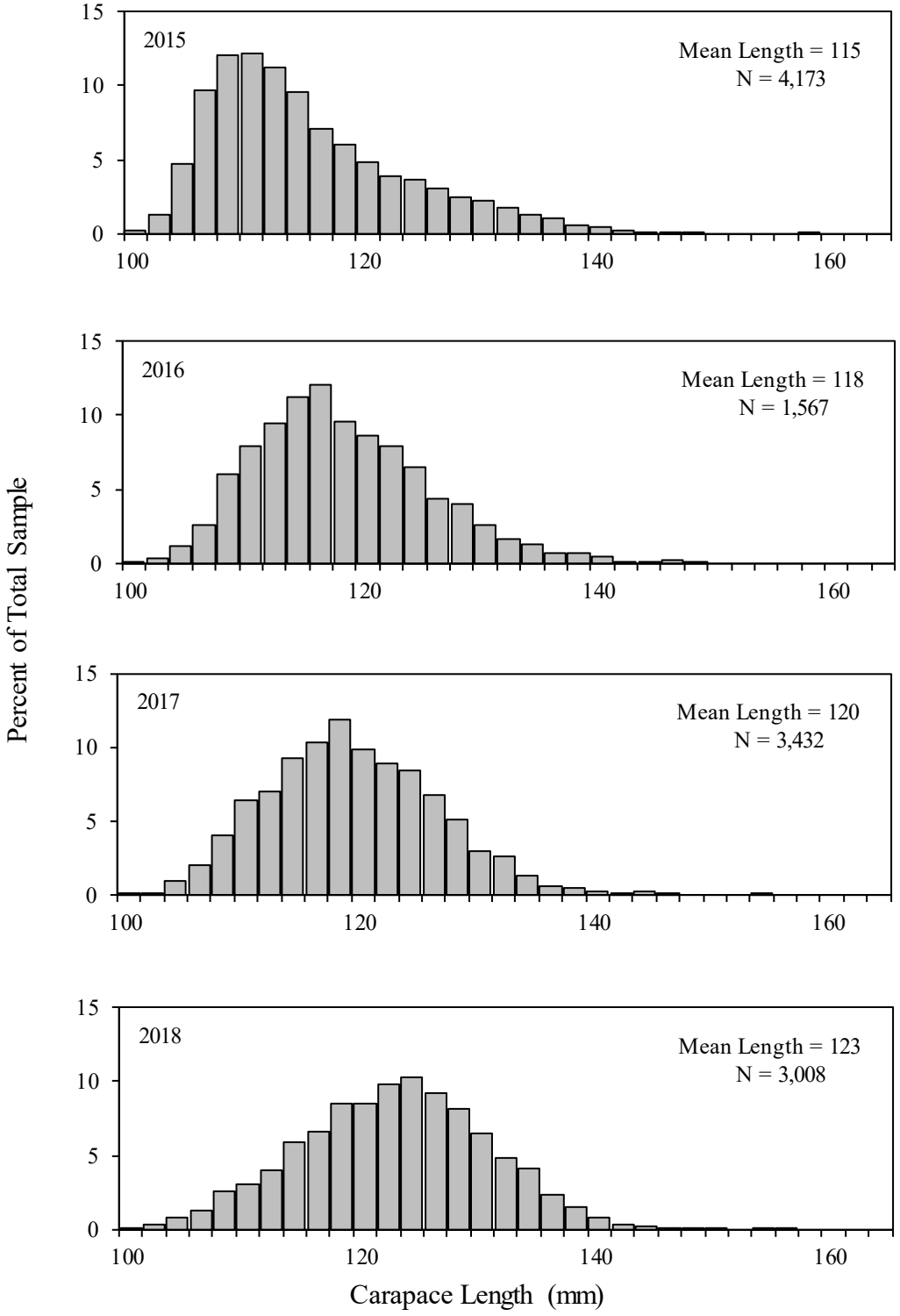
Appendix E19.–Length composition of Norton Sound red king crab summer commercial harvests, 2003–2006.



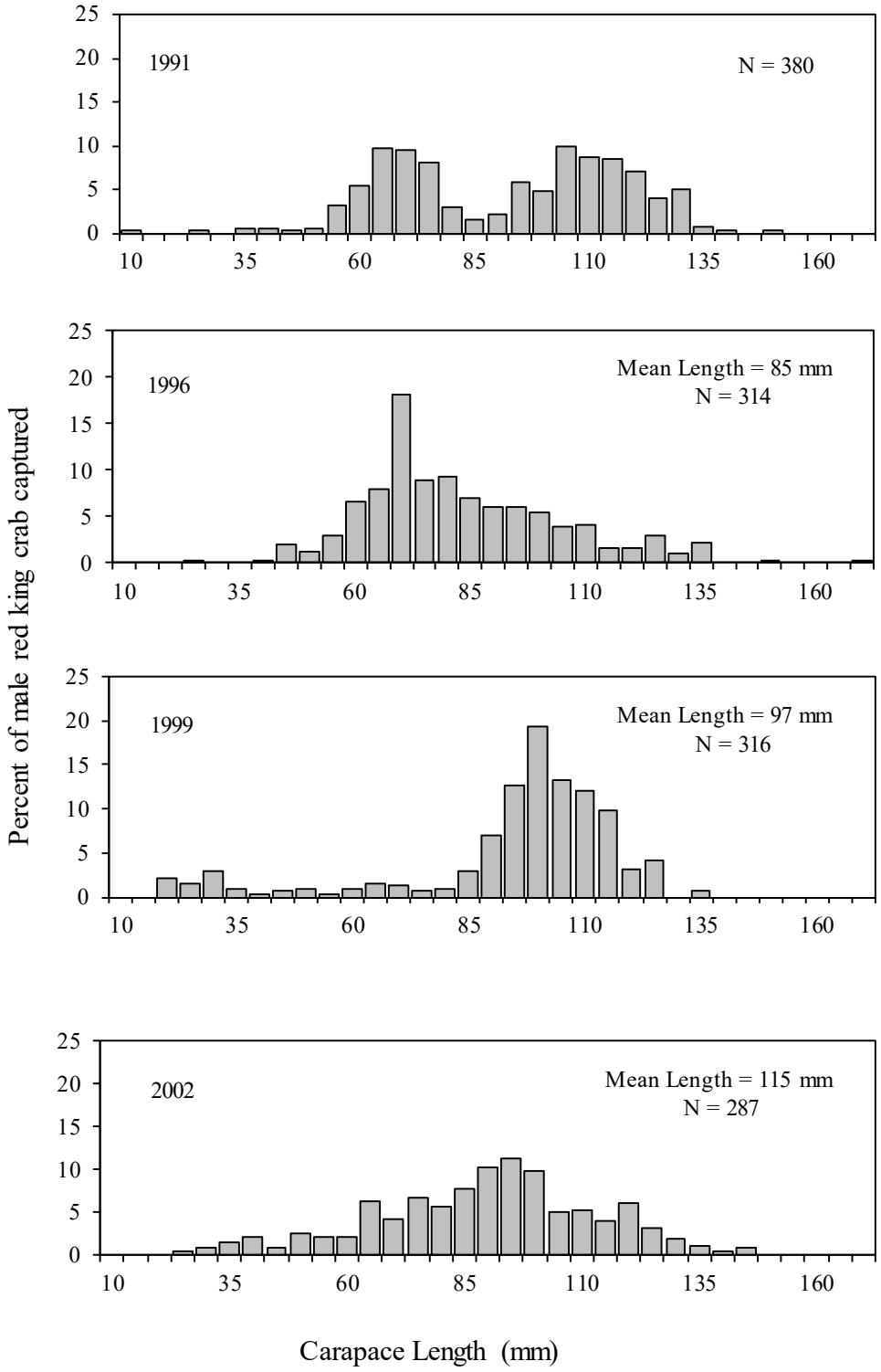
Appendix E20.–Length composition of Norton Sound red king crab summer commercial harvests, 2007–2010.



Appendix E21.–Length composition of Norton Sound red king crab summer commercial harvests, 2011–2014.

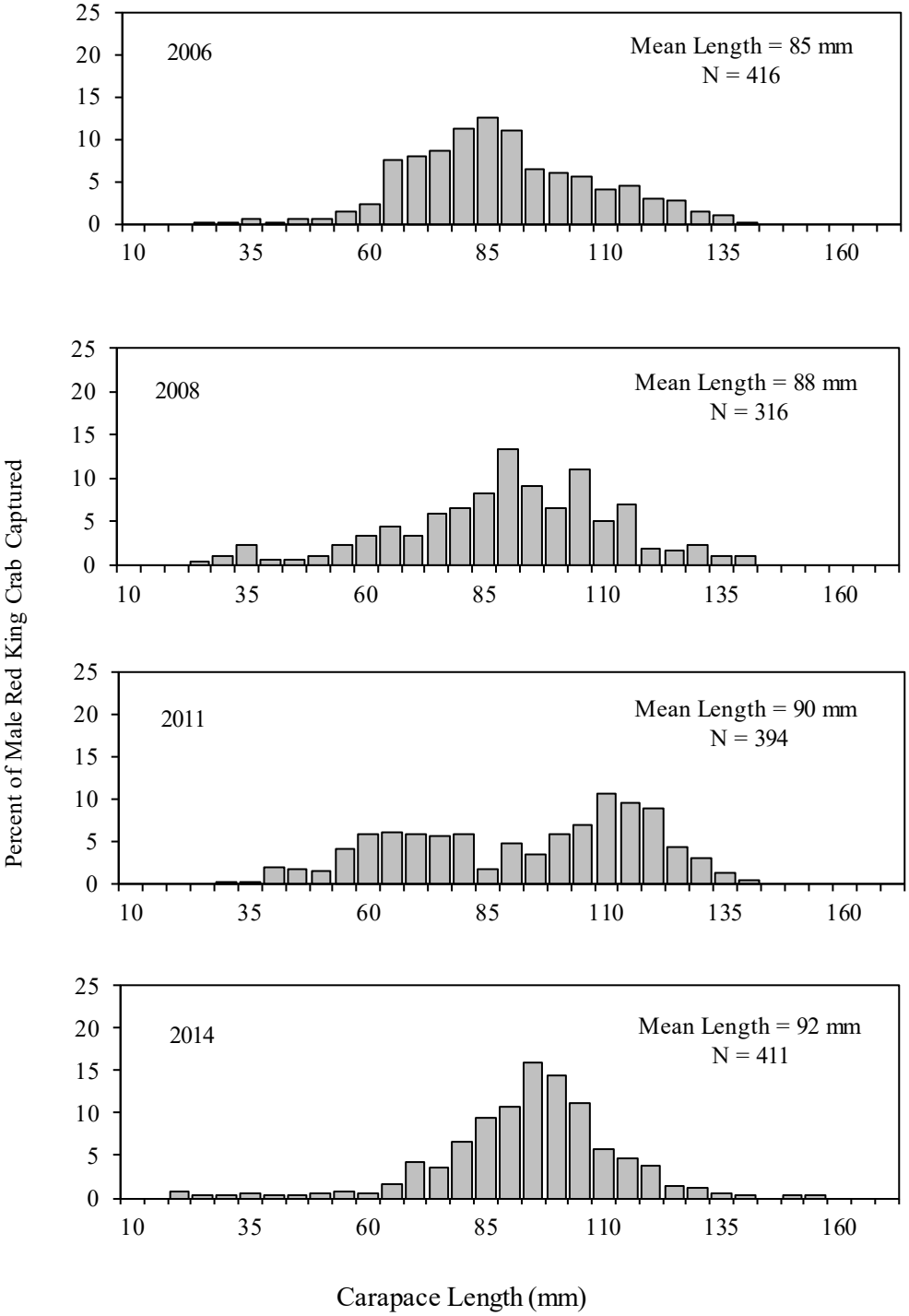


Appendix E22.–Length composition of Norton Sound red king crab summer commercial harvest, 2015–2018.

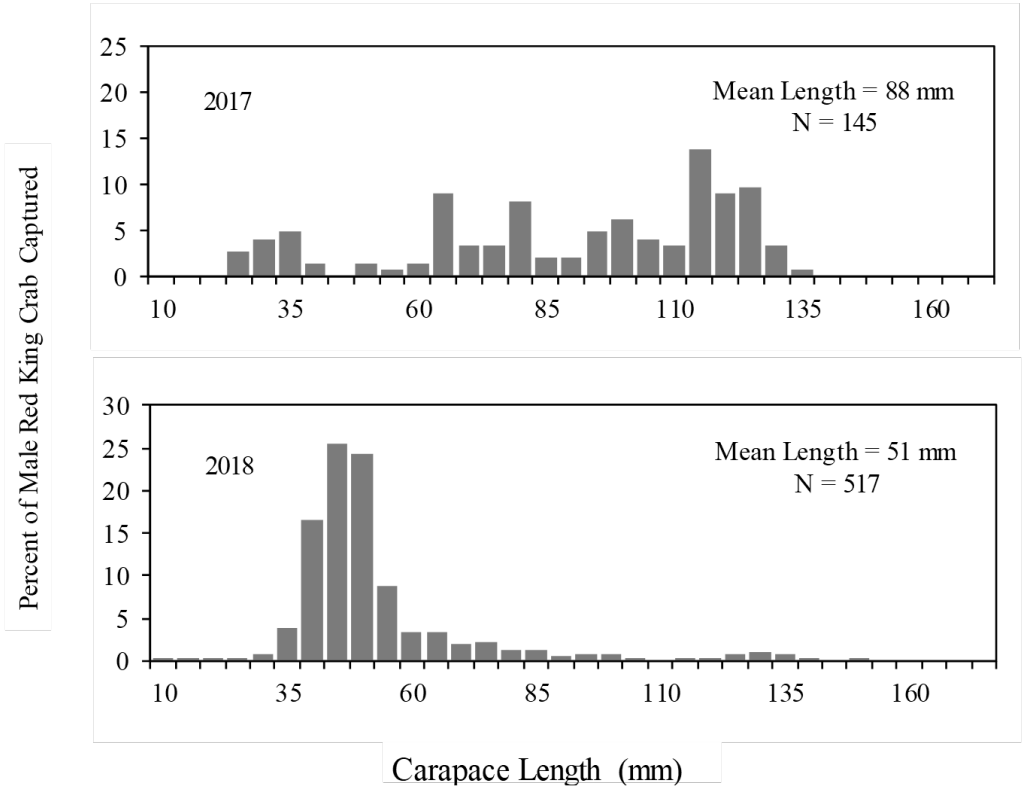


Appendix E23.–Norton Sound male red king crab size distribution from trawl assessment surveys conducted by the National Marine Fisheries Service in 1991, and by ADF&G in 1996, 1999, and 2002.

Note: Mean length information is not available for 1991.



Appendix E24.–Norton Sound male red king crab size distribution from trawl assessment surveys conducted by ADF&G in 2006, 2008, 2011, and 2014.



Appendix E25.–Norton Sound male red king crab size distribution from trawl assessment survey conducted by ADF&G in 2017 and 2018.

APPENDIX F: MISCELLANEOUS FISHERIES

Appendix F1.–Kotzebue District winter commercial sheefish harvest statistics, 1990–2018.

Year [b]	Number of fishermen	Number of fish	Pounds [a]		Price per pound ($)	Estimated value ($)
			Total	Average		
1990	6	687	5,617	8.2	[c]	[c]
1991	5	852	8,224	9.7	0.50	4,112
1992	3	289	2,850	9.9	0.65	1,853
1993	1	210 [d]	1,700	8.1	0.50	850
1994 [e]						
1995	1	226	2,240	9.9	0.50	1,120
1996	2	308	3,002	9.7	0.44	1,321
1997 [e]						
1998	1	254	2,400	9.4	0.43	1,032
1999–2000 [e]						
2001	1	19	200	10.5	1.00	200
2002	4	30	300	10.0	1.00	300
2003	1	122	1,250	10.2	0.56	700
2004	1	37	474	12.8	1.91	905
2005	3	242	3,744	15.5	1.20	4,493
2006–2010 [e]						
2011	1	Confidential Information			2.09	[f]
2012–2014 [e]						
2015	2	Confidential Information			1.02	[f]
2016	2	Confidential Information			1.25	[f]
2017	1	Confidential Information			1.00	[f]
2018	2	Confidential Information			0.94	[f]

[a] Data are not exact; in some instances, total catch poundage was determined from average weight and catch data. Similarly, various price-per-pound figures were determined from price-per-fish and average weight data.

[b] Season was from October 1 to September 30. Year indicated would be the year the commercial season ended. For example, the year 1980 would represent October 1, 1979, to September 30, 1980.

[c] Data unavailable or incomplete.

[d] Number of fish is not always reported. Estimates were based on average weight from reported sales that documented the number of fish.

[e] No reported commercial catches.

[f] Less than 3 fishermen; data confidential under Alaska Statute 16.05.815. Prior to 2005, confidentiality was waived by permit holders.

Appendix F2.–Kotzebue District reported subsistence harvests of sheefish, 1991–2014.

Year [a]	Number of households interviewed	Reported harvest	Average catch per household
1991	40	2,180	55
1992	43	2,821	66
1993	46	2,441	53
1994	171	3,181	19
1995 [b]	314	9,465	30
1996 [b]	389	6,953	18
1997 [b]	338	9,805	29
1998 [b]	435	5,350	12
1999 [b]	191	8,256	43
2000 [b]	237	7,446	31
2001 [b]	363	3,838	11
2002	101	3,882	38
2003	488	7,823 [c]	16
2004 [d]	440	10,163	23
2012 [d]	360	11,694	32
2013 [d,e]	618	22,116	36
2014 [f]	866	31,909	37

Note: Subsistence surveys were not conducted 2005–2011 and after 2014.

[a] Due to limited survey effort during many years, total catch and effort should be regarded as minimum numbers only and are not comparable year to year.

[b] Subsistence sheefish harvests are from villages on Kobuk River.

[c] Includes 10 fish reported from commercial salmon fishery and used for subsistence.

[d] Subsistence surveys were not conducted in the town of Kotzebue.

[e] Villages surveyed were Ambler, Buckland, Kiana, Kobuk, Noatak, Noorvik, Shungnak, and Selawik.

[f] Villages surveyed were Ambler, Buckland, Kiana, Kobuk, Noatak, Noorvik, Shishmaref, Shungnak, Selawik, and Kotzebue.

Appendix F3.–Non-salmon sport fish harvests in Norton Sound and Kotzebue/Chukchi Sea, 1990–2018.

	Norton Sound		Kotzebue / Chukchi Sea		
Year	Dolly Varden	Arctic Grayling	Dolly Varden	Arctic Grayling	Inconnu/ sheefish
1990	3,765	1,378	806	622	151
1991	10,365	5,121	1,149	1,981	603
1992	2,382	492	582	968	1,904
1993	5,907	1,584	914	916	1,029
1994	3,071	1,331	2,365	814	564
1995	2,908	1,037	939	910	1,142
1996	4,285	1,485	913	2,136	485
1997	4,467	1,262	598	1,903	906
1998	2,240	298	440	1,788	414
1999	6,708	1,600	796	1,247	635
2000	7,952	1,203	1,599	1,233	1,201
2001	3,174	994	1,693	1,244	1,305
2002	2,252	1,565	1,884	1,994	500
2003	5,531	1,778	533	1,473	2,509
2004	4,318	824	1,285	1,983	1,634
2005	2,617	595	239	269	393
2006	3,180	419	2,328	760	810
2007	2,808	314	2,924	836	1,066
2008	3,319	965	852	293	61
2009	3,373	1,185	1,406	445	957
2010	1,835	232	493	366	595
2011	4,041	1,398	865	486	385
2012	252	520	781	626	104
2013	1,184	500	1,074	563	218
2014	154	0	216	237	244
2015	412	154	221	664	1,191
2016	2,016	1,215	1,081	496	667
2017	1,531	395	1,830	272	46
2018	Information is not yet available.				
Average					
2013–2017	1,059	453	884	446	473
2008–2017	1,812	656	882	445	447

Appendix F4.–Kotzebue District incidentally caught and sold Dolly Varden during the commercial salmon fishery, 1990–2018.

Year	Number of fish sold	Estimated total catch [a]	Pounds sold	Average weight [b]	Average price
1990	604	[c]	4,219	7.0	0.25
1991	6,136	[c]	40,747	6.6	0.18
1992	1,977	[c]	11,951	6.0	0.10
1993	76	[c]	540	7.1	0.10
1994	149	[c]	767	5.1	0.17
1995	2,090	[c]	13,195	6.3	0.20
1996	188	[c]	1,153	6.1	0.25
1997	3,320	[c]	23,203	7.0	0.20
1998	349	[c]	2,640	7.6	0.20
1999	1,502	[c]	11,352	7.6	0.20
2000	7	[c]	44	6.3	0.20
2001	0	[c]	0	[d]	0.00
2002	0	30	0	[d]	0.00
2003	20	176	160	8.0	0.50
2004	124	[c]	846	6.8	0.26
2005	181	[c]	1,158	6.4	0.30
2006	0	278	0	[d]	0.00
2007	0	960	0	[d]	0.00
2008	0	1,629	0	[d]	0.00
2009	0	960	0	[d]	0.00
2010	0	1,323	0	[d]	0.00
2011	0	400	0	[d]	0.00
2012	0	300	0	[d]	0.00
2013	0	302	0	[d]	0.00
2014	0	620	0	[d]	0.00
2015	0	62	0	[d]	0.00
2016	0	710	0	[d]	0.00
2017	0	523	0	[d]	0.00
2018	0	648	0	[d]	1.00

[a] Estimate includes fish caught but not sold based on interviews of fishermen or fish tickets.

[b] Some data extrapolated from average reported weight.

[c] No estimates were made of Dolly Varden caught but not sold.

[d] Dolly Varden caught but not sold were not weighed.

Appendix F5.–Subsistence harvests of Dolly Varden from the villages of Kivalina and Noatak, 1991–2014.

	Kivalina		Noatak [b,c]
Year [a]	Number	Pounds	Number
1991			4,814
1992			4,395
1993			4,275
1995			5,762
1996			5,031
1997			4,763
1998			3,872
2000			3,315
2001			2,702
2002			3,242
2003			6,386
2004			11,697
2007	20,527	67,739	10,234
2012			6,437
2013			6,223
2014			9,289

Note: Data are not available for all years.

[a] Subsistence surveys were not conducted in 1994, 1999, 2005–2006, 2008–2011, and after 2014.

[b] No data are available on poundage.

[c] Based on ADF&G, Division of Subsistence, household surveys in Noatak.

Appendix F6.–Dolly Varden sport fish harvests in Norton Sound, by river, 1990–2018.

	Location									
Year	Marine water	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other streams	Total
1990	183	1,078	166	614	348				1,227	3,616
1991	0	1,220	856	1,474	1,474	729	1,252	2,219	1,141	10,365
1992	204	557	131	746	270	139	115	131	89	2,382
1993	205	917	448	427	1,003	536	331	893	1,147	5,907
1994	90	431	63	410	699	305	117	197	759	3,071
1995	0	462	74	976	346	158	131	366	395	2,908
1996	12	873	388	1,506	402	485	97	49	473	4,285
1997	189	328	65	936	2,071	346	81	186	265	4,467
1998	0	302	14	588	160	311	0	383	482	2,240
1999	330	791	45	2,384	1,952	88	44	154	920	6,708
2000	1,069	340	0	4,462	1,687	59	199	0	136	7,952
2001	166	43	270	1,002	1,197	86	108	162	140	3,174
2002	67	511	72	789	259	47	18	18	471	2,252
2003	0	1,223	482	134	110	712	13	0	2,857	5,531
2004	72	226	0	3,593	120	42	0	53	212	4,318
2005	95	553	12	500	1,148	141	27	0	141	2,617
2006	0	959	0	1,307	0	531	51	153	179	3,180
2007	14	625	0	731	193	144	461	481	159	2,808
2008	0	46	0	1,062	1,061	107	46	0	997	3,319
2009	0	253	0	2,794	108	50	50	0	118	3,373
2010	0	165	0	1,411	12	117	0	24	106	1,835
2011	0	0	11	2,219	1,631	0	10	0	170	4,041
2012	0	111	0	88	0	9	33	0	11	252
2013	0	17	0	483	0	0	0	0	684	1,184
2014	0	0	0	40	0	20	0	15	79	154
2015	0	97	0	120	0	195	0	0	0	412
2016	0	24	0	1,611	197	45	24	0	115	2,016
2017	0	573	0	485	0	0	0	0	0	1,058
2018	Information is not yet available.									
Average										
2013–2017	0	142	0	548	39	52	5	3	176	965
2008–2017	0	129	1	1,031	301	54	16	4	228	1,764

Note: Data are not available for all years.

Appendix F7.–Aerial survey counts of overwintering and spawning Dolly Varden in the Kotzebue District, 1990–2018.

Year [a]	Noatak River spawner survey [b]	Overwintering	
		Wulik River [c]	Kivalina River [c]
1990	7,261	[d]	[d]
1991	9,605	126,985	35,275
1992	[d]	135,135	[e]
1993	9,560	144,138	16,534
1994	[d]	66,752	[d]
1995	6,500	128,705	28,870
1996	12,184	61,005	[d]
1997	[d]	95,412	[d]
1998	[d]	104,043	[d]
1999	9,059 [f]	70,704	[d]
2000	[d]	[d]	[d]
2001	[d]	92,614	[d]
2002	[d]	44,257	[d]
2003	[d]	1,500 [g]	[d]
2004	[d]	101,806	[d]
2005	[d]	120,848	[d]
2006	[d]	108,352	[d]
2007	[d]	99,311	[d]
2008	[d]	71,493	[d]
2009	[d]	63,977	[d]
2010	[d]	36,866	[d]
2011	[d]	64,499	[d]
2012	[d]	21,084	[d]
2013	[d]	23,312 [h]	[d]
2014	[d]	64,351	[d]
2015	[d]	72,895	[d]
2016	[d]	70,969	[d]
2017	[d]	62,557	[d]
2018	[d]	97,385	[d]

[a] Counts are considered minimal because data listed include both poor and good surveys.

[b] Includes spawner counts on the Kelly, Kugurorok, and Nimiuktuk rivers, and tributaries of the Noatak River.

[c] Surveys conducted by Division of Sport Fish.

[d] Not surveyed.

[e] Poor weather hampered or prevented survey.

[f] Poor conditions on the Nimiuktuk did not allow a count.

[g] Spawning survey conducted very early (August 20, 2003).

[h] Counting conditions were poor due to presence of river ice.

Appendix F8.–Subsistence whitefish catch and effort in the Kotzebue District, 1991–2014.

Year [a]	Number of households interviewed	Number of whitefish harvested	Average catch per household
1991 [b]	63	16,015	254
1992 [b]	66	17,485	265
1993 [b]	70	19,060	272
1997	413 [c]	84,851	205
1998	435 [c]	39,754	91
1999	191 [c]	56,326	295
2000	237 [c]	70,097	296
2001	363 [c]	30,976	85
2002	101 [d]	25,607	254
2003	446	73,242	164
2004	440 [c]	50,501	115
2012	360 [c]	38,113	106
2013	618 [e]	100,948	163
2014	866 [f]	82,903	96

Note: Subsistence surveys were not conducted 1994–1996, 2005–2011, and after 2014.

[a] Whitefish harvest information was collected during chum salmon subsistence surveys and is considered a fraction of the annual catch. Whitefish numbers include all species of whitefish, except sheefish.

[b] Subsistence interviews from Noatak, Noorvik, and Shungnak villages only.

[c] Subsistence harvest information is from Ambler, Kiana, Kobuk, Noatak, Noorvik, and Shungnak.

[d] Subsistence harvest information is from Noatak and Noorvik only.

[e] Subsistence harvest information is from Ambler, Buckland, Kiana, Kobuk, Noatak, Noorvik, Selawik, and Shungnak.

[f] Subsistence harvest information is from Ambler, Buckland, Kiana, Kobuk, Noatak, Noorvik, Selawik, Shishmaref, Shungnak, and Kotzebue.

Appendix F9.–Norton Sound District winter commercial whitefish harvest statistics, 2006–2018.

Year [a]	Number of fishermen	Number of whitefish	Total pounds	Price per pound ($)	Estimated value ($)
2006–2007	1	3,209	3,723	0.44	2,635
2007–2008 [b]					
2008–2009 [b]					
2009–2010 [b]					
2010–2011	1	1,733	2,009	0.50	1,005
2011–2012	1	1,853	2,148	0.40	859
2012–2013	2	68	105	0.50	53
2013–2014 [c]	1	3,947	4,726	0.50	2,288
2014–2015 [b]					
2015–2016	3	1,971	2,076	0.50	1,038
2016–2017	1	1,999	1,999	0.50	1,000
2017–2018 [b]					

Note: Confidentiality was waived by fishermen.

[a] Season was from September 15 to June 15.

[b] No reported sales.

[c] Total pounds include personal use.

Appendix F10.–Norton Sound District winter commercial saffron cod harvest statistics, 1993–2018.

Year [a]	Number of fishermen	Total pounds	Price per pound ($)	Estimated value ($)
1993–1994	[b]	1,402	[b]	[b]
1994–1995	[b]	52	0.50	26
2009–2010 [c]	1	1,748	0.30	524
2010–2011	5	8,031	0.50	4,016
2011–2012	9	3,780	0.47	1,772
2012–2013	25	33,939	0.50	16,970
2013–2014	27	19,050	0.50	9,525
2014–2015	16	12,973	0.50	6,487
2015–2016	6	3,921	0.50	1,961
2016–2017	16	9,792	0.50	4,896
2017–2018 [d]				
Average 2013–2017	18	15,935	0.50	7,968

Note: Information is not available for 1996–2008.

[a] Season was from September 15 to June 15.

[b] Information is not available.

[c] Confidentiality was waived by the fisherman.

[d] No reported sales.

Appendix F11.–Norton Sound District capelin sightings, 2013–2018.

Year	Dates
2013	7/19
2014	mid-June
2015	early and late June
2016	6/19
2017	7/2
2018	6/15–6/21

Note: Capelin sightings were not tracked or recorded by ADF&G prior to 2013.

APPENDIX G: OVERVIEW OF 2018

Appendix G1.–List of common and scientific names of finfish species of the Norton Sound, Port Clarence, Kotzebue, and Arctic Districts.

Common name	Scientific name
Arctic lamprey	*Lampetra camtschatica*
Arctic char	*Salvelinus alpinus*
Arctic cod	*Boreogadus saida*
Arctic flounder	*Liopsetta glacialis*
Arctic grayling	*Thymallus arcticus*
Alaska plaice	*Pleuronectes quadrituberculatus*
Burbot	*Lota lota*
Bering cisco	*Coregonus laurettae*
Bering poacher	*Ocella dodecaedria*
Bering wolfish	*Anarjicas orientalis*
Blackfish	*Dallia pectoralis*
Boreal smelt (rainbow-toothed)	*Osmerus mordax*
Broad whitefish	*Coregonus nasus*
Capelin	*Mallotus villosus*
Dolly Varden	*Salvinus malma*
Pond smelt	*Hypomesus olidus*
Humpback whitefish	*Coregonus pidschian*
Inconnu (sheefish)	*Stenodus leucichthys*
Lake trout	*Salvelinus namaycush*
Least cisco	*Coregonus sardinella*
Longhead dab	*Liranda probiscidea*
Ringtail snailfish	*Liparis rutteri*
Northern Pike	*Esox lucius*
Longnose sucker	*Casostomus catostomus*
Pricklebacks	*Stichaeidae*
Pacific herring	*Clupea harengus pallasii*
Rock flounder	*Lepidosetta bilineata*
Rock greenling (terpug)	*Hexagrammus lagocephalus*
Round whitefish	*Prosopium cylindraceum*
Sculpins	*Cottodae*
Pink salmon	*Oncorhynchus gorbuscha*
Chum salmon	*Oncorhynchus keta*
Coho salmon	*Oncorhynchus kisutch*
Sockeye salmon	*Oncorhynchus nerka*
Chinook salmon	*Oncorhynchus tshawytscha*
Saffron cod	*Eleginus gracilis*
Starry flounder	*Platichthys stellatus*
Sandlance	*Amrodytes hexapterus*
Sturgeon poacher	*Angonus acipenserinus*
Threespine stickleback	*Gasterocteus aculeatus*
Ninespine stickleback	*Pungitius*
Tubenose poacher	*Pallasina barbata aix*
Whitespotted greenling	*Hexagrammus stelleri*
Yellowfin sole	*Limanda aspera*

Appendix G2.–Alaska Department of Fish and Game and associated cooperative studies conducted within the Norton Sound, Port Clarence, Kotzebue, and Arctic Districts, 2018.

SALMON

Bonanza River Weir

a) Location: Bonanza River, approximately 6 miles upstream from the Bonanza channel bridge, and just below Jackson Creek.

b) Description: Determine daily and seasonal timing and magnitude of chum, pink, and coho salmon escapements. Collect age, sex, and length data from chum salmon from weir trap. Cooperative project operated by ADF&G with assistance from NSEDC.

Eldorado River Weir

a) Location: Eldorado River, approximately 15 miles upstream from the Safety Sound highway bridge, and approximately 3 miles above the furthest upstream connecting channel to the Flambeau River.

b) Description: Determine daily and seasonal timing and magnitude of chum and pink salmon escapements. Collect age, sex, and length data from chum salmon from weir trap. Cooperative project operated by NSEDC with assistance from ADF&G.

Fish River Tower

a) Location: Fish River, approximately 9 miles upstream of White Mountain.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapement. NSEDC project with assistance from ADF&G.

Inglutalik River Tower

a) Location: Inglutalik River, approximately 18 miles upstream from the mouth at Norton Bay.

b) Description: Determine daily and seasonal timing and magnitude of Chinook, chum, pink, and coho salmon escapements. Collect age, sex, and length data from Chinook, chum, and coho salmon from beach seine. Cooperative project operated by NSEDC with assistance from ADF&G.

Kwiniuk River Tower

a) Location: Kwiniuk River, approximately 5 miles upstream from mouth.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapements. Determine age, sex, and length of Chinook and chum salmon in the Kwiniuk River escapement from beach seining. ADF&G project with additional funding from NSEDC.

Nome River Weir

a) Location: Nome River, approximately 1 mile upstream of the VOR site.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapement. Compare aerial survey totals with weir counts to improve survey accuracy. Collect age and sex data through escapement sampling of weir trap. ADF&G project with additional funding from NSEDC.

North River Tower

a) Location: North River, approximately 2 miles below bridge.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapements. Cooperative project operated by NSEDC with assistance from ADF&G.

Pilgrim River Weir

a) Location: Pilgrim River, approximately 6 miles downstream of Pilgrim River bridge at mile 65 of the Kougarok Road / Nome–Taylor Highway.

b) Description: Determine daily and seasonal timing and magnitude of the salmon escapements. Collect age, sex, and length data from weir trap. Cooperative project operated by NSEDC with assistance from ADF&G.

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Shaktoolik River Sonar/Tower

a) Location: Shaktoolik River, approximately 2 miles upstream from the village of Shaktoolik.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapements. Cooperative project operated by NSEDC with assistance from ADF&G.

Snake River Weir

a) Location: Snake River, approximately 5 miles upstream of boat harbor, where river turns north.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapements. Sample for age, sex, and length. Cooperative project operated by ADF&G and NSEDC.

Solomon River Weir

a) Location: Solomon River, at approximately mile 35.5 on the Nome-Council road.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapements. ADF&G project.

Unalakleet River Weir

a) Location: Unalakleet River, approximately 15 miles upstream from village of Unalakleet.

b) Description: Determine daily and seasonal timing and magnitude of Chinook, chum, and pink escapements. Collect age, sex, and length data from Chinook and chum salmon from weir trap. Cooperative ADF&G, BLM, NSEDC, and Unalakleet IRA project.

Kobuk River Test Fish

a) Location: Lower Kobuk River, approximately 2 miles downriver of Kiana.

b) Description: Evaluate chum salmon abundance migrating into the Kobuk River drainage using systematic drift gillnet catches. To qualitatively assess the impact of the Kotzebue District commercial salmon fishery on chum abundance into the Kobuk River drainage for fisheries management purposes. Describe migratory timing in the lower Kobuk River. Sample for age, sex, and length. ADF&G project.

Salmon Lake Limnology Project / Sockeye Salmon Restoration

a) Location: Salmon Lake, throughout; and smolt trap 2 miles downstream from lake, on Pilgrim River.

b) Description: Restore sockeye salmon population to higher historical levels. Biological (age, weight, and length) samples taken from emigrating smolt and enumerated by mark–recapture. Hydroacoustic-tow net studies conducted to estimate rearing fry population and gather growth data. Fertilization of Salmon Lake. Operated by NSEDC.

Subsistence Salmon Fishing Surveys

a) Location: Norton Sound District.

b) Description: Determine subsistence utilization of salmon for formulating management procedures and goals. Subsistence salmon permits were issued in northern Norton Sound and Port Clarence District by Commercial Fisheries Division. Koyuk, Saint Michael, Shaktoolik, Stebbins, and Unalakleet were also surveyed by Commercial Fisheries Division. ADF&G project.

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CRAB

Winter King Crab Commercial Fishery Monitoring

a) Location: Monitoring of winter commercial crabbers conducted on nearshore ice from roughly 25 miles west to 25 miles east of Nome.

b) Description: Observe handling of red king crab in Norton Sound and note male/female and legal/sublegal composition. Cooperative project between ADF&G and NSEDC.

Summer King Crab Observing Program

a) Location: Observers were placed on commercial fishing vessels throughout the open fishing area of Norton Sound.

b) Description: Investigate size and sex composition and handling of red king crab in Norton Sound. Sample for age, sex, and length. Cooperative project between ADF&G and NSEDC.

Norton Sound Red King Crab Trawl Survey (Conducted in 2018)

a) Location: Ocean waters of Norton Sound, 10-mile grid.

b) Description: Annual trawl survey to establish abundance of red king crab. Biological (sex and size) samples and species presence-absence data taken. Cooperative ADF&G and NSEDC project.

Appendix G3.–Norton Sound and Kotzebue Sound processors, 2018.

Company	Address	Type of processing	District
Norton Sound Seafood Products	Nome, AK 99762 and Unalakleet, AK 99684	Frozen/Fresh Salmon Herring & Miscellaneous Finfish Bait Frozen/Fresh King Crab	Norton Sound
Maniilaq Services, Inc. dba Arctic Circle Wild Salmon	1700 Seventh Avenue Suite 2100 Seattle, WA 98101	Buy and Fly Frozen/Fresh Salmon	Kotzebue Sound
Copper River Seafoods	1118 East Fifth Avenue Anchorage, AK 99501	Buy and Fly Frozen/Fresh Salmon	Kotzebue Sound
Pacific Star Seafoods	520 Bridge Access Rd. Kenai, AK 99611	Buy and Fly Floating Processor Frozen/Fresh Salmon	Kotzebue Sound

Appendix G4.–Norton Bay Subdistrict subsistence salmon harvest survey form, 2018.

NORTON SOUND 2018 SUBSISTENCE SALMON HARVEST SURVEY **Community ID# 204**

Alaska Department of Fish and Game **Household ID#_____**

Community: KOYUK

Survey Date: **Household Size: _____**

Interviewer: **(If new household) PO Box: _____**

Household participation is voluntary. Individual household data will not be released without permission of household head.

1. Did your household fish for salmon for subsistence use this year? (Include fishing with a rod and reel) ☐ YES ☐ NO

2. Does your household usually subsistence fish for salmon? ☐ YES ☐ NO

FOR SALMON FISHING HOUSEHOLDS ONLY ("Yes" to #1)

3. Please estimate how many salmon your household caught for subsistence use this year, including with a rod and reel. It is important not to double count fish harvests. Report only your share of the catch if fishing with others. Include salmon you gave away, ate fresh, fed to dogs, lost to spoilage, or obtained from helping others process fish.

SPECIES	NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY GEAR TYPE)		NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY LOCATION)			
	SUBSISTENCE GILL NET or SEINE (Number of fish)	ROD & REEL (Number of fish)	MARINE WATERS	KOYUK RIVER	INGLUTALIK RIVER	UNGALIK RIVER
CHUM SALMON Dog						
CHINOOK SALMON King						
PINK SALMON Humpy						
SOCKEYE SALMON Red						
COHO SALMON Silver						

4. Comments or Suggestions?

Appendix G5.–Shaktoolik Subdistrict subsistence salmon harvest survey form, 2018.

NORTON SOUND 2018 SUBSISTENCE SALMON HARVEST SURVEY **Community ID# 307**

Alaska Department of Fish and Game **Household ID#_____**

Community: SHAKTOOLIK

Survey Date: **Household Size: _____**

Interviewer: **(If new household) PO Box: _____**

Household participation is voluntary. Individual household data will not be released without permission of household head.

1. Did your household fish for salmon for subsistence use this year? (Include fishing with a rod and reel) ☐ YES ☐ NO

2. Does your household usually subsistence fish for salmon? ☐ YES ☐ NO

FOR SALMON FISHING HOUSEHOLDS ONLY ("Yes" to #1)

3. Please estimate how many salmon your household caught for subsistence use this year, including with a rod and reel. It is important not to double count fish harvests. Report only your share of the catch if fishing with others. Include salmon you gave away, ate fresh, fed to dogs, lost to spoilage, or obtained from helping others process fish.

SPECIES	NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY GEAR TYPE)		NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY LOCATION)	
	SUBSISTENCE GILL NET or SEINE (Number of fish)	ROD & REEL (Number of fish)	MARINE WATERS	SHAKTOOLIK RIVER
CHUM SALMON Dog				
CHINOOK SALMON King				
PINK SALMON Humpy				
SOCKEYE SALMON Red				
COHO SALMON Silver				

4. Comments or Suggestions?

Appendix G6.–Unalakleet Subdistrict subsistence salmon harvest survey form, 2018.

NORTON SOUND 2018 SUBSISTENCE SALMON HARVEST SURVEY **Community ID# 357**

Alaska Department of Fish and Game **Household ID#_____**

Community: UNALAKLEET

Survey Date: **Household Size: _____**

Interviewer: **(If new household) PO Box: _____**

Household participation is voluntary. Individual household data will not be released without permission of household head.

1. Did your household fish for salmon for subsistence use this year? (Include fishing with a rod and reel) ☐ YES ☐ NO

2. Does your household usually subsistence fish for salmon? ☐ YES ☐ NO

FOR SALMON FISHING HOUSEHOLDS ONLY ("Yes" to #1)

3. Please estimate how many salmon your household caught for subsistence use this year, including with a rod and reel. It is important not to double count fish harvests. Report only your share of the catch if fishing with others. Include salmon you gave away, ate fresh, fed to dogs, lost to spoilage, or obtained from helping others process fish.

SPECIES	NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY GEAR TYPE)		NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY LOCATION)		
	SUBSISTENCE GILL NET or SEINE (Number of fish)	ROD & REEL (Number of fish)	MARINE WATERS	UNALAKLEET RIVER	NORTH RIVER
CHUM SALMON Dog					
CHINOOK SALMON King					
PINK SALMON Humpy					
SOCKEYE SALMON Red					
COHO SALMON Silver					

4. Comments or Suggestions?

Appendix G7.–Emergency Orders issued during 2018.

RED KING CRAB

Emergency Order: 3-C-Z-01-18 Effective Date: March 3, 2018

EXPLANATION: This emergency order opens the Norton Sound winter through the ice open access & community development quota (CDQ) red king crab fisheries from 12:00 noon Saturday, March 3 until 11:59 p.m. Monday, April 30, or when closed by subsequent emergency order when the guideline harvest level (GHL) is reached.

JUSTIFICATION: By regulation the open access winter red king crab fishery can open anytime on or after January 15 by emergency order. The GHL for the 2018 Norton Sound commercial red king crab fishery is 319,410 pounds with 8% reserved for the winter open access fishery, which results in a potential harvest of 25,553 pounds. By regulation 7.5% of the 2018 GHL is reserved for the CDQ fishery, which can open anytime during the winter or summer fishery when the CDQ group is ready to harvest the crab. The CDQ crab can only be harvested by permit holders approved by Norton Sound Economic Development Corporation (NSEDC) and the quota is 23,956 pounds. The CDQ group has notified the department they are ready to harvest crab on March 3.

Emergency Order: 3-C-Z-02-18 Effective Date: April 14, 2018

EXPLANATION: This emergency order closes the Norton Sound CDQ fishery at 5 p.m. April 14, 2017. Except for pots registered to fish in the open access fishery, all pots must be unbaited with doors secured opened by that time and all CDQ-only pots must be removed from the water by April 19, 2018.

JUSTIFICATION: By regulation the CDQ fishery may take 7.5% of the GHL. The CDQ portion of the fishery is 23,956 pounds. NSEDC, which has rights to the CDQ allocation, has requested the department to close the fishery because they are nearing their allocation. Any allocation remaining can be taken in the summer fishery.

Emergency Order: 3-C-Z-03-18 Effective Date: June 24, 2018

EXPLANATION: This emergency order opens the summer commercial open access crab fishery in Norton Sound from 12:00 noon Sunday, June 24 until 12:00 noon Monday, September 3, or when the open access quota is reached.

JUSTIFICATION: By regulation the summer open access king crab fishery can open anytime on or after June 15 by emergency order. The GHL for the 2018 Norton Sound summer open access fishery is the remainder of the total GHL after accounting for the winter open access and CDQ harvests. The entire CDQ quota was harvested during the winter fishery and the winter open access harvest was 5,161 pounds; therefore, 290,292 pounds remain for the summer commercial fishery. Currently the major land-based processor-buyer is registered and has notified the department that they are ready to purchase crab.

Emergency Order: 3-C-Z-04-18 Effective Date: July 28, 2018

EXPLANATION: This emergency order closes the commercial crab fishery in Norton Sound, and all pots must be removed from the water by Saturday, August 4, 2018.

JUSTIFICATION: The GHL for the 2018 Norton Sound summer crab fishery is 319,410 pounds. Through the morning of July 25, approximately 11,000 pounds of the quota remain to be harvested. There are currently 16 vessels fishing and the GHL will likely be reached by midnight Saturday, July 28.

HERRING

Emergency Order: 3-H-Z-01-18 Effective Date: May 14, 2018

EXPLANATION: This emergency order opens the Norton Sound District to commercial gillnet fishing for bait herring beginning 12:00 p.m. Monday, May 14, 2018 until Sunday, July 1, 2018, unless superseded by another emergency order.

JUSTIFICATION: The buyer, Norton Sound Seafood Products (NSSP), plans to buy up to 100 tons of herring for

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bait this season. Processing and buying operations will be limited to the NSSP processing plant in Unalakleet and possibly Nome. Herring catches were reported on Friday, May 11. The herring quota is over 6,000 tons, but there is only buyer interest in herring for bait and no interest in a sac roe fishery.

Leaving the fishery open continuously allows the buyer to direct the bulk of the fishing fleet to areas where harvest efficiency can be maximized. Any herring not purchased by the buyer must be retained for personal or subsistence uses.

KOTZEBUE SALMON

Emergency Order: 3-S-X-01-18 Effective Date: July 10, 2018

EXPLANATION: This emergency order closes commercial fishing in the ocean area adjacent to the end of the main runway nearest the ocean at the Kotzebue airport.

JUSTIFICATION: The main runway at the Kotzebue airport extends nearly to the ocean and concern has arisen over fishing effort creating a safety hazard by attracting birds that may be struck by airplanes while landing or taking off from Kotzebue airport. Consistent with **AS 16.05.060. Emergency orders**, when circumstances require, an area may be closed by emergency order because of safety concerns; therefore, it is warranted to close fishing in waters off the end of the runway as a public safety measure.

Emergency Order: 3-S-X-02-18 Effective Date: July 10, 2018

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 12 hours daily from the hours of 8 a.m. until 8 p.m. Tuesday, July 10 through Friday, July 13.

JUSTIFICATION: 3 buyers have registered to purchase Kotzebue chum salmon this season and 2 buyers purchased salmon the first week of fishing. Regulation allows the season to be open from July 10 through August 31. The buyers have notified the department that they would like to begin purchasing fish on Tuesday, July 10. Having daily 12-hour openings will serve as a test of early run strength and fishing effort.

Emergency Order: 3-S-X-03-18 Effective Date: July 15, 2018

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 12 hours daily from the hours of 10 a.m. until 10 p.m. Sunday, July 15 through Friday, July 20.

JUSTIFICATION: 3 buyers have registered to purchase Kotzebue chum salmon this season and 2 buyers purchased salmon the first week of fishing. Last week's catch of 18,300 salmon by 40 permit holders was below last year's catch, but similar to 2016. Having daily 12-hour openings should not jeopardize subsistence fishing efforts or needed escapement.

Emergency Order: 3-S-X-04-18 Effective Date: July 21, 2018

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 12 hours daily from the hours of 8 a.m. until 8 p.m. Sunday, July 22 through Tuesday, July 24.

JUSTIFICATION: 3 buyers have registered to purchase Kotzebue chum salmon this season and 2 buyers purchased salmon the first 2 weeks of fishing. The cumulative catch of nearly 90,000 salmon by 60 permit holders was like last year when the season catch was the sixth highest on record. Having daily 12-hour openings should not jeopardize subsistence fishing efforts or needed escapement.

Emergency Order: 3-S-X-05-18 Effective Date: July 25, 2018

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 12 hours

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daily from the hours of 8 a.m. until 8 p.m. Wednesday, July 25 through Friday, July 27.

JUSTIFICATION: 3 buyers have registered to purchase Kotzebue chum salmon this season and 2 buyers purchased salmon the first 2 and one-half weeks of fishing. The cumulative catch of nearly 120,000 salmon by 72 permit holders is 20% higher than last year for this time and last year's season catch was the sixth highest on record with no escapement concerns. Having daily 12-hour openings should not jeopardize subsistence fishing efforts or needed escapement.

Emergency Order: 3-S-X-06-18 Effective Date: July 29, 2018

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 12 hours daily from the hours of 10 a.m. until 10 p.m. Sunday, July 29 through Monday, July 30.

JUSTIFICATION: 3 buyers have registered to purchase Kotzebue chum salmon this season and 2 buyers purchased salmon the first 2 and one-half weeks of fishing. The cumulative catch of nearly 205,000 salmon by 78 permit holders is 30% higher than last year for this time and last year's season catch was the sixth highest on record with no escapement concerns. Having daily 12-hour openings should not jeopardize subsistence fishing efforts or needed escapement.

Emergency Order: 3-S-X-07-18 Effective Date: July 31, 2018

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 14 hours daily from the hours of 8 a.m. until 10 p.m. Tuesday, July 31 through Friday, August 3.

JUSTIFICATION: 3 buyers have registered to purchase Kotzebue chum salmon this season and 2 buyers purchased salmon the first 2 and one-half weeks of fishing. The cumulative catch of nearly 219,000 salmon by 78 permit holders is 35% higher than last year for this time and last year's season catch was the sixth highest on record with no escapement concerns. Having daily 14-hour openings should not jeopardize subsistence fishing efforts or needed escapement.

Emergency Order: 3-S-X-08-18 Effective Date: August 5, 2018

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 14 hours daily from the hours of 8 a.m. until 10 p.m. Sunday, August 5 through Friday, August 10.

JUSTIFICATION: 3 buyers have registered to purchase Kotzebue chum salmon this season and 2 buyers purchased salmon the first 4 weeks of fishing. The cumulative catch of nearly 330,000 chum salmon by 90 permit holders is 41% higher than last year for this time and last year's season catch was the sixth highest on record with no escapement concerns. Having daily 14-hour openings should not jeopardize subsistence fishing efforts or needed escapement.

Emergency Order: 3-S-X-09-18 Effective Date: August 12, 2018

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 14 hours daily from the hours of 8 a.m. until 10 p.m. Sunday, August 12 through Friday, August 17.

JUSTIFICATION: 3 buyers have registered to purchase Kotzebue chum salmon this season and 2 buyers have purchased salmon through 5 weeks of fishing. The cumulative catch of nearly 438,000 chum salmon by 92 permit holders is 20% higher than last year for this time and last year's season catch was the sixth highest on record with no escapement concerns. The Kobuk River test fish catch is also tracking nearly 20% ahead of last year's catch and is tracking ahead of the long-term catch average. Having daily 14-hour openings should not jeopardize subsistence fishing efforts or needed escapement.

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Emergency Order: 3-S-X-10-18 Effective Date: August 19, 2018

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 14 hours daily from the hours of 8 a.m. until 10 p.m. Sunday, August 19 through Friday, August 24.

JUSTIFICATION: 3 buyers have registered to purchase Kotzebue chum salmon this season and 2 buyers have purchased salmon through 6 weeks of fishing. The cumulative catch of nearly 548,000 chum salmon by 94 permit holders is on track to exceed 600,000 chum salmon for only the fourth time in history. The Kobuk River test fish catch is tracking nearly 10% ahead of last year's catch and is tracking ahead of the long-term catch average. Having daily 14-hour openings should not jeopardize subsistence fishing efforts or needed escapement.

Emergency Order: 3-S-X-11-18 Effective Date: August 25, 2018

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 10 hours daily from the hours of 10 a.m. until 8 p.m. Sunday, August 25 through Friday, August 31.

JUSTIFICATION: The cumulative catch of 641,000 chum salmon by 96 permit holders is the second highest in history. The Kobuk River test fish chum salmon catch is tracking eighth highest in the 26-year project history. Catches this week in the commercial fishery and test fishery have been well above average for the second half of August. Having daily 10-hour openings should not jeopardize subsistence fishing efforts or needed escapement.

Emergency Order: 3-S-X-1S-18 Effective Date: July 10, 2018

EXPLANATION: This emergency order closes subsistence fishing in the ocean area adjacent to the end of the main runway nearest the ocean at the Kotzebue airport.

JUSTIFICATION: The main runway at the Kotzebue airport extends nearly to the ocean and concern has arisen over fishing effort creating a safety hazard by attracting birds that may be struck by airplanes while landing or taking off from Kotzebue airport. Consistent with **AS 16.05.060. Emergency orders**, when circumstances require, an area may be closed by emergency order because of safety concerns; therefore, it is warranted to close fishing in waters off the end of the runway as a public safety measure.

NORTON SOUND SALMON

Emergency Order: 3-S-Z-01-18 Effective Date: June 1, 2018

EXPLANATION: This emergency order closes all subsistence net fishing, except for dip nets and cast nets, from within 500 yards of the mouth of the Unalakleet River to confluence of the North River and includes the North River, and only subsistence gillnets with a mesh size less than 4 inches may be used in the Unalakleet River drainage or its tributaries upstream from the North River confluence and in the North River from June 1 through July 6, 2018. Any king salmon captured in dip nets or cast nets must be immediately returned to the water unharmed.

JUSTIFICATION: Small mesh size nets can ensnare king salmon and the department received reports 2 years ago of a fisherman using a trout net to capture king salmon just upstream of the Unalakleet River mouth. Salmon gillnet fishing had been closed to protect king salmon, but the department had allowed fishing with small mesh gillnets with a mesh size of 4 inches or less to target Dolly Varden and whitefish. To prevent fishermen using the small mesh exception during the salmon fishing closure to ensnare king salmon the department is restricting all subsistence fishing downstream of the North River. This closure will prevent any king salmon being harvested by small mesh gillnets. King salmon are a stock of concern and all salmon fishing has been greatly curtailed for several years to reach escapement goals.

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Emergency Order: 3-S-Z-02-18 Effective Date: June 8, 2018

EXPLANATION: This emergency order requires a subsistence salmon permit from Bald Head near Elim to Cape Prince of Wales and all waters between those locations flowing into the Bering Sea and the salmon catch limits as set in regulation.

JUSTIFICATION: The department forecast for 2018 is that the chum salmon run will exceed the ANS, and Tier II restrictions will not be required in Subdistrict 1. By regulation, catch limits are in effect for the various freshwater subsistence areas in Subdistrict 1 and Port Clarence District. All catch limits are listed on the permits. Department staff will be flying aerial surveys and boating some of the rivers to track the salmon escapement. The weirs on the Nome, Snake, Eldorado, Bonanza, Solomon and Pilgrim rivers will also count salmon escapements. If a river has adequate escapement, then catch limits will be relaxed in that location.

Emergency Order: 3-S-Z-03-18 Effective Date: June 9, 2018

EXPLANATION: This emergency order closes subsistence salmon fishing in all fresh waters and marine waters of Norton Sound Subdistricts 5 and 6, the Shaktoolik and Unalakleet Subdistricts from June 9 until July 16, 2018.

JUSTIFICATION: Shaktoolik and Unalakleet Subdistrict king salmon runs have supported subsistence fisheries since well before statehood, and commercial fisheries since statehood. However, commercial fisheries directed at king salmon have been closed since 2005 and subsistence harvests have been at record low levels for a nearly a decade. Escapements of king salmon as indexed by the North River tower have been within the middle to upper end of the SEG range of 1,200–2,600 king salmon in 2014 and 2015. However, severe restrictions on subsistence fishing time and mesh size were necessary to achieve escapement goals. Nevertheless, king salmon run abundance had improved in 2014 and 2015 and met escapement but failed to do so in 2016 and 2017. Further restrictions will be needed in 2018 to have a chance of meeting escapement and providing some surplus for subsistence harvest opportunities directed on king salmon. Ground-based escapement data and fishermen reports will be evaluated in season to determine if subsistence restrictions can be relaxed or rescinded earlier without jeopardizing king salmon escapement needs.

Emergency Order: 3-S-Z-04-18 Effective Date: June 9, 2018

EXPLANATION: This emergency order closes subsistence salmon fishing from June 9 through July 30, 2018 in all marine waters from Point Dexter westward to the southern tip of Cape Denbigh, and all marine waters from Black Point south of Unalakleet to Wood Point, east of St. Michael.

JUSTIFICATION: Southern Norton Sound king salmon runs are expected to exhibit early run timing this season but are also expected to have well below average run strength. Restrictive measures, including area closures are needed to conserve king salmon bound for eastern Norton Sound drainages that will contribute towards spawning escapements and subsistence harvests in eastern Norton Sound fishing subdistricts. Closing the coastal areas from Point Dexter to Cape Denbigh and from Black Point to Wood Point to subsistence salmon fishing for the month of June is necessary to reduce subsistence harvests of king salmon to meet escapement needs.

Emergency Order: 3-S-Z-05-18 Effective Date: June 9, 2018

EXPLANATION: This emergency order closes and immediately reopens all freshwaters of the Inglutalik and Ungalik River drainages and all marine waters of Norton Sound Subdistrict 4, the Norton Bay Subdistrict to subsistence salmon fishing with set gillnets to a schedule of two 36-hour periods per week from June 8 until July 1, 2018. Periods will be from 6:00 a.m. Mondays to 6:00 p.m. Tuesdays and from 6:00 a.m. Saturdays to 6:00 p.m. Sundays. For periods from Mondays to Tuesdays, subsistence salmon fishing is restricted to set gillnets with a stretched mesh size of 6 inches or less. For subsistence salmon fishing periods from Saturdays to Sundays, there are no mesh size restrictions. The Koyuk River remains open to subsistence salmon fishing and is not affected by this action.

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JUSTIFICATION: Subdistrict 4 (Norton Bay Subdistrict) king salmon runs may constitute the northernmost coastal king salmon populations of significant size in Alaska supporting longstanding subsistence fisheries in Inglutalik River. Like other areas of western Alaska, an early but below average run of king salmon is expected for Norton Bay Subdistrict. However, a modest amount of harvestable surplus is expected. This subsistence fishing schedule combined with mesh size restrictions for half the periods should provide enough escapement opportunities for king salmon migrating to spawning areas. Inglutalik River tower counts and aerial surveys will be flown to determine if additional subsistence fishing time can be provided without jeopardizing king salmon escapement needs. The Koyuk River is not affected by this action and will remain open 24 hours a day, 7 days a week.

Emergency Order: 3-S-Z-06-18 Effective Date: June 9, 2018

EXPLANATION: This emergency order prohibits the retention of king salmon captured in dipnets or cast nets in all freshwaters of Norton Sound Subdistricts 4 (Norton Bay), 5 (Shaktoolik), and 6 (Unalakleet) from June 9 through July 31, 2018. This emergency order requires that any king salmon incidentally captured in dipnets and castnets to be returned immediately to the water alive and unharmed.

JUSTIFICATION: Subsistence effort using dipnets and cast nets in eastern Norton Sound is expected to be minimal. These gear types do provide an economic alternative to gillnets and beach seines that could be effective targeting pink and chum salmon. Additionally, dipnets and cast nets could be utilized during gillnet closures to target salmon other than king salmon. Below average runs of king salmon necessitate the requirement to have king salmon released alive and unharmed so that they may contribute to spawning escapements of eastern Norton Sound stocks.

Emergency Order: 3-S-Z-07-18 Effective Date: June 9, 2018

EXPLANATION: This emergency order prohibits the retention of king salmon captured in beach seines in freshwater areas of Norton Sound Subdistricts 4, 5 or 6. This emergency order requires that any king salmon incidentally captured in beach seines be returned immediately to the water alive and unharmed.

JUSTIFICATION: Beach seining is permitted 24 hours a day 7 days a week in the Norton Bay Subdistrict (Subdistrict 4). However, a below average run of king salmon underscores the need to conserve king salmon for escapement needs and beach seines can be an extremely effective gear type in areas where groups of king salmon are milling. Consequently, the department is requiring subsistence users in the Norton Bay Subdistrict to release any king salmon captured in beach seines alive and unharmed back into the water. Likewise, any openings in Subdistricts 5 and 6 allowing the use of beach seines will also require that king salmon captured must be released back unharmed to the water. This gear type does allow subsistence users to target more plentiful chum and pink salmon for subsistence harvest purposes even during gillnet closures without inflicting mortality on king salmon incidentally captured.

Emergency Order: 3-S-Z-08-18 Effective Date: June 12, 2018

EXPLANATION: This emergency opens subsistence salmon fishing in the marine waters of Norton Sound Subdistricts 5 and 6, the Shaktoolik and Unalakleet Subdistricts from noon June 12 through noon June 13, 2018.

JUSTIFICATION: Shaktoolik and Unalakleet Subdistrict king salmon runs have supported subsistence fisheries since well before statehood, and commercial fisheries since statehood. However, commercial fisheries directed at king salmon have been closed since 2005 and subsistence harvests have been at record low levels for nearly a decade. Escapements of king salmon as indexed by the North River tower have been within the middle to upper end of the SEG range of 1,200–2,600 king salmon in 2014 and 2015. However, severe restrictions on subsistence fishing time and mesh size were necessary to achieve escapement goals. Nevertheless, king salmon run abundance had improved in 2014 and 2015 and met escapement but failed to do so in 2016 and 2017. Further restrictions have occurred this year and the department will have 24-hour fishing periods once a week when weather is favorable to allow for subsistence fishing. This opening should provide for some subsistence harvest opportunity without jeopardizing king salmon escapement needs.

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Emergency Order: 3-S-Z-09-18 Effective Date: June 15, 2018

EXPLANATION: This emergency order closes all subsistence net fishing, except for dip nets and cast nets from upstream of Boulder Creek on the Sinuk River including Glacial Lake.

JUSTIFICATION: Small mesh size nets can ensnare salmon and upstream of Boulder Creek, salmon hold in waters near and under the Sinuk River bridge. To prevent fishermen using the small mesh exception to ensnare salmon upriver of the subsistence salmon net fishing boundary, the department is closing subsistence net fishing except for dip nets and cast nets. Any salmon captured in a dip net or cast net must be immediately released unharmed in the water.

Emergency Order: 3-S-Z-10-18 Effective Date: June 19, 2018

EXPLANATION: This emergency order opens subsistence salmon fishing in the marine waters of Norton Sound Subdistricts 5 and 6, the Shaktoolik and Unalakleet Subdistricts from noon June 19 through noon June 20, 2018.

JUSTIFICATION: Shaktoolik and Unalakleet Subdistrict king salmon runs have supported subsistence fisheries since well before statehood, and commercial fisheries since statehood. However, commercial fisheries directed at king salmon have been closed since 2005 and subsistence harvests have been at record low levels for nearly a decade. Escapements of king salmon as indexed by the North River tower have been within the middle to upper end of the SEG range of 1,200–2,600 king salmon in 2014 and 2015. However, severe restrictions on subsistence fishing time and mesh size were necessary to achieve escapement goals. Nevertheless, king salmon run abundance had improved in 2014 and 2015 and met escapement but failed to do so in 2016 and 2017. Further restrictions have occurred this year and the department will have 24-hour fishing periods once a week when weather is favorable to allow for subsistence fishing. This opening should provide for some subsistence harvest opportunity without jeopardizing king salmon escapement needs.

Emergency Order: 3-S-Z-11-18 Effective Date: June 23, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, and 4 to commercial fishing for 24 hours with nets restricted to 6 inches or less.

JUSTIFICATION: These openings will serve as index openings to test run strength. High water this year has prevented any adult salmon escapement projects from being operational. The department has forecasted a well above average chum salmon run and this opening will allow department staff to compare the catch per unit of effort (CPUE) with historical catches near the same date. This brief opening will allow some utilization of an expected harvest surplus while not jeopardizing escapement needs of chum salmon in Subdistrict 2, 3, and 4 drainages.

Emergency Order: 3-S-Z-12-18 Effective Date: June 23, 2018

EXPLANATION: This emergency order opens subsistence salmon fishing in the marine waters of Norton Sound Subdistricts 5 and 6, the Shaktoolik and Unalakleet Subdistricts from noon June 23 through noon June 24, 2018.

JUSTIFICATION: Shaktoolik and Unalakleet Subdistrict king salmon runs have supported subsistence fisheries since well before statehood, and commercial fisheries since statehood. However, commercial fisheries directed at king salmon have been closed since 2005 and subsistence harvests have been at record low levels for nearly a decade. Escapements of king salmon as indexed by the North River tower have been within the middle to upper end of the SEG range of 1,200–2,600 king salmon in 2014 and 2015. However, severe restrictions on subsistence fishing time and mesh size were necessary to achieve escapement goals. Nevertheless, king salmon run abundance had improved in 2014 and 2015 and met escapement but failed to do so in 2016 and 2017. Further restrictions have occurred this year and the department will have 24-hour fishing periods at least once a week when weather is favorable to allow for subsistence fishing. This opening should provide for some subsistence harvest opportunity without jeopardizing king salmon escapement needs.

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Emergency Order: 3-S-Z-13-18 Effective Date: June 27, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, and 4 to commercial fishing for 24 hours with nets restricted to 6 inches or less.

JUSTIFICATION: The first index openings of the season recorded above average to well above average catches. These openings will allow for further harvest-based management. Except for Inglutalik River tower, high water this year has prevented adult salmon escapement projects from being operational. The department has forecasted a well above average chum salmon run and this opening will allow department staff to compare the catch per unit of effort (CPUE) with historical catches near the same date. This brief opening will allow some utilization of an expected harvest surplus while not jeopardizing escapement needs of chum salmon in Subdistrict 2, 3, and 4 drainages.

Emergency Order: 3-S-Z-14-18 Effective Date: June 27, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 24 hours.

JUSTIFICATION: The first commercial fishing periods in 3 subdistricts east of Subdistrict 1 had above average to well above average catches of chum salmon. The department has forecast a well above average run of chum salmon and with the first openings east of Nome showing strong catches of chum salmon this opening will allow the department to compare Nome catch with the other subdistricts and historical Nome catches. High water this year has prevented most adult salmon escapement projects from being operational. This opening will allow some utilization of an expected harvestable surplus while not jeopardizing escapement needs of chum salmon in Subdistrict 1.

Emergency Order: 3-S-Z-15-18 Effective Date: June 28, 2018

EXPLANATION: This emergency order opens subsistence salmon fishing in the marine waters of Norton Sound Subdistricts 5 and 6, the Shaktoolik and Unalakleet Subdistricts from 6 p.m. June 28 through 6 p.m. June 29, 2018.

JUSTIFICATION: Shaktoolik and Unalakleet Subdistrict king salmon runs have supported subsistence fisheries since well before statehood, and commercial fisheries since statehood. However, commercial fisheries directed at king salmon have been closed since 2005 and subsistence harvests have been at record low levels for nearly a decade. Escapements of king salmon as indexed by the North River tower have been within the middle to upper end of the SEG range of 1,200–2,600 king salmon in 2014 and 2015. However, severe restrictions on subsistence fishing time and mesh size were necessary to achieve escapement goals. Nevertheless, king salmon run abundance had improved in 2014 and 2015 and met escapement but failed to do so in 2016 and 2017. Further restrictions have occurred this year and the department will have 24-hour fishing periods at least once a week when weather is favorable to allow for subsistence fishing. This opening should provide for some subsistence harvest opportunity without jeopardizing king salmon escapement needs.

Emergency Order: 3-S-Z-16-18 Effective Date: June 30, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, and 4 to commercial fishing for 24 hours with nets restricted to 6 inches or less.

JUSTIFICATION: The first index openings of the season recorded above average to well above average catches. These openings will allow for further harvest-based management. Except for Inglutalik River tower, high water this year has prevented adult salmon escapement projects from being operational. The department has forecasted a well above average chum salmon run and this opening will allow department staff to compare the catch per unit of effort (CPUE) with historical catches near the same date. This brief opening will allow some utilization of an expected harvest surplus while not jeopardizing escapement needs of chum salmon in Subdistrict 2, 3, and 4 drainages.

Emergency Order: 3-S-Z-17-18 Effective Date: June 30, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 24 hours.

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JUSTIFICATION: The first commercial fishing period had a well above average catch of 1,549 chum salmon in a 24-hour fishing period. The department has forecast a well above average run of chum salmon and the Eldorado River weir passed 207 chums with the weir fish tight for 12 hours yesterday which is above average for this date. Reported subsistence catches of chum salmon have been above average also. This opening will allow some utilization of an expected harvestable surplus while not jeopardizing escapement needs of chum salmon in Subdistrict 1.

Emergency Order: 3-S-Z-18-18 Effective Date: July 1, 2018

EXPLANATION: This emergency order supersedes a previous emergency order not allowing beach seining.

JUSTIFICATION: Beach seines can be used to harvest chum and pink salmon that are now moving into southern Norton Sound rivers. A well above average run of chum and pink salmon is forecast and early indications are the run is at least above average. However, king salmon are a stock of concern in southern Norton Sound and to protect king salmon they must be returned alive from beach seines back to the water.

Emergency Order: 3-S-Z-19-18 Effective Date: July 1, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 to commercial fishing for 24 hours with nets restricted to 6 inches or less.

JUSTIFICATION: These openings will serve as index openings to test run strength. High water this year has prevented any adult salmon escapement projects in subdistricts 5 and 6 from being operational until this week. The department has forecasted a well above average chum salmon run and this opening will allow department staff to compare the CPUE with historical catches near the same date. This brief opening will allow some utilization of an expected harvest surplus while not jeopardizing escapement needs of chum salmon in Subdistrict 5 and 6 drainages. Subsistence salmon fishing has been restricted this season to protect king salmon and therefore regulations prohibit king salmon sales. Having a commercial salmon fishing opening to target chum and pink salmon should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-20-18 Effective Date: July 3, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, and 4 to commercial fishing for 48 hours with nets restricted to 6 inches or less.

JUSTIFICATION: The most recent 24-hour fishing period had catches ranging from above average to well above average. Escapement projects have recently become operational and the department has been using harvest-based management in comparing catches with historical catches. The department has forecasted a well above average chum salmon run and to date the CPUE has been above average to well above average. This opening will allow some utilization of an expected harvest surplus while not jeopardizing escapement needs of chum salmon in Subdistrict 2, 3, and 4 drainages.

Emergency Order: 3-S-Z-21-18 Effective Date: July 3, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 24 hours.

JUSTIFICATION: The first 2 commercial fishing periods had well above average catches. The department has forecast a well above average run of chum salmon and the Eldorado River weir has passed 1,368 chums this season which is above average for this date. This opening will allow some utilization of an expected harvestable surplus while not jeopardizing escapement needs of chum salmon in Subdistrict 1.

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Emergency Order: 3-S-Z-22-18 Effective Date: July 3, 2018

EXPLANATION: This emergency order opens subsistence salmon fishing in the marine waters of Norton Sound Subdistricts 5 and 6, the Shaktoolik and Unalakleet Subdistricts from 6 p.m. July 3 through 6 p.m. July 4, 2018.

JUSTIFICATION: Shaktoolik and Unalakleet Subdistrict king salmon runs have supported subsistence fisheries since well before statehood, and commercial fisheries since statehood. However, commercial fisheries directed at king salmon have been closed since 2005 and subsistence harvests have been at record low levels for nearly a decade. Escapements of king salmon as indexed by the North River tower have been within the middle to upper end of the SEG range of 1,200–2,600 king salmon in 2014 and 2015. However, severe restrictions on subsistence fishing time and mesh size were necessary to achieve escapement goals. Nevertheless, king salmon run abundance had improved in 2014 and 2015 and met escapement but failed to do so in 2016 and 2017. Further restrictions have occurred this year and the department will have 24-hour fishing periods at least once a week when weather is favorable to allow for subsistence fishing. This opening should provide for some subsistence harvest opportunity without jeopardizing king salmon escapement needs.

Emergency Order: 3-S-Z-23-18 Effective Date: July 4, 2018

EXPLANATION: This emergency order opens subsistence salmon fishing in the fresh waters of Norton Sound Subdistricts 5 and 6, the Shaktoolik and Unalakleet Subdistricts from 6 p.m. July 4 through 6 a.m. July 5, 2018.

JUSTIFICATION: Shaktoolik and Unalakleet Subdistrict king salmon runs have supported subsistence fisheries since well before statehood, and commercial fisheries since statehood. However, commercial fisheries directed at king salmon have been closed since 2005 and subsistence harvests have been at record low levels for nearly a decade. Escapement counting projects were delayed this year because of high water and the Unalakleet River weir became operational late last night. Shaktoolik and North River counting towers have been operational for a week and king salmon counts are slowly increasing. This opening will be the first freshwater subsistence gillnet opening in nearly a month and should provide for some subsistence harvest opportunity before commercial fishing resumes and with gillnets restricted to 4 ½ inches or smaller should not jeopardize king salmon escapement needs.

Emergency Order: 3-S-Z-24-18 Effective Date: July 5, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 to commercial fishing for 48 hours with nets restricted to 6 inches or less.

JUSTIFICATION: The first index openings of the season recorded above average to well above average catches. These openings will allow for further harvest-based management. All southern Norton Sound escapement projects are installed and operational as of this week. Escapement goal-based management should resume shortly. The department has forecasted a well above average chum salmon run and this opening will allow department staff to compare the CPUE with historical catches near the same date. Subsistence salmon fishing has been restricted this season to protect king salmon and therefore regulations prohibit king salmon sales. Having a commercial salmon fishing opening to target chum and pink salmon should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-25-18 Effective Date: July 6, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, and 4 to commercial fishing for 48 hours with nets restricted to 6 inches or less.

JUSTIFICATION: The most recent 48-hour fishing period had catches that were well above average. Escapement projects have recently become operational and there has been well above average chum salmon passage. The department has forecasted a well above average chum salmon run and to date the CPUE has been above average to well above average. This opening will allow utilization of harvest surplus while not jeopardizing escapement needs of chum salmon in Subdistrict 2, 3, and 4 drainages.

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Emergency Order: 3-S-Z-26-18 Effective Date: July 6, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 48 hours.

JUSTIFICATION: Commercial catches have been well above average this season. The department has forecast a well above average run of chum salmon and the Eldorado River weir has passed 1,368 chums this season which is above average for this date. This opening will allow some utilization of an expected harvestable surplus while not jeopardizing escapement needs of chum salmon in Subdistrict 1.

Emergency Order: 3-S-Z-27-18 Effective Date: July 9, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 to commercial fishing for 48 hours with nets restricted to 6 inches or less.

JUSTIFICATION: All Norton Sound escapement projects are installed and operational as of this week. Escapement goal-based management has resumed. Chum salmon and pink salmon escapements have been average to above average in southern Norton Sound. Subsistence salmon fishing has been restricted this season to protect king salmon and therefore regulations prohibit king salmon sales. Having a commercial salmon fishing opening to target chum and pink salmon should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-28-18 Effective Date: July 10, 2018

EXPLANATION: This emergency order waives the sockeye salmon subsistence catch limit at Pilgrim River.

JUSTIFICATION: The Pilgrim River weir count for sockeye salmon is 7,033 fish through July 10 and 614 sockeyes were counted through the weir yesterday. Historically the average first quarter point of sockeye passage is July 12. The escapement goal range is 4,000 to 8,000 sockeye salmon observed by aerial survey. Waiving the catch limit will lessen the number of sockeye salmon exceeding the high end of the range.

Emergency Order: 3-S-Z-29-18 Effective Date: July 10, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, and 4 to commercial fishing for 24 hours with nets restricted to 6 inches or less.

JUSTIFICATION: The most recent 24-hour fishing period had catches that were well above average. Escapement projects have recently become operational and there has been above average chum salmon passage. The department has forecasted a well above average chum salmon run and to date the CPUE has been above average to well above average. This opening will allow utilization of harvest surplus while not jeopardizing escapement needs of chum salmon in Subdistrict 2, 3, and 4 drainages.

Emergency Order: 3-S-Z-30-18 Effective Date: July 10, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 48 hours.

JUSTIFICATION: Commercial catches have been well above average this season. The department has forecast a well above average run of chum salmon and the Eldorado River weir has passed over 12,000 chum salmon to date, exceeding the escapement goal range of 6,000 to 9,200 chum salmon. This opening will allow some utilization of an expected harvestable surplus while not jeopardizing subsistence needs of chum salmon in Subdistrict 1.

Emergency Order: 3-S-Z-31-18 Effective Date: July 11, 2018

EXPLANATION: This emergency order opens subsistence salmon fishing in the marine waters of Norton Sound Subdistricts 5 and 6, the Shaktoolik and Unalakleet Subdistricts, south to Wood Point from 6 p.m. July 11 until 6 p.m. July 12.

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JUSTIFICATION: Shaktoolik and Unalakleet Subdistrict king salmon runs have supported subsistence fisheries since well before statehood, and commercial fisheries since statehood. However, commercial fisheries directed at king salmon have been closed since 2005 and subsistence harvests have been at record low levels for nearly a decade. Escapement counting projects were delayed this year because of high water, but the North River tower and the Unalakleet River weir cumulative king salmon counts are above average. Opening the subsistence fishery to gillnets restricted to 6 inches or smaller should not jeopardize king salmon escapement needs.

Emergency Order: 3-S-Z-32-18 Effective Date: July 12, 2018

EXPLANATION: This emergency order opens subsistence salmon fishing in the fresh waters of Norton Sound Subdistricts 5 and 6, the Shaktoolik and Unalakleet Subdistricts, south to Wood Point from 12 p.m. July 12 through 12:01 a.m. July 13, 2018.

JUSTIFICATION: Shaktoolik and Unalakleet Subdistrict king salmon runs have supported subsistence fisheries since well before statehood, and commercial fisheries since statehood. However, commercial fisheries directed at king salmon have been closed since 2005 and subsistence harvests have been at record low levels for nearly a decade. Escapement counting projects were delayed this year because of high water, but the North River tower and the Unalakleet River weir cumulative king salmon counts are above average. Opening the subsistence fishery to gillnets restricted to 6 inches or smaller should not jeopardize king salmon escapement needs while providing subsistence opportunity.

Emergency Order: 3-S-Z-33-18 Effective Date: July 12, 2018

EXPLANATION: This emergency order extends the ongoing fishing period by 48 hours in Norton Sound Subdistrict 1.

JUSTIFICATION: Chum salmon escapement goal ranges are expected to be exceeded. Limited fishing power within Norton Sound Subdistrict 1 should not jeopardize chum salmon escapement and may limit over-escapement of chum salmon.

Emergency Order: 3-S-Z-34-18 Effective Date: July 13, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing for one 48-hour period with nets restricted to 6 inches or less.

JUSTIFICATION: Chum salmon passage at Norton Sound salmon counting projects has exceeded escapement goal ranges or is projected to exceed all escapement goal ranges. Buyer has capacity to handle fish.

Emergency Order: 3-S-Z-35-18 Effective Date: July 17, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing for one 48-hour period with nets restricted to 6 inches or less.

JUSTIFICATION: Chum salmon passage at Norton Sound salmon counting projects has exceeded escapement goal ranges or is projected to exceed all escapement goal ranges. Buyer has capacity to handle fish.

Emergency Order: 3-S-Z-36-18 Effective Date: July 17, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 48 hours.

JUSTIFICATION: Commercial catches have been well above average this season. The department has forecast a well above average run of chum salmon and the Eldorado River weir has passed over 23,000 chum salmon to date, exceeding the escapement goal range of 6,000 to 9,200 chum salmon. Both Nome River and Snake River are projected to exceed the escapement goal ranges. This opening will allow some utilization of an expected harvestable surplus while not jeopardizing subsistence needs of chum salmon in Subdistrict 1.

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Emergency Order: 3-S-Z-37-18 Effective Date: July 18, 2018

EXPLANATION: This emergency order eliminates the previous prohibition on the retention of king salmon captured in dipnets or cast nets in all freshwaters of Norton Sound Subdistricts 4 (Norton Bay), 5 (Shaktoolik), and 6 (Unalakleet) from June 9 through July 31, 2018.

JUSTIFICATION: The escapement count past North River tower is 1,947 king salmon through July 17 and has exceeded the midpoint of the escapement goal range of 1,200-2,400 king salmon. Tagging studies have shown Subdistrict 5 and 6 king salmon intermingle and the department has used the North River tower goal to manage for southern Norton Sound.

Emergency Order: 3-S-Z-38-18 Effective Date: July 19, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing for 24 hours by extending the ongoing 48-hour fishing period.

JUSTIFICATION: Weather has created rough sea conditions preventing permit holders from fishing. Therefore, the period is being extended by 24 hours.

Emergency Order: 3-S-Z-39-18 Effective Date: July 19, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 24 hours by extending the ongoing 48-hour fishing period.

JUSTIFICATION: Weather has created rough sea conditions preventing permit holders from fishing. Therefore, the period is being extended by 24 hours.

Emergency Order: 3-S-Z-40-18 Effective Date: July 20, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing on a set schedule for two 48-hour periods each week.

JUSTIFICATION: Chum salmon catches have been above average to well above average in Norton Sound and escapement counting projects have had above average chum counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-41-18 Effective Date: July 21, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing on a set schedule for two 48-hour periods each week.

JUSTIFICATION: Chum salmon catches have been above average to well above average in Norton Sound and escapement counting projects have had above average chum counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-42-18 Effective Date: August 2, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 24 hours by extending the ongoing 48-hour fishing period.

JUSTIFICATION: Weather has created rough sea conditions preventing permit holders from fishing. Therefore, the period is being extended by 24 hours.

Emergency Order: 3-S-Z-43-18 Effective Date: August 6, 2018

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EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing for 24 hours by extending the ongoing 48-hour fishing period.

JUSTIFICATION: Weather has created rough sea conditions preventing permit holders from fishing. Therefore, the period is being extended by 24 hours.

Emergency Order: 3-S-Z-44-18 Effective Date: August 7, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing on a set schedule for two 48-hour periods.

JUSTIFICATION: Coho salmon catches have been above average to well above average in Norton Sound and most escapement counting projects have had above average silver counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-45-18 Effective Date: August 8, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing on a set schedule for two 48-hour periods.

JUSTIFICATION: Silver salmon catches have been above average to well above average in Norton Sound and most escapement counting projects have had above average silver counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-46-18 Effective Date: August 11, 2018

EXPLANATION: This emergency order cancels the previously announced Norton Sound Subdistricts 2, 3, 4, 5 and 6 48-hour commercial fishing salmon fishing period scheduled to begin at 6 p.m. Saturday and sets a 48-hour commercial salmon fishing period beginning 24 hours later.

JUSTIFICATION: The buyer needs to delay commercial salmon fishing by 24 hours to process the backlog of salmon catches. Catches have been above average to well above average in Norton Sound and most escapement counting projects have had above average to record silver counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-47-18 Effective Date: August 12, 2018

EXPLANATION: This emergency order extends Norton Sound Subdistrict 1 commercial fishing period an additional 48 hours.

JUSTIFICATION: Sea conditions are rough, and fishermen will likely not be able to reach their nets until Tuesday. Coho salmon catches have been above average to well above average in Norton Sound and most escapement counting projects have had above average silver counts. Extending commercial fishing time should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-48-18 Effective Date: August 14, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing for 48 hours by extending the ongoing 48-hour fishing period.

JUSTIFICATION: Buyer processing delays caused 48 hours of commercial salmon fishing time to be lost. Silver salmon catches have been above average to well above average in Norton Sound and most escapement counting projects have had above average to record silver counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

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Emergency Order: 3-S-Z-49-18 Effective Date: August 14, 2018

EXPLANATION: This emergency order extends Norton Sound Subdistrict 1 commercial fishing period an additional 48 hours.

JUSTIFICATION: Sea conditions have continued to be rough and have prevented most fishermen from fishing this period. Coho salmon catches have been above average to well above average in Norton Sound and most escapement counting projects have had above average silver counts. Extending commercial fishing time should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-50-18 Effective Date: August 18, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing for 48 hours.

JUSTIFICATION: Silver salmon catches have been above average to well above average in Norton Sound and most escapement counting projects have had above average to record silver counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-51-18 Effective Date: August 18, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 48 hours.

JUSTIFICATION: Coho salmon catches have been above average to well above average in Norton Sound and most escapement counting projects have had above average silver counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-52-18 Effective Date: August 20, 2018

EXPLANATION: This emergency order extends the ongoing Norton Sound Subdistrict 2 commercial salmon fishing for an additional 96 hours.

JUSTIFICATION: Coho salmon escapements to Fish River in Subdistrict 2 have been well above average. Only 2 permit holders are commercial fishing and extending the commercial fishing period should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-53-18 Effective Date: August 21, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 3, 4, 5 and 6 to commercial fishing on a set schedule for two 48-hour periods.

JUSTIFICATION: Silver salmon catches have been above average to well above average in Norton Sound and most escapement counting projects have had above average silver counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-54-18 Effective Date: August 22, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 48 hours.

JUSTIFICATION: Coho salmon catches have been above average to well above average in Nome Subdistrict and escapement at the Snake River weir has been average and well above average at Nome River weir. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-55-18 Effective Date: August 24, 2018

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EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 24 hours by extending the ongoing 48-hour fishing period.

JUSTIFICATION: Forecasted weather may create rough sea conditions that may delay future fishing opportunity until early next week. Therefore, the period is being extended by 24 hours.

Emergency Order: 3-S-Z-56-18 Effective Date: August 27, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 2 to commercial salmon fishing for 96 hours.

JUSTIFICATION: Coho salmon escapements to Fish River in Subdistrict 2 continue to be well above average. Only 2 permit holders are commercial fishing and continuing commercial fishing should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-57-18 Effective Date: August 27, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 96 hours.

JUSTIFICATION: Coho salmon catch this season is a record in Nome Subdistrict and escapement at the Nome and Snake River weirs has ranked second or third highest for most of the season. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-58-18 Effective Date: August 28, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 3, 4, 5 and 6 to commercial fishing for one 72-hour period.

JUSTIFICATION: Silver salmon catches have been above average to record setting in Norton Sound and most escapement counting projects have had above average to record setting silver counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-59-18 Effective Date: September 2, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 5 and 6 to commercial fishing for 120 hours.

JUSTIFICATION: Silver salmon catches have been above average to record setting in Norton Sound and most escapement counting projects have had above average to record setting silver counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-60-18 Effective Date: September 2, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 48 hours.

JUSTIFICATION: Coho salmon catch this season is a record in Nome Subdistrict and escapement at the Nome and Snake River weirs has ranked second or third highest for most of the season. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-61-18 Effective Date: September 4, 2018

EXPLANATION: This emergency order opens the northeast section of Salmon Lake to subsistence salmon net fishing.

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JUSTIFICATION: The Pilgrim River weir count was over 33,000 sockeye salmon this year which is almost double the most recent 10-year average. By regulation the department can open the northeast section of Salmon Lake when there are enough numbers of sockeye salmon for harvest, however the southwest section of Salmon Lake remains closed to taking of salmon.

Emergency Order: 3-S-Z-62-18 Effective Date: September 4, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 24 hours by extending the ongoing 48-hour fishing period.

JUSTIFICATION: Coho salmon catch this season is a record in Nome Subdistrict. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-63-18 Effective Date: September 6, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 72 hours.

JUSTIFICATION: Coho salmon catch this season is a record in Nome Subdistrict and escapement at the Nome and Snake River weirs has ranked second or third highest for most of the season. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-64-18 Effective Date: September 9, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 5 and 6 to commercial fishing for 120 hours.

JUSTIFICATION: Silver salmon catches have been above average to record setting in Norton Sound and most escapement counting projects have had above average to record setting silver counts. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

Emergency Order: 3-S-Z-65-18 Effective Date: September 10, 2018

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 96 hours.

JUSTIFICATION: Coho salmon catch this season is a record in Nome Subdistrict and escapement at the Nome and Snake River weirs has ranked second highest. Continuing with commercial fishing periods should not jeopardize escapement or subsistence fishing opportunity.

NORTON SOUND SALMON – SPORT FISH

Emergency Order: 3-KS-W-02-18 Effective Date: May 14, 2018

EXPLANATION: This emergency order prohibits sport fishing of king salmon in all fresh waters from Bald Head to Point Romanof that includes, but is not limited to, the Unalakleet, Shaktoolik, Koyuk, Ungalik, Inglutalik, and Golsovia river drainages. In addition, only 1 unbaited, single-hook, artificial lure may be used in these drainages. All king salmon caught incidentally, in the waters described above, while fishing for other species may not be removed from the water and must be released immediately. This emergency order will remain in effect through August 15, 2018 or until inseason assessments project that the escapement goal will be met for king salmon on the Unalakleet River.

JUSTIFICATION: The 2018 preseason outlook for the Unalakleet River drainage king salmon run is expected to be insufficient to provide for a moderate harvestable surplus. According to the Subdistricts 5 and 6 of the Norton Sound

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District and the Unalakleet River King Salmon Management Plan, when the inriver subsistence fishery is closed to the retention of king salmon, sport fishing for king salmon will be closed. At this time, restrictions are planned to close the Unalakleet River subsistence fishery for king salmon effective May 14, 2018.

The department does not have reliable inseason stock assessment information for the Shaktoolik, Koyuk, Ungalik, Inglutalik, and Golsovia river drainages, but these king salmon runs generally cycle in accordance with Unalakleet River stocks. The closure of sport fishing for king salmon in these rivers will provide protection for returning fish. The prohibition of bait while sport fishing should minimize catch-and-release mortality for king salmon incidentally caught while sport fishing for other species.

The department will continue to evaluate inseason run strength and take appropriate management actions to ensure that escapement requirements are met. If inseason stock assessment information indicates that the king salmon escapement goal in the Unalakleet River will be met, restrictions will be relaxed.

Emergency Order: 3-KS-W-05-18 Effective Date: July 19, 2018

EXPLANATION: This emergency order opens sport fishing for king salmon in all waters of the Unalakleet River drainage with a bag and possession limit of 1 fish, with no size limit, and an annual limit for king salmon of 2 fish. All other fresh waters of southern Norton Sound including the Koyuk, Ungalik, Inglutalik, Shaktoolik, and Golsovia river drainages will remain closed to sport fishing for king salmon and the use of bait is prohibited in these waters.

JUSTIFICATION: Daily escapement counts of king salmon at the North River tower on the Unalakleet River have increased recently, and the midpoint of the Sustainable Escapement Goal (SEG) of 1,900 fish is projected to be exceeded. According to the Subdistricts 5 and 6 of the Norton Sound District and the Unalakleet River King Salmon Management Plan, when the subsistence fishery in the Unalakleet River drainage is opened to at least two 36-hour periods per week, or the subsistence fishery in the marine waters of Subdistricts 5 and 6 is opened to at least two 48-hour periods per week, the sport fish bag and possession limit for king salmon in the Unalakleet River drainage is 1 fish, with no size limit, and an annual harvest limit of 2 fish.

Inseason stock assessment information for the Shaktoolik and Inglutalik river drainages indicate that king salmon escapements there are below average and will remain closed to sport fishing for king salmon and to the use of bait. In addition, all other fresh waters of southern Norton Sound that do not have inseason escapement information including the Koyuk, Ungalik, and Golsovia river drainages will remain closed and the use of bait is prohibited in these waters.

Emergency Order: 3-PS-W-01-18 Effective Date: July 21, 2018

EXPLANATION: This emergency order increases the sport fish bag and possession limit for pink salmon to 20 fish in the Northern Norton Sound, which includes all flowing waters draining into Norton Sound from Cape Darby to Cape Prince of Wales, and the Unalakleet River drainage.

JUSTIFICATION: Daily escapement counts of pink salmon at enumeration projects throughout Norton Sound are much higher than average and in drainages where there are escapement goals for pink salmon, all goals have been exceeded. In the Nome River, over 750,000 pink salmon have been counted as of July 17. The SEG for pink salmon in the Nome River is 13,000 fish. Likewise, in the North River, a tributary of the Unalakleet River which has an SEG of 25,000 pink salmon, over 350,000 pink salmon have been counted as of July 17. Other nearby drainages, while not having escapement goals or enumeration projects, track similarly to the Nome and Unalakleet rivers and are showing large returns of pink salmon as well. Due to the high escapement of pink salmon in the Nome and Unalakleet river drainages as well as continued high returns of pink salmon in other drainages within Norton Sound, an increase in the bag and possession limit for pink salmon from 10 to 20 fish is warranted.

Emergency Order: 3-SS-W-01-18 Effective Date: August 17, 2018

EXPLANATION: This emergency order increases the sport fish bag and possession limit for coho salmon to 10 fish in all waters of the Unalakleet River drainage.

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JUSTIFICATION: The cumulative count of coho salmon at the counting tower on the North River, a tributary of the Unalakleet River, is well above the recent 5-year average. As of August 14, 11,247 coho salmon have been counted at the North River tower, compared to the recent 10-year average 3,469 fish. While no aerial surveys have been conducted on the North River, the coho salmon count at the tower will be enough to exceed the North River aerial survey-based SEG of 550-1,100 salmon. In addition, the cumulative coho salmon count at the Unalakleet River weir is over 3 times the historical average for this date. As of August 10, when the weir was removed for the season, 58,756 coho salmon had passed the weir. This is well above the average of 16,295 coho salmon by this date. Due to the high number of coho salmon in the Unalakleet River drainage and projections to exceed the upper bound of the SEG at the North River tower, an increase in the bag and possession limit for coho salmon from 4 to 10 fish is warranted. It is anticipated that the additional harvest associated with the increased bag limit will not reduce the escapement below the SEG.

APPENDIX H: ARCTIC FISHERIES

Appendix H1.–Commercial freshwater finfish harvest and sales, Colville River, Arctic Area, 1990–2007.

	Number of fish harvested intended for commercial sale [a]					Estimated commercial sales based on fish tickets	
Year	Broad whitefish	Humpback whitefish	Least Cisco (herring)	Arctic cisco ("kaktok")	Total harvest	Arctic cisco	Whitefish species [b]
1990	0	5,694	21,003	19,374	46,071	12,571 [c]	14,249 [c]
1991	0	1,240	5,697	13,805	20,742	1,970 [d]	3,307 [d]
1992	126	5,209	6,962	20,939	33,236	[e]	10,200 [f]
1993	20	5,339	6,037	31,310	42,706	11,291 [d]	6,170 [d]
1994	ND	6,056 [g]	10,176	8,958	25,190	7,434 [d]	4,121 [d]
1995	ND	33,794 [h]	ND	ND	33,794	13,921	6,000
1996	ND	6,425 [g]	7,796	21,817	36,038	9,076	4,127
1997	ND	1,721 [g]	10,754	9,403	21,878	9,403	4,760
1998	ND	4,881 [g]	9,936	7,019	21,836	5,648	7,105
1999	ND	6,875 [g]	7,430	8,832	23,137	7,095	6,170
2000	ND	3,706 [g]	5,758	2,619	12,083	2,809	6,569
2001	ND	6,078 [g]	2,839	1,740	10,657	1,779	7,306
2002	ND	4,183 [g]	5,503	3,935	13,621	899	4,093
2003	ND	6,463 [g]	4,777	5,627	16,867	0	1,292
2004	ND	1,145 [g]	3,061	3,061	7,267	2,412 [f]	476
2005	ND	490 [g]	2,870	9,343	12,703	2,975 [f]	2,170
2006	ND	1,188 [g]	4,995	3,293	9,476	1,482 [f]	3,655
2007	ND	462 [g]	2,265	390	3,117	[e]	[e]
2002–2006 Average	ND	2,694	4,241	5,052	11,987	1,554	2,337

Note: ND is no data.

[a] Reported on daily catch form returned to ADF&G. Catch reports were returned to ADF&G following the fishing season. All fish reported on the catch report were harvested with the intent to sell.

[b] Whitefish species include mostly humpback whitefish and least cisco, with occasional broad whitefish.

[c] Commercial harvest estimate based on 1 fish ticket average weights of 0.89 lb (900 Arctic cisco at 800 lb) and 0.61 lb (1,400 whitefish species at 850 lb).

[d] Estimated commercial harvest sales based on 1995 to 2001 average weight of 0.92 lb for Arctic cisco and 0.89 lb for whitefish species (humpback and broad whitefish, and least cisco).

[e] No information is available from fish tickets indicating that harvested fish were sold commercially.

[f] Mixed commercial harvest of mostly Arctic cisco along with humpback whitefish, broad whitefish, and least cisco. Estimated commercial harvest sales based on 1995 to 2001 combined average of $1.07/lb. for whitefish species and Arctic cisco.

[g] Humpback whitefish harvest includes undetermined amounts of broad whitefish.

[h] Humpback whitefish harvest includes undetermined amounts of broad whitefish, least cisco, and Arctic cisco.