Fishery Management Report No. 22-09

2020 Annual Management Report Norton Sound–Port Clarence Area 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

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

FISHERY MANAGEMENT REPORT NO. 22-09

2020 ANNUAL MANAGEMENT REPORT NORTON SOUND–PORT CLARENCE AREA AND ARCTIC–KOTZEBUE AREAS

by
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TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF APPENDICES (Continued)

LIST OF APPENDICES (Continued)

LIST OF APPENDICES (Continued)

ABSTRACT

This report provides information about the 2020 commercial and subsistence fisheries of Norton Sound–Port Clarence and Arctic–Kotzebue management areas in 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° 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.*

Keywords: Chinook salmon *Oncorhynchus tshawytscha,* chum salmon *Oncorhynchus keta*, coho salmon *Oncorhynchus kisutch,* pink salmon *Oncorhynchus gorbuscha,* sockeye 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 2020 season and historical information concerning management of the commercial and subsistence fisheries of Norton Sound–Port Clarence and 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 annual management reports (e.g., Menard et al. 2020). An attempt has been made to correct errors present in earlier reports, and previously unreported data were included. Current year catch data 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 1–11 present annual data, and 2) appendices generally present historical comparisons.

SECTION 1: MANAGEMENT AREA OVERVIEWS

AREAWIDE BOUNDARIES

Norton Sound–Port Clarence and Arctic–Kotzebue areas 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 mi² and has a coastline exceeding that of California, Oregon, and Washington combined. For crab management, the Norton Sound–Port Clarence Area extends south to Cape Romanzof and encompasses waters of the Bering Sea north of Cape Romanzof and east of the Maritime Boundary Agreement boundary line.

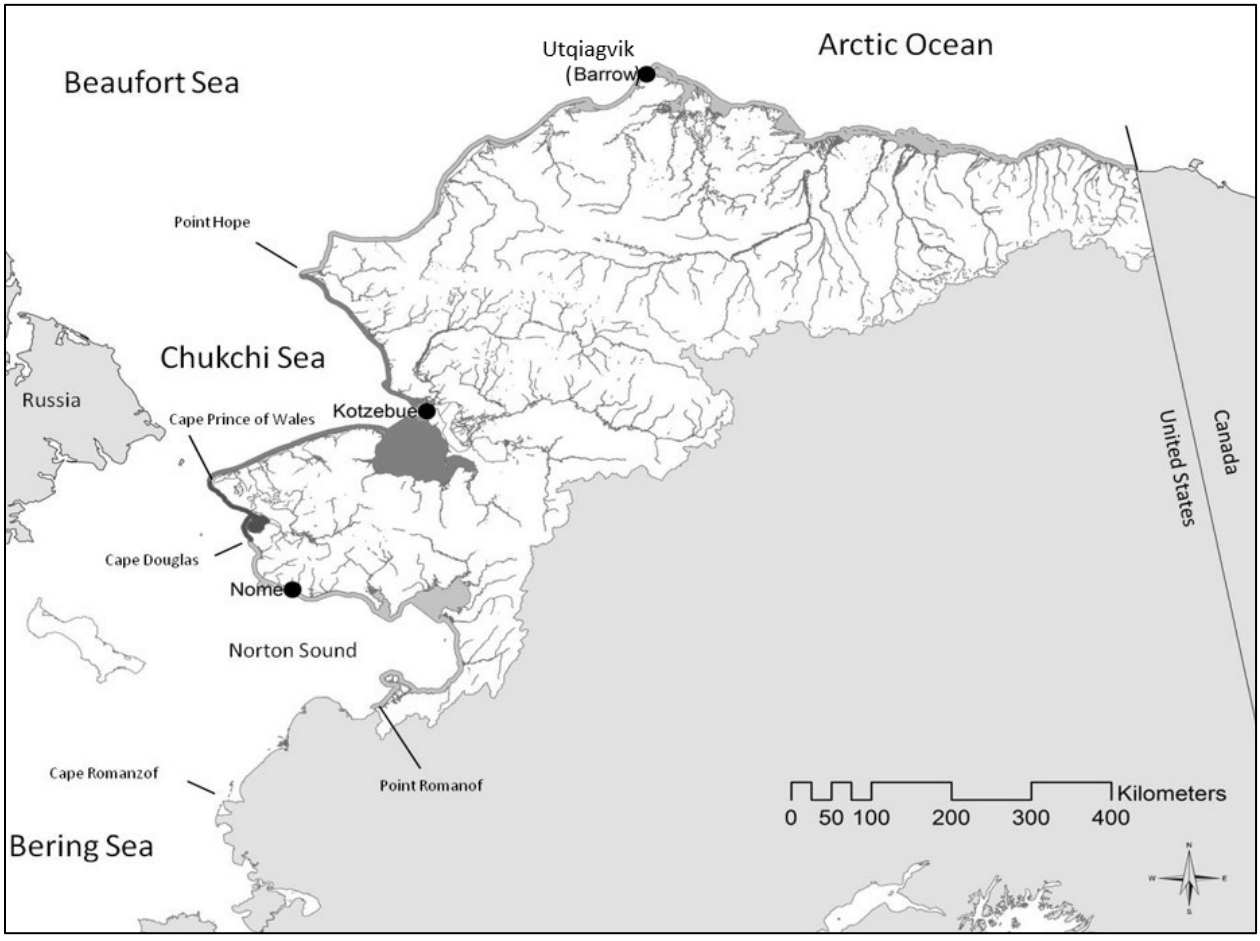

Figure 1.–Norton Sound, Port Clarence, Kotzebue Sound, and Arctic management districts.

AREAWIDE SALMON OVERVIEW

There are 5 species of Pacific salmon indigenous to the area, and chum *Oncorhynchus keta* and pink salmon *O. gorbuscha* historically are the most abundant. Chinook salmon *O. tshawytscha* are found as far north as Utqiagvik (formerly Barrow), but they are less common north of Kotzebue Sound drainages. Chum salmon are found as far north as Utqiagvik, but they are less common north of Kotzebue Sound drainages. Coho salmon *O. kisutch* are found in large numbers throughout Norton Sound but are not in large numbers further north. Pink salmon are found in increasing numbers each year from Norton Sound to Utqiagvik. Sockeye salmon *O. nerka* populations exist within a few Seward Peninsula drainages, such as Glacial and Salmon Lakes. Small numbers of Chinook, chum, pink, and sockeye salmon have been reported by subsistence users 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. Commercial salmon fishing has grown significantly in the decades since statehood and continues to support many residents of the region.

Currently, most commercial fishery participants and many buying station workers are Alaska Natives (Yupik, Inupiat, and Siberian Yupik). Commercial users 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 users 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. The major portion of fish taken during summer months is air-dried or smoked for later use.

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. 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. This program was also cut after the 2003 season in Norton Sound and after 2004 in Kotzebue Sound due to budget constraints.

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 Norton Sound Subdistrict 1 (affecting the community of Nome) 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 (when applicable), 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 participants 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.

To assess Pacific salmon resources in the Arctic District, a cooperative project between ADF&G Divisions of Commercial Fisheries, Habitat, and Subsistence and the North Slope Borough Department of Wildlife Management and Planning was completed from 2008 to 2013. 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 in river 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.

SPORT SALMON FISHERY

Sport salmon harvests occur in all areas. More detailed description of sport fish harvest is reported in the sport fishery management report in these areas (e.g., Scanlon 2018). It is important to note that from Bald Head near Elim in the Norton Sound area to Point Hope in the Kotzebue area, a fishing pole is legal subsistence gear, and catches otherwise reported as sport fish harvests can be reported as subsistence harvests.

SALMON FISHERIES 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 2020 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 approximately 20 seasonal biologists and technicians in Norton Sound, Port Clarence, and Kotzebue Sound. Regional staff biologists provided additional assistance. In 2020, unlike previous years, interns funded by Norton Sound Economic Development Corporation (NSEDC) were not utilized as fisheries technicians at some projects. In 2020, 8 salmon monitoring projects were operated by NSEDC and 5 salmon monitoring projects were operated by ADF&G in Norton Sound, Port Clarence, and Kotzebue Sound.

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 on salmon abundance, migration, and stock composition.

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 in any given week during the open season depending on current conditions. ADF&G attempts to distribute fishing effort throughout the entire run to avoid harvesting only particular segments of the return. Occasionally, fishing time is increased or decreased by emergency order. Managers issue these orders depending upon fishing conditions and strength of runs, or spawning escapements, as determined by evaluation of available run timing and abundance indicators. Weekly fishery reports with fishery status and schedules are broadcast during the fishing season over radio stations KICY and KNOM in Nome, and KOTZ in Kotzebue, 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 Point Romanof in the south and Cape Douglas in the north. 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).

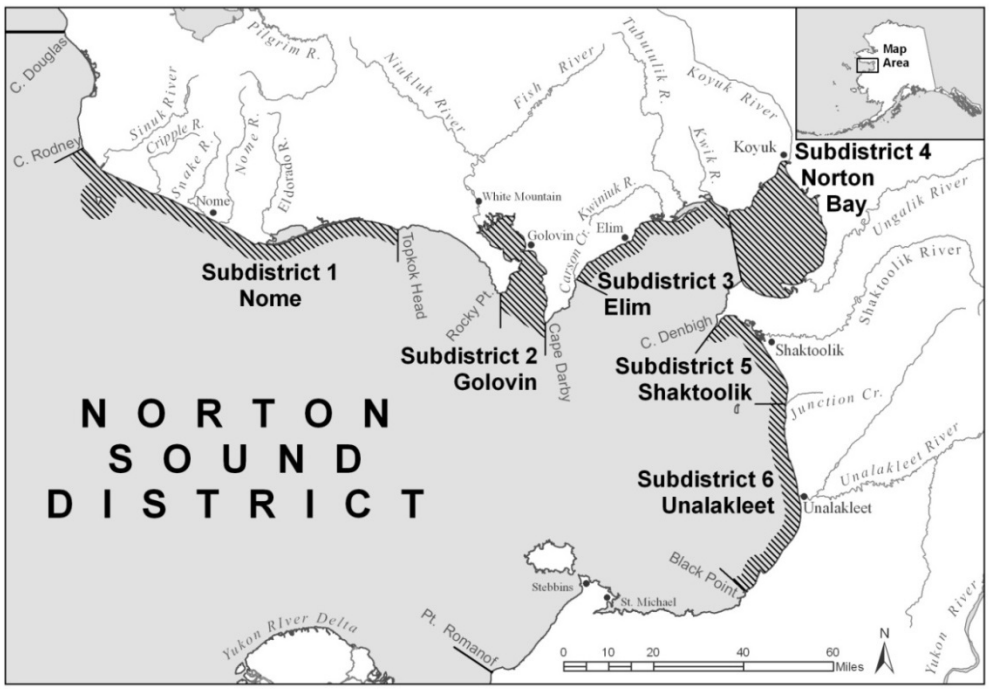

Figure 2.–Norton Sound District commercial salmon fishing subdistricts.

All commercial salmon fishing in the district is in marine waters and fishing effort is usually concentrated near river mouths. Commercial fishing typically begins in June and targets Chinook salmon if sufficient 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 more

abundant in even-numbered year returns. A pink salmon directed fishery may be scheduled to coincide with or alternate periods with the chum salmon directed fishery.

Norton Sound commercial salmon fishing changed significantly beginning in the mid-1990s because of limited market conditions and marginal returns of several salmon stocks within the district. 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 Subdistricts 2 and 3 and since 2008 in Subdistrict 4. Commercial fishery managers use estimates of run strength from escapement projects, test fisheries, aerial surveys, and commercial fishing CPUE. Subdistrict 1 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. Commercial salmon fishing resumed in Subdistrict 1 in 2013.

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 of fish on any given stream was 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 occurred throughout Norton Sound after the discovery of gold, having impacts areawide. 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 one 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. Changes to both streams and human population size impacted fish populations, although effects are not fully understood.

In the late nineteenth century, the size of dog teams increased from 2 or 3 dogs to as many as 10 to 20 dogs. At about the same time, wooden boats began to replace kayaks. 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. One elder in the area thought people retained more fish for their own use, which may have averaged 5 to 10 bundles per household, compared to the amount sold (Thomas 1982).

After the gold rush and the gold deposits were worked out, the number of people gradually decreased over the next 20 years. 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 Subdistricts 5 and 6 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.

Markets were sporadic, with some subdistricts often unable to attract buyers for entire seasons until the 2000s. 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 sellers, limited to salmon caught in the internal waters of Golovnin and Norton Bays. Markets began to stabilize in the 2000s, thanks in large part to Norton Sound Seafood Products (NSSP) opening additional buying stations in villages across Norton Sound. Since 2008 markets have been stable, with the most consistent markets in Shaktoolik and Unalakleet, and onshore processing in Unalakleet and Nome. Appendix G3 provides a list of commercial processors and buyers that operated in Norton Sound and Kotzebue Sound in 2020.

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 September 7 (with possible extensions set by emergency order), with processor operations often terminated before regulatory closure dates. However, during recent years NSSP has remained operational until the regulatory fishing season closure.

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.

Inseason management switches focus to different salmon species throughout the course of the season. 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 incidental harvest in other salmon directed fisheries.

Management actions consist of emergency orders that open and close fishing seasons and periods and establish gillnet mesh size specifications. No commercial salmon fishing periods occurred in Subdistrict 1 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 limited commercial fishing has occurred for coho salmon beginning in 2016 (Appendix A6). Commercial fishing gear is limited to gillnets in Subdistricts 1–4 and beach seine gear is also allowed in Subdistricts 5 and 6 by regulations adopted in 2016. A maximum aggregate length of 100 fathoms for gillnets is allowed for each participant; in a pink salmon directed fishery, a maximum aggregate length of 200 fathoms for gillnets is allowed for each participant if established by emergency order. There are no depth restrictions and mesh size is often restricted to direct harvest toward species specific targeting 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 approximately 5.875-inch stretched mesh. In Subdistricts 5 and 6, 8.25-inch stretched mesh gillnets are commonly used when Chinook salmon fishing periods in June through early July are scheduled. During years when large pink salmon runs occur and buyer interest, ADF&G establishes fishing periods which restrict gillnets to 4.5-inch mesh or less to be used.

Little or no commercial salmon harvest has occurred in Subdistricts 1 and 4 since the early 1980s. Subdistrict 1 had very depressed chum salmon stocks that, until the mid-2000s, required closure or severe restrictions to 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. There had been little interest in commercial pink and coho salmon fisheries in Subdistrict 1 until recently and Subdistrict 1 was closed to commercial chum salmon fishing by regulation until 2013. Subdistrict 4 often had healthy stocks, but it had been unable to attract markets willing to operate in this remote area until recently. Since 2008, NSSP has deployed more tenders to Subdistrict 4 and commercial salmon fishing has resumed.

Commercial fisheries in Subdistricts 2 and 3 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 in 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 these subdistricts.

Subdistricts 5 and 6consistently attract commercial markets due to larger fish volumes and better transportation services. Management actions typically encompass both subdistricts because it is thought the salmon bound for Unalakleet and Shaktoolik Rivers intermingle in the marine waters of both subdistricts (Gaudet and Schaefer 1982). Information collected from ADF&G's test net in Unalakleet River (Kent 2010), North River tower counts, and subsistence use interviews in Unalakleet were used to set early fishing periods in both subdistricts. The test net project was discontinued in 2013 and Unalakleet River weir began in 2010 and contributes to management decisions. Commercial fishing is typically only allowed after Chinook salmon have been observed in increasing numbers in the subsistence fishery and ADF&G is confident the midpoint of the Chinook salmon escapement goal range of 1,200–2,600 fish at the North River counting tower will be obtained. If the escapement goal range is not expected to be met, commercial gillnet fishing periods for any species are not allowed 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; Joy and Reed 2014). Aerial surveys on Shaktoolik and Unalakleet Rivers are not useful inseason management tools for 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).

Beginning in 2004, subsistence salmon permits were required in Port Clarence District (affecting the communities of Teller and Brevig Mission) and in Norton Sound Subdistricts 2 and 3 (affecting the communities of Council, White Mountain, Golovin, and Moses Point/Elim), in addition to the existing subsistence salmon permits in Norton Sound Subdistrict 1 (affecting the community of Nome), which has required subsistence fishing permits since 1975.

Efforts to quantify subsistence salmon harvest have increased throughout Norton Sound over the years. By regulation, permits with catch calendars are issued to each requesting household listing all Subdistrict 1 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 participants 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 9 years nearly all subsistence salmon permits issued have been returned or households have reported catches in person, by telephone, or by email.

Prior to the fishing season, ADF&G personnel usually make at least 1 visit to each village to issue subsistence salmon fishing permits. Permit users 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 2004, annual subsistence salmon household surveys began 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.

Subdistricts 4–6 have continued to be surveyed postseason by household surveys. In addition to annual household surveys, from 1985 to 2012, daily surveys of Unalakleet River and ocean subsistence fishery participants were conducted after fishing periods during the Chinook salmon run. Effort and catch information from these daily surveys were used to judge timing and magnitude of the Chinook salmon run inseason. These surveys were discontinued because major reductions in subsistence fishing time and gear restrictions limited the utility of the data inseason. Because of Covid-19 travel restrictions, no household surveys were conducted in Koyuk and Shaktoolik in 2020. A copy of the Norton Sound subsistence salmon harvest survey form is shown for Unalakleet in Appendix G4.

Beginning in 2007, regulations allowed for cash sales of up to $200 of subsistence-taken finfish per household, per year, in the Norton Sound–Port Clarence Area, which was increased in 2013 to $500. From 2007 to 2012, 5 or fewer customary trade finfish permits were issued per year, but more recently (2013–2019), due to ADF&G's increased efforts to remind residents about the permit requirement when selling subsistence-caught finfish, an average of 15 customary trade permits were issued per year in Norton Sound District. Total annual reported sales have never exceeded $2,300 (Appendix A32).

HISTORICAL REGULATORY AND MANAGEMENT ACTIONS IN NORTON SOUND SUBDISTRICTS

Subdistrict 1 has been the focus of most regulatory actions within the Norton Sound District since the 1970s. Relatively large chum salmon commercial catches in the subdistrict in conjunction with weak local returns to Subdistrict 1 streams implied that the fishery may have harvested nonlocal 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 Norton Sound 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 in 1981.

The Alaska Board of Fisheries (BOF), in response to an advisory committee petition, directed ADF&G to manage the Subdistrict 1 commercial fishery for optimal chum salmon escapement after poor chum salmon escapements during the 1982 and 1983 seasons. During the 1984 fall BOF meeting, 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 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." At the same time 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 restrictions in place, chum salmon escapement goals were difficult to attain. The 1987 fishing season experienced poor returns of both chum and pink salmon to Subdistrict 1 streams. Numerous management actions were made to curtail commercial fishing activities, and later, sport, personal use, and subsistence fishing were further 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 Subdistrict 1, several new regulations were adopted by BOF in 1987. Restrictions on gillnet length and mesh size in the subsistence fishery and elimination of beach seine use in specific waters in the subsistence fishery were adopted into regulation. Further commercial fishing restrictions were not made in 1987 because the commercial fishery was considered all but 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 Subdistrict 1. 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. That view changed in 1999, when beach seines were used to harvest abundant species and allow live release of other species experiencing depressed runs.

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, Subdistrict 1 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 based on projected harvestable surplus. As a result, ADF&G issued 20 permits to individuals who scored highest on the Tier II application process in 1999. 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 with individual harvests restricted to prescribed bag limits. Additionally, BOF established "closed waters" areas where no subsistence salmon fishing would be allowed to protect chum salmon on the spawning grounds and placed existing chum salmon aerial survey escapement goals for 6 Subdistrict 1 streams into regulation. In 1999, due to poor chum salmon returns, ADF&G closed 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 Subdistrict 1 were determined to be a stock of management concern, and chum salmon in Subdistricts 2 and 3 were determined to be stocks 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 were 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, which factor in additional chum salmon needed to provide for in river subsistence use, the OEGs were the same as ADF&G established sustainable escapement goals (SEG) at that time:

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

Subdistrict 3

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

A chum salmon management plan for Subdistrict 1 and a salmon management plan for Subdistricts 2 and 3 was adopted by BOF in 2001. Commercial chum salmon fishing in Subdistrict 1 was closed and the fishery was not to be reopened until the abundance of chum salmon had a harvestable surplus large enough to meet subsistence needs for 4 consecutive years. Consequently, commercial chum salmon fishing remained closed in Subdistrict 2 until 2008, in Subdistrict 3 until 2007, and in Subdistrict 1 until 2013. As part of the salmon management plans,

Additional BOF actions were taken in 2001. 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. Cripple and Penny Rivers were closed to subsistence fishing for chum salmon. The BOF expanded legal gear for the subsistence fishery to include hook and line, from Cape Espenburg on the northern Seward Peninsula along the coast to Bald Head boundary between Subdistricts 3 and 4. Although hook and line could be used for subsistence fishing, sport fish methods and means requirements still applied to harvesting of fish (for example, snagging of fish was prohibited). Sport fish bag and possession limits, by species, as specified in regulation 5 AAC 70.022 also applied, except when fishing through ice or in the Subdistrict 1 subsistence areas designated for each river. However, they could not combine sport fish bag and possession limits with subsistence harvest permit limits.

In 2001, chum salmon runs began to improve in Subdistrict 1 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 for waters by Brevig Mission, Teller, White Mountain, Golovin, and Elim in addition to Nome.

Improving chum salmon runs in Subdistrict 1 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 Subdistrict 1 from a management concern to a yield concern. The yield concern status was reaffirmed for Subdistricts 2 and 3, and all 3 subdistricts' stocks of yield concern designation were upheld at the 2010 and 2013 BOF regulatory meetings. The BOF allowed commercial chum salmon fishing beginning in 2013 in Subdistrict 1 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 Subdistrict 1 from June 15 through August 15. Starting in 2016, the BOF dropped yield concern status for Subdistrict 1 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. Subdistricts 2 and 3 retained yield concern status for chum salmon.

In January 2019, the BOF dropped yield concern status for chum salmon stocks in Subdistricts 2 and 3 and repealed existing OEGs, in regulation since 2001. At the same time, ADF&G also established new SEGs for Subdistricts 1 and 3, listed below.

Subdistrict 1

Snake River: 1,600–5,300 chum salmon
Nome River: 2,000–4,200 chum salmon
Eldorado River: 4,400–14,200 chum salmon

Subdistrict 3

Kwiniuk River: 9,100–32,600 chum salmon
Tubutulik River: 3,100–9,900 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, 2016, and 2019. 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. If ADF&G projects that the lower end of the SEG range for North River Chinook salmon passage will not be achieved, ADF&G is directed to close the Chinook salmon fishery.

In 2013, Chinook salmon escapements from the Unalakleet River and its major tributary, North River, were the lowest 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 subsistence fishing seasons began with unprecedented closures to subsistence salmon fishing with the intended result that Chinook salmon escapements dramatically improved with the North River counting tower meeting its escapement goal range of 1,200–2,600 Chinook salmon. 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, and in 2019 the run was one of the best in the decade with record counts at both Unalakleet River weir and North River tower where the escapement goal range was exceeded. In 2020, Unalakleet River weir was not operated due to prolonged high water early in the season and Covid-19 travel restrictions, and the North River tower Chinook salmon escapement goal was not reached.

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 3). Salmon, saffron cod *Eleginus gracilis*, whitefish, and herring *Clupea pallasii* are the major subsistence species.

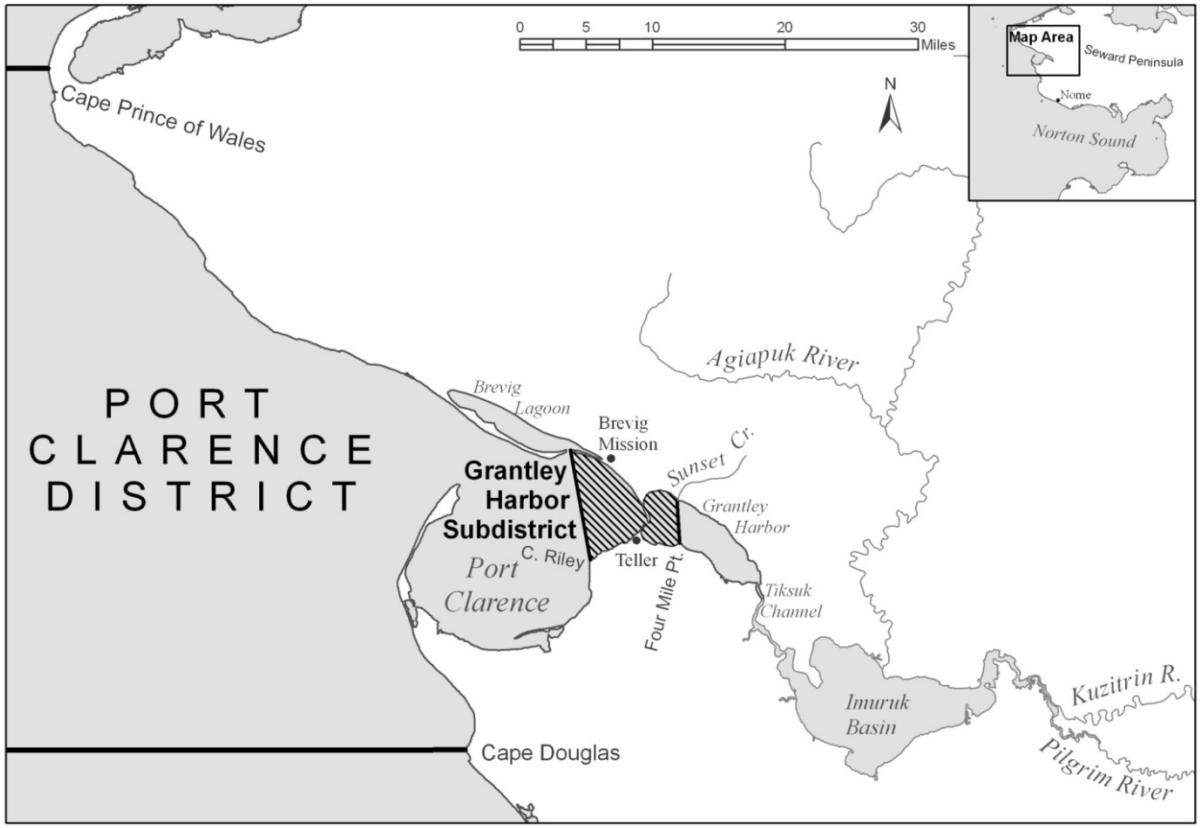

Figure 3.–Port Clarence District.

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

COMMERCIAL FISHERY OVERVIEW

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 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 the mid-2000s. Large increases in sockeye salmon runs, as well as positive results from an ADF&G test fishery in 2006, renewed interest in a commercial fishery. 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 previous 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 Subdistrict 1, 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 people from Brevig Mission fish northern and northeastern sections of Port Clarence District, and those from Teller 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 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 reported sales have never exceeded $2,300 (Appendix A32).

Village subsistence surveys were conducted annually by the Division of Commercial Fisheries from 1963 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 4), there has been increased fishing effort from Nome area residents due to fishing restrictions in Subdistrict 1 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 sockeye record runs of sockeye salmon to Salmon Lake, there were 100 permits issued. Over the next 5 years, the average yearly 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 estimated less than 4,000 sockeye salmon passing (Appendix B2). The number of permits issued dropped from 255 in 2008 to 133 in 2011, in response to subsistence fishing closures on Pilgrim River. Since 2011, there continues to be increasingly heavy fishing effort at Pilgrim River, even though numerous fishing restrictions have been eliminated in Subdistrict 1. The average yearly number of Pilgrim River permits issued from 2012 to 2015 was 273, compared to the then record number of 506 permits issued in 2016 (Menard et al. 2017), 489 permits in 2017, 498 permits in 2018, 476 permits in 2019, and the current record of 591 permits in 2020. A major contributing factor to increasing permits for Pilgrim River was that, due to indications of a good run, the subsistence sockeye salmon fishing limit for Pilgrim River had been waived early in the season the previous 5 years. Subsistence limits were not waived in 2020 and only doubled to 50 sockeye salmon late in the season.

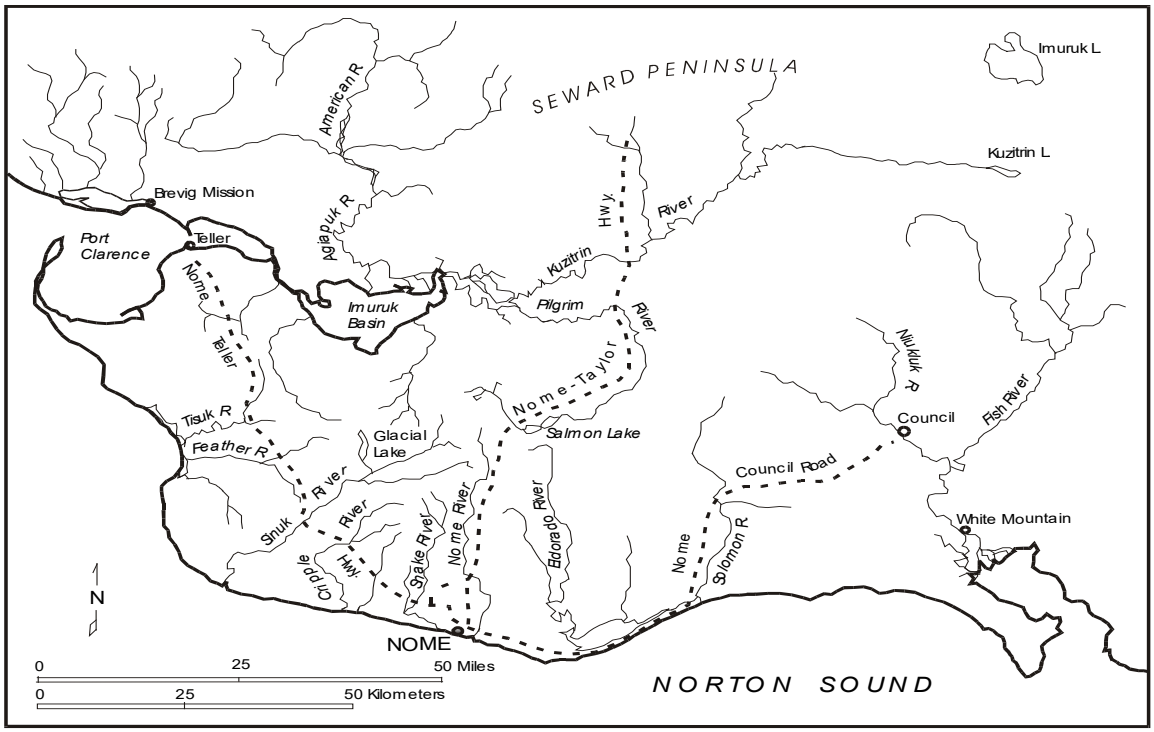

Figure 4.–Seward Peninsula with road-accessible waters.

From 1997 to 2001, ADF&G conducted a fertilization program at Salmon Lake, partially funded by NSEDC and the Bureau of Land Management (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 5). Salmon, saffron cod, whitefish, and herring are major subsistence species.

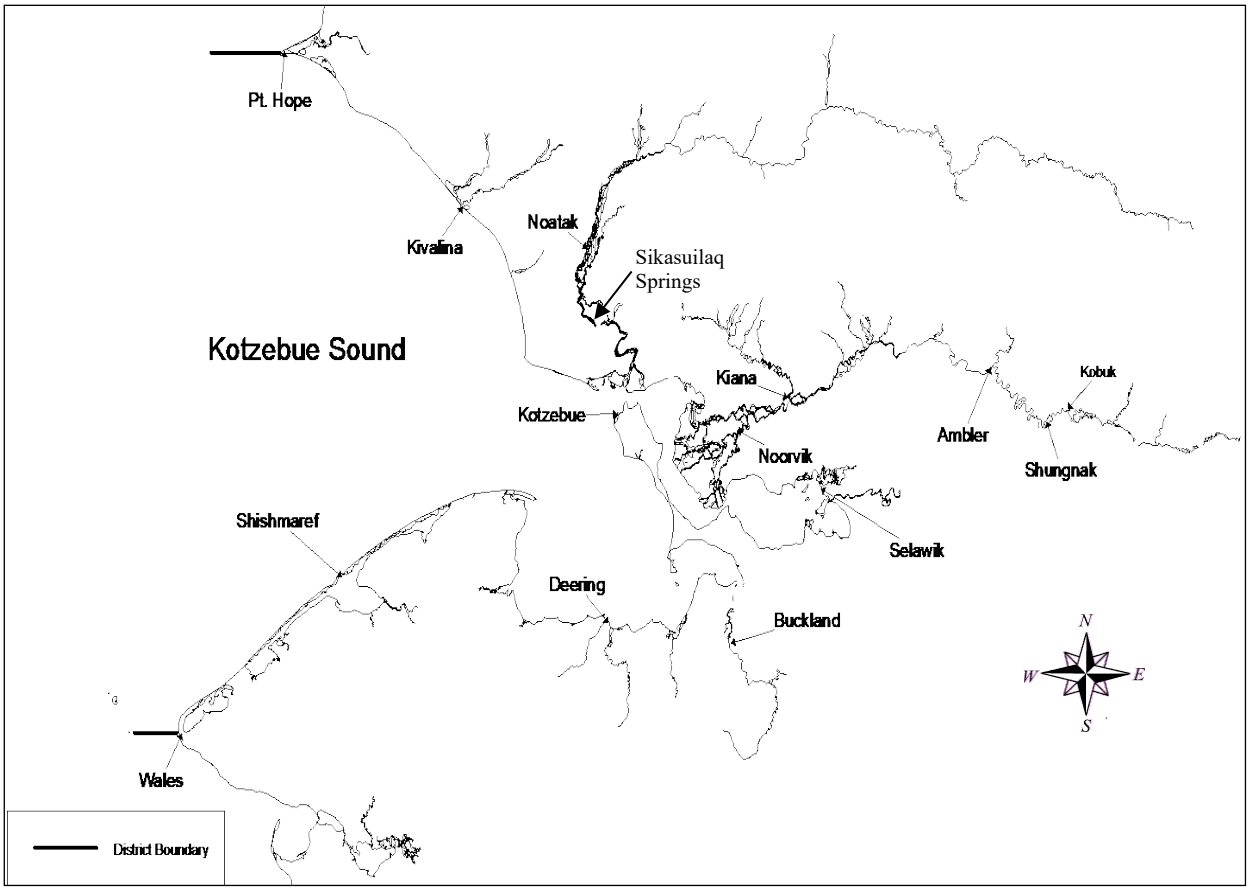

Figure 5.–Kotzebue District, villages, and subsistence fishing area.

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 6).

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

In the Kotzebue salmon fishery, gear is limited to set gillnets with an aggregate of no more than 150 fathoms per permit holder. Gear is usually operated with an end on or near shore and with all

3 shackles of gear, 50 fathoms each, connected. Nets are often set in deeper channels in the mudflats farther out from shore. Most gear used in the district is 5.75-inch to 6.0-inch stretch mesh gillnet.

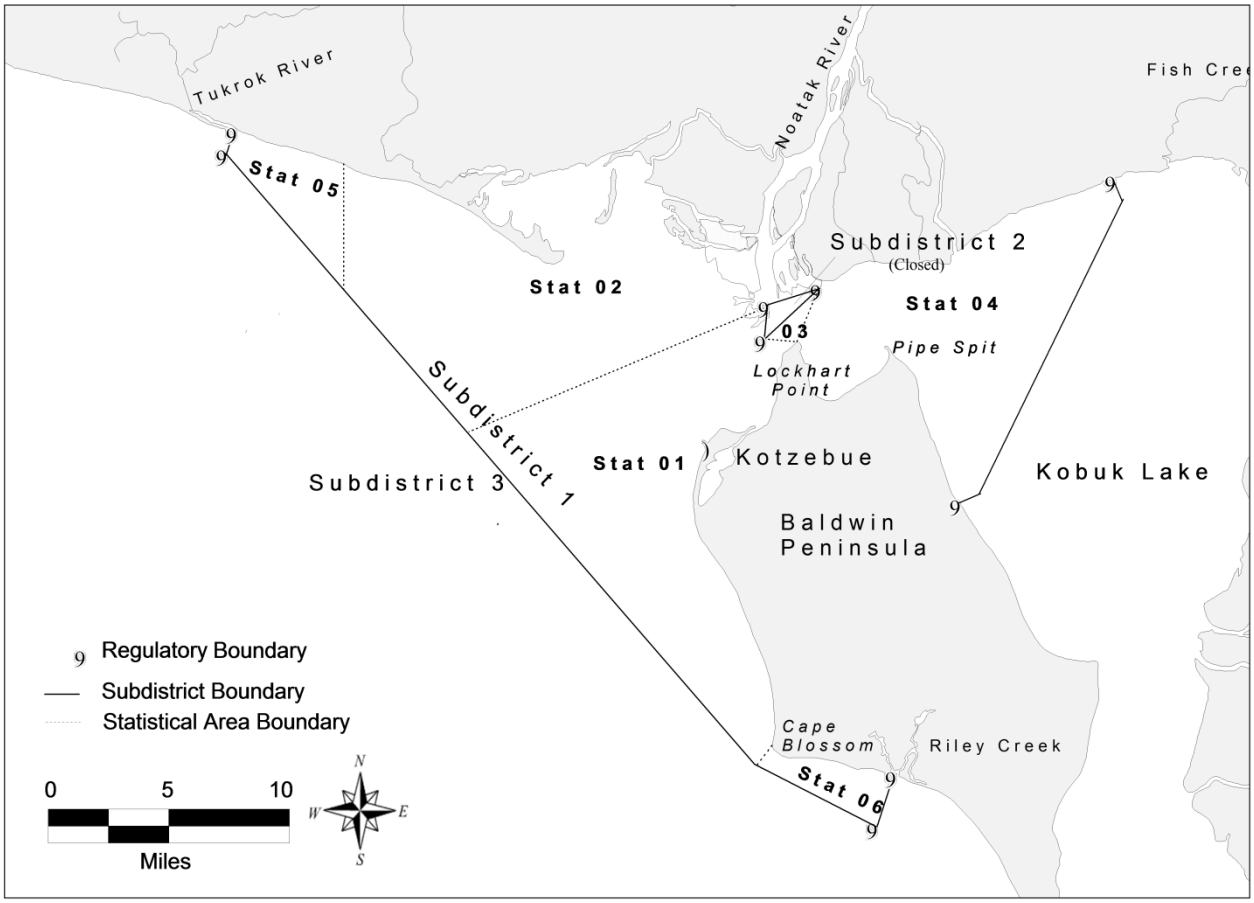

Figure 6.–Kotzebue Sound commercial salmon fishing subdistricts and statistical areas.

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. Starting in 1995, poor market conditions and limited buyer capacity 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 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). Although only 1 major buyer returned in 2015 and 2016, there were 3 buyers again from 2017–2019, and 2 buyers in 2020 (Appendix G3).

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 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 between communities. 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 small runs. Some people 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 inconsistent through time. Expanded surveys from 1995 to 2001 annual household subsistence surveys, including Kotzebue, estimated a total subsistence chum salmon harvest for the Kotzebue Sound area of 74,000 fish annually (Appendix C4). 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 the Division of Subsistence. From 2012–2014, 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). 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 7).

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 use groups along the Arctic coast; pink salmon are the most numerous followed by chum salmon. Salmon are caught in gillnets as an incidental species if they are targeting other non-salmon finfish. In October 2012, one person caught 2 sockeye salmon in Ikroavik Lake, approximately 5 miles south of Utqiagvik, subsistence fishing using gillnets under the ice targeting least cisco *Coregonus sardinella*. There are no reliable reports of coho salmon caught.

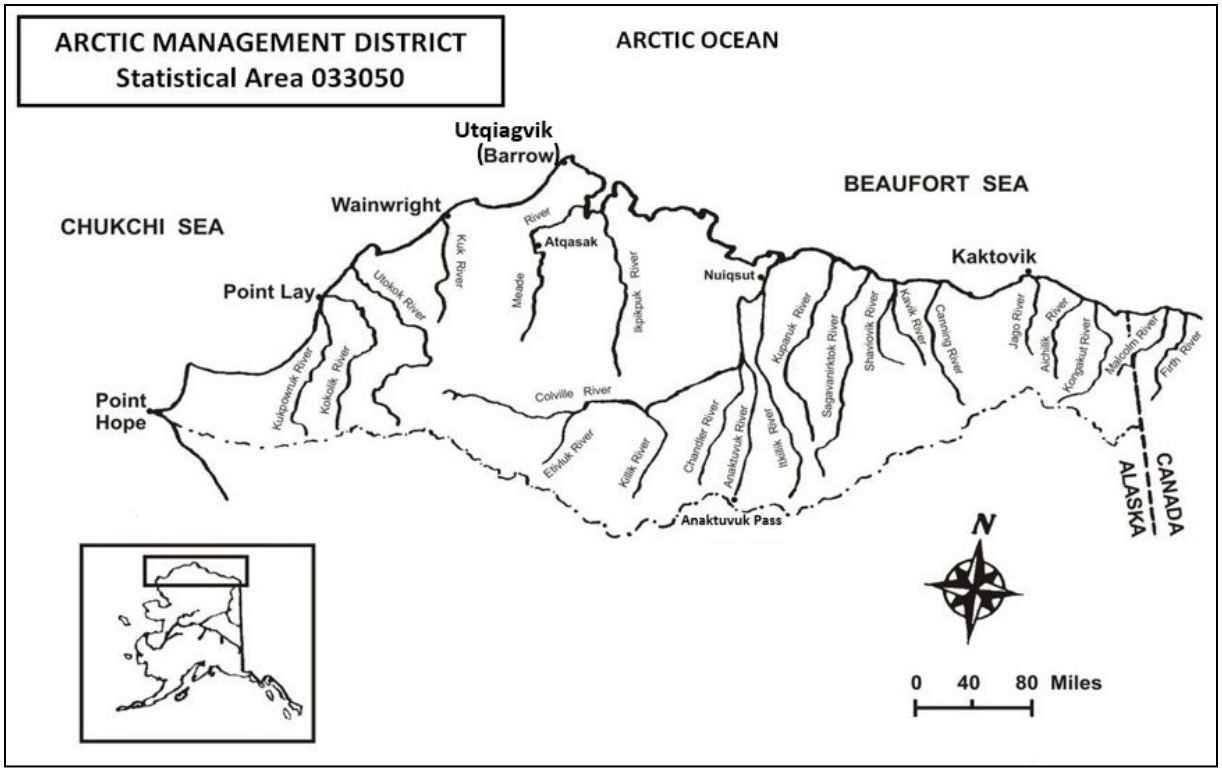

Figure 7.–Arctic management district.

AREAWIDE 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 8). 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, just south of Spruce Creek. 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 Nome and Kwiniuk River, near Elim. 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 (statistical area

332-52) in Port Clarence District, and Shishmaref Inlet (inside waters of Shishmaref), the coast between Deering and Church Rock, and Hotham Inlet (inside waters of Kotzebue). Although subsistence herring catches have been reported in the Arctic District near Utqiagvik, there is no information available on spawning areas.

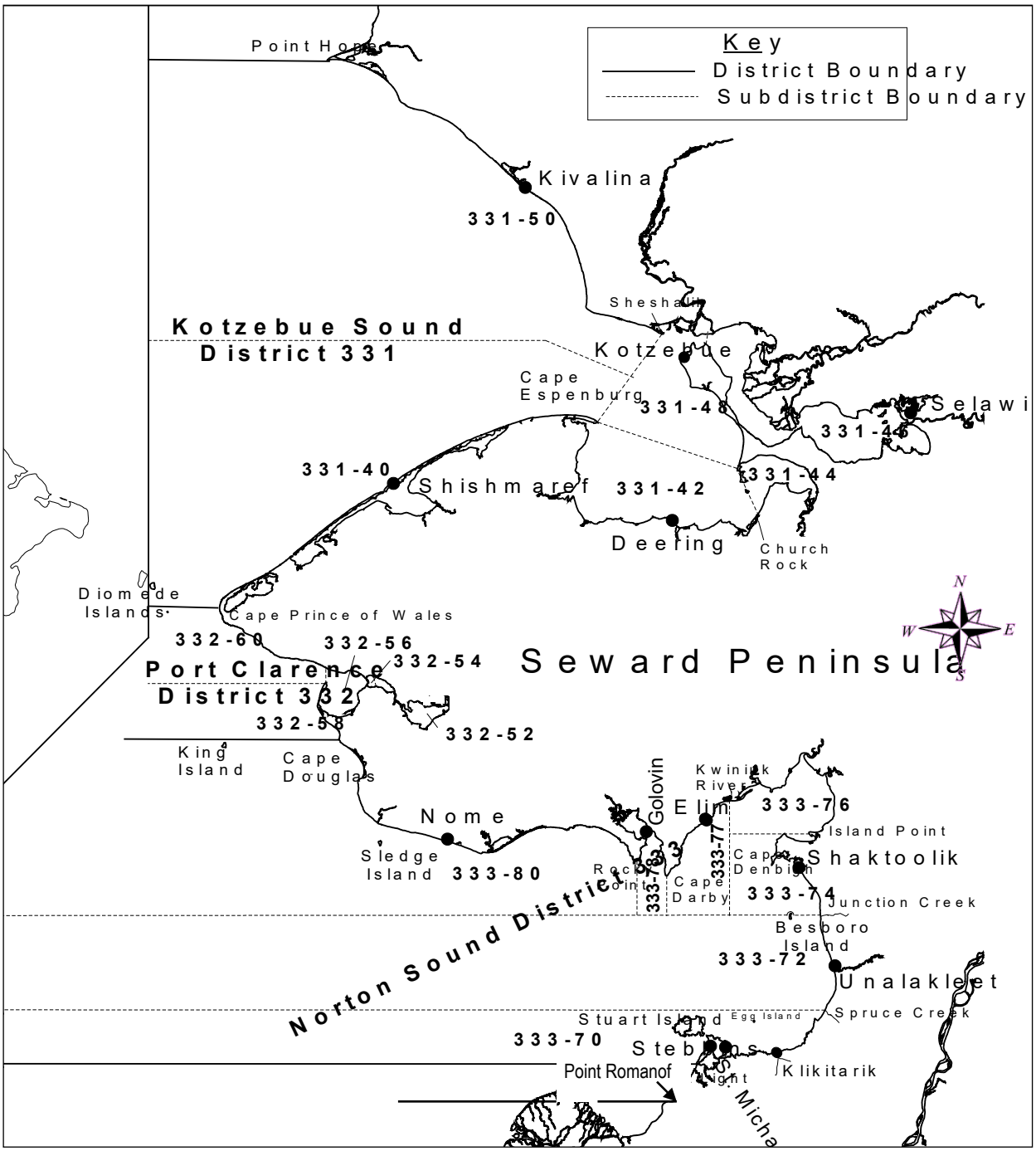

Figure 8.–Commercial herring districts and statistical areas of Norton Sound, Port Clarence, and Kotzebue Sound.

NORTON SOUND PACIFIC HERRING OVERVIEW

COMMERCIAL FISHERY OVERVIEW

Sac Roe Fishery

The earliest American commercial effort on Bering Sea herring may have taken place in the early part of the 1900s near Golovin in Norton Sound. Documented domestic commercial fishing for "spring herring" in Norton Sound began 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 approximately 1,292 short tons of herring were taken by 63 participants (13 purse seiners, 50 gillnetters). Purse seiners took 70% of the total catch.

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 locals to participate in this developing fishery.

During the 1980 season, 294 gillnet users harvested 2,452 short tons of herring (Menard et al. 2013). Because gillnet users demonstrated they could 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 using beach seines were negligible, but in 1984, 10 beach seines 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 meeting, 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 there were more than 200 participants through 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. The 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. 2 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 amount of commercial harvest. There has been no harvest using beach seines since 2000 and the number of participants decreased from 122 in 1999 to an average of 13 in 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, 2007–2009, 2012, and after 2013. Even when there was a buyer, sometimes only bait was purchased, as happened in each of the last 7 years. In 2012 and since 2013, there has been no sac roe fishery either because of ocean ice blocking tenders or preventing deliveries, or lack of market interest (Appendix D1).

Spawn-on-Kelp Fishery

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 additional herring fisheries in Norton Sound in 1998 was to allow as much opportunity as possible to sac roe permit holders, because only a small number of sac roe permit holders 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. 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 fleet during 1968–1974. All foreign fleets were prohibited from gillnet fishing in the area in 1977.

Since 1977, there has not been a consistent domestic commercial food and bait herring fishery in Norton Sound. Most reported food and bait herring harvest estimates were initially harvested as sac roe but bought and processed as food and bait, and 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 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. For Norton Sound, if a minimum biomass threshold level of 7,000 short tons 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 subsequent 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. In 2016, funds to conduct herring aerial surveys to estimate biomass and collect ASL information were cut, and therefore there is limited assessment of herring biomass. Because of the decline in market demand, there is no expectation 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 assuming 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 was not always possible. The fishing fleet had to be flexible to maximize catches and roe quality. Declining markets starting in 1997 has resulted in the catch being well below the GHL. Since 2002, to maximize efficiency participants 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. 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 (Thomas 1982). 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 district, 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. 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. Size difference may be explained by warmer water temperatures from river discharge. 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). 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 for multiple reasons. First, much of Port Clarence District waters contain organic coloring making aerial observation impossible. Second, 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, with ice obscuring aerial observation. 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 while conducting salmon aerial surveys.

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 9).

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, harvests, and pot studies, the model is used to project biomass estimates of legal male crab even in years when no trawl survey occurs, allowing biomass-based management of the summer and winter commercial crab fisheries. No winter study has taken place after the 2011–2012 season because ADF&G did an expanded spring and summer tagging study from 2012–2015. Every time new data are incorporated into the population model, it estimates current abundance and revises prior years' abundances. Trawl survey estimates prior to 1996 were revised and standardized in 2013 (NPFMC 2013). Starting in 2018, triennial trawl surveys were replaced with annual trawl surveys.

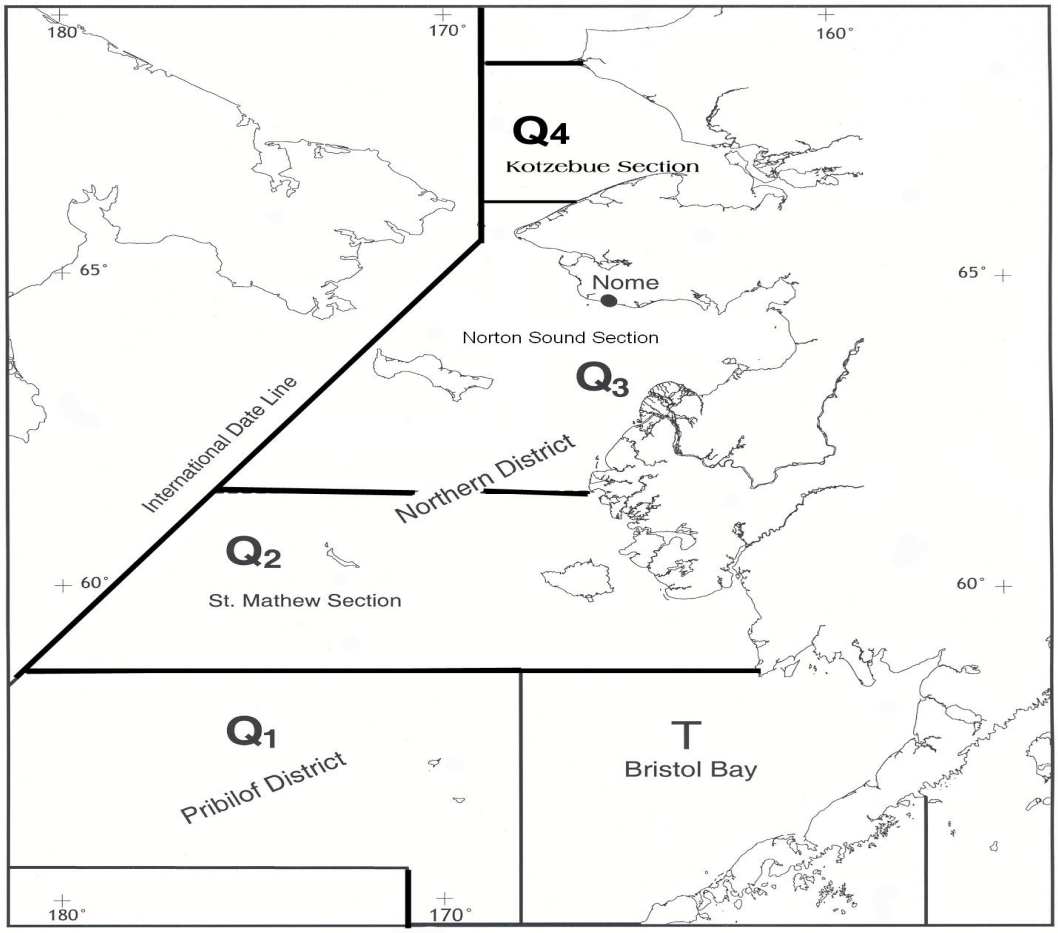

Figure 9.–King crab fishing districts and sections of Statistical Area Q.

COMMERCIAL FISHERY OVERVIEW: SUMMER

The last year that a large-vessel summer commercial crab fishery existed in Norton Sound Section was 1990. No summer commercial fishery occurred in 1991 because of ADF&G staff constraints. In 1992, the summer commercial fishery resumed. A regulation change adopted during the March 1993 BOF meeting resulted in participation in the fishery by predominantly small boats operated by residents of the region. The regulation designated the Norton Sound commercial crab fishery as superexclusive effective, June 27, 1994. This designation stated that 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. In addition, a vessel moratorium program put into place through federal regulation 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 CDQ harvest did not occur 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).

Harvest strategy has changed over time as more has been learned about the Norton Sound red king crab stock and data and modeling techniques have improved. In 1983, the BOF adopted a harvest strategy for ADF&G to manage the Norton Sound Section summer king crab fishery for a harvest of one-half of the exploitation rate common in other Bering Sea commercial king crab fisheries. This harvest strategy remained in place until the March 1999 BOF meeting when a new harvest strategy was enacted for the Norton Sound summer red king crab fishery. The new harvest strategy was developed with prior history performance data and a new length-based model that made yearly biomass estimates instead of triennial biomass estimates. A threshold level of abundance of legal male red king crab biomass was set at 1.5 million pounds. A summer commercial season could open if the legal crab biomass was estimated to be at least 1.5 million pounds, and if the legal biomass fell in the range of 1.5 to 2.5 million pounds the harvest rate would be no more than 5.0% so that the stock may rebuild. If legal biomass was 2.5 million pounds or more, the harvest rate would be no more than 10.0%. 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 7.0% of legal male biomass. From 2.0 to 3.0 million pounds, the harvest rate will be no more than 13.0%. If the estimated legal biomass is more than 3.0 million pounds, the harvest rate will be no more than 15.0%. Starting in 2016, under the new king crab management plan, both winter and summer commercial fisheries were combined under the red king crab harvest strategy. Any commercial harvest allocation not taken during the winter commercial fishery is added to the summer commercial fishery allocation.

Since 1981, to protect crab utilized by the inshore subsistence fishery from commercial harvest, an area delineated by a line approximately 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 of sublegal and female crab, regulations were adopted at the 2008 March BOF meeting: 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, it became standard practice for NSSP to purchase market preferred sized red king crab (>5 inch CW) while other buyers and catchers-sellers continue to sell legal size and larger red king crab.

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) are open to crabbing north of the latitude of Cape Prince of Wales (Appendix E12).

Out of concern for stock status, the BOF amended a proposal at its March 2020 meeting that changed the regulation for the start of the winter commercial crab season (from on or after January 15 to starting on February 1) to include closure of the commercial crab season east of 167 degrees west longitude in 2020 (5 AAC 34.910(d)(3)). This closure took effect during the summer commercial crab season and expired at the end of the 2020.

COMMERCIAL FISHERY OVERVIEW: WINTER

A winter commercial through-the-ice fishery has existed in Norton Sound since 1978. Until 2010, 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 to the ice edge (Appendix E15). 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 and southern Norton Sound have not been conducive to winter crab fishing; consequently, Nome crabbers have harvested 90% or more of the total commercial winter harvest since 2012. 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. The harvest is generally divided among residents who buy crab directly from individuals, the seafood plant (NSSP) in Nome, and other nonlocal markets such as Anchorage and Korea.

By regulation, season dates were initially from January 1 to April 30, but in its March 1985 meeting, the BOF set 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 shorefast ice is relatively more stable and solid from mid-January to April. In 2020, a proposal adopted by the BOF set a new season start date of February 1 each year.

Winter commercial harvest peaked in 2015 (Appendix E4), which prompted the BOF at its March 2015 meeting to adopt regulations to include winter commercial harvest in the GHL. Harvest allocation for the winter commercial fishery is 8.0% of the total open-access GHL. Another regulation adopted during the March 2015 BOF meeting and implemented starting with the 2017 season limited commercial permit holders to 20 pots, each of which must have a current-year pot tag attached.

Dramatic increases in winter fishing effort started in 2012 due to much higher exvessel prices. During the years 1978–2011, an average of 9 permit holders fished commercially in winter with an average harvest of roughly 7,000 pounds. From 2012 to 2015, winter fishery participation more than tripled, to an average of 32 permit holders, and 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, where from 2013 to 2016, crab were sold live to South Korea by 1 or 2 catcher-processors based in Nome.

Since 2017, total commercial harvest (including CDQ) during the winter fishery has not exceeded 30,000 pounds. Fishing efforts were hampered by poor ice and weather conditions in 2018 and 2019. In 2020, NSSP, the major buyer, did not purchase crab and only one catcher-seller participated in the winter fishery; foreign markets collapsed as well because of the Covid-19 pandemic.

Commercial Catch Sampling

From 1977 to 1999 commercial catch sampling was minimal and dependent upon Nome ADF&G staff availability. The Norton Sound red king crab summer commercial fishery had an onboard observer conducting commercial catch sampling during the 2000 and 2001 seasons because there was a floating processor on the fishing grounds. The onboard observer was able to sample a larger percentage of commercial harvest than shore-side sampling. NSSP began operating in Nome in summer 2002, greatly improving the ability to sample crab. Crab were either sampled at NSSP or at the small boat harbor where non-resident fishery participants or catcher-processors not selling to NSSP offload their catch. An average of 3,800 crab were sampled from 2010 to 2019 (Appendices E20–E23). The summer red king crab commercial fishery has had an onboard observer program since 2012, with no observers in 2020 due to lack of fishing effort.

From 2016 to 2018, up to 500 crab were sampled during the winter commercial fishery out of live holding tanks. In 2015, harvest sampling was conducted at NSSP and Stephanie Sue Fisheries and has been conducted only at NSSP since 2016; no winter sampling occurred in 2019 or 2020. No effort is currently made to sample catcher-seller harvests due to the small harvest and logistics involved. A winter observer program was started during the 2016 winter red king crab commercial fishery, where observers are collecting information about the handling of nontarget (e.g., sublegal and female) red king crab. There were no observers in 2020 due to lack of fishing effort.

CDQ Fishery Overview

NSEDC and Yukon Delta Fisheries Development Association (YDFDA) divide the CDQ allocation of Norton Sound red king crab. Only participants designated by these 2 CDQ groups may participate in this portion of the king crab fishery. CDQ fishing permit from CFEC are required for all fishing and owners must register their vessel with ADF&G before they make their first delivery. The fishery operates under authority of the CDQ group and each CDQ group decides how their crab quota will be harvested.

During the March 2002 BOF meeting, new regulations were adopted that affected the CDQ crab fishery. 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 in 2008 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, but starting in 2019, they reverted to harvesting it during the summer season. In 2020, NSEDC did not harvest any of their CDQ allocation.

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 a subsistence use permit in Norton Sound to fish. Daily effort and catch were recorded 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 addition to increased use of more efficient gear (pots instead of hand lines), may affect success of the winter fishery. Unstable ice conditions and record snowfalls adversely affected 1992–1993, 1996–1997, 2000–2001, 2003–2004, 2005–2006, and 2018–2019 catches. During years of stable ice conditions, an average of 85 participants caught an average 75 crab each. For the last 10 years (2010–2019), winter subsistence harvest averaged 5,700 crab annually.

SPORT FISHERY OVERVIEW

A mail survey has been conducted by ADF&G to estimate sport fishing total harvest since 1977 and sport fishing total catch since 1990. In addition, sport fishery harvest logs, similar to a subsistence permit, are required and are issued by the Nome office to fish for crab in the Norton Sound Section of Registration Area Q. The sport fishery allows a catch of 6 male crab per day of legal size (4.75 inch or greater CW). Sport fishery harvest has been sporadic in the last 10 years (2010–2019), with only 3 of the last 10 years reporting any catch or harvest. In the most recent of those years, 2019, 516 crab were caught and of those, 344 crab were kept (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome).

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 9). 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. At the March 2008 BOF meeting, legal size for blue king crab was changed from 5.5-inch to 5.0-inch CW. 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 was 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 locals 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].

Residents 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 extent 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.

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 commissioner's permit.

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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."

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 (Figure 10). 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.

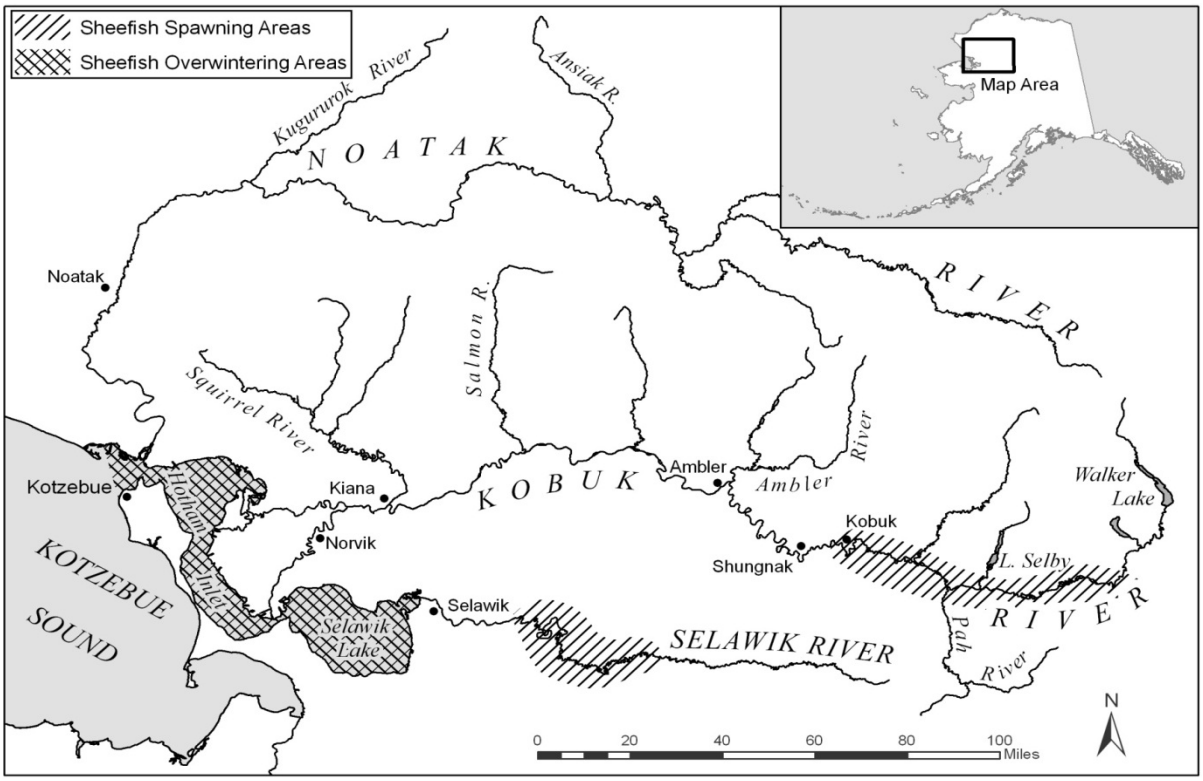

Figure 10.–Kotzebue and Kobuk River Valley villages and their spatial relationship with sheefish spawning and overwintering areas.

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 (Alt 1969). 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 (Alt 1969). 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 Division of Subsistence did not survey the villages in Kotzebue District for subsistence sheefish harvests from 2005–2011. 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 Kotzebue, where a sizable ice fishery occurs for sheefish in late winter and spring. From 2012–2014, there were comprehensive subsistence surveys for fish and wildlife harvests of 6–9 villages in the Kotzebue area. 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 gillnets are 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 reported commercial sheefish catches in 2011, 2015–2018, and 2020. 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 on 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 Division of Subsistence 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 available about the Upper Kobuk River in the hope that proper handling during catch-and-release can minimize impacts on spawning populations. Although overall harvests are substantial, populations appear to be healthy and sport harvests are relatively low (Scanlon 2018). Sheefish sport harvests in the last 10 years have averaged under 500 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 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 concern for declining stocks, 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 & Wildlife Service (USFWS), and National Park Service. Spawning sheefish were tagged in Upper Kobuk River and Selawik River. The Selawik River project ended in 1996, and it ended a year later in Upper Kobuk River. Spawning population estimates of sheefish in 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 Mauneluk 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; residents of the region refer to Dolly Varden as 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 before outmigrating 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 (Scanlon 2018). Most Norton Sound District reports show Dolly Varden as incidental catches in subsistence salmon nets that are not directly targeting the species. Dolly Varden are harvested from the subsistence fishery using 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. Dolly Varden catch is stored and allowed to freeze in willow cribs located near the seining site (Bernard and DeCicco 1987; Georgette and Shiedt 2005). These fish are used throughout the winter by the fishing group. Most Dolly Varden harvests take place before or just after freeze-up. Residents 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). Noatak Dolly Varden harvests should be considered minimum estimates because of survey timing. In addition, Kivalina Dolly Varden harvest surveys have not been conducted during the last 25 years, except for 2007. From 2012–2014, a comprehensive survey of fish and wildlife harvests was done in 6–9 Kotzebue area villages by the Division of Subsistence, but not since then.

In Arctic District, fishery harvest studies by ADF&G's Division of Subsistence 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 nontarget 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 and 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. According to fish tickets, during the 2011–2012 season, 3 fishery participants caught and sold 903 pounds of Dolly Varden to the fish plant in Nome as bait. The following year, 4 fishery participants 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 when 1 participant made deliveries and catch information was confidential.

Sport Fishery

Drainages of Kotzebue Sound and the Chukchi Sea are known for the large size of anadromous Dolly Varden. Kotzebue area residents and non-locals boating on Kobuk and Noatak Rivers are the primary participants in this area's Dolly Varden sport fishery. 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 (Savereide and Huang 2016; Scanlon 2009).

Sport fishing effort has been consistently low, which is probably due to the remote location and difficult access of fishing sites (Scanlon 2018). Dolly Varden sport fish harvest in the last 10 years in Norton Sound averaged 1,200 fish annually but is less than half that number 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, only Wulik River has been surveyed, until 2020 when Kivalina River was also 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 they 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 Division of Subsistence 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 2012–2014, 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 participant, 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). No reported harvest has occurred since the 2016–2017 season.

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 Colville 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 interviews with locals 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. Saffron cod are taken through the ice by jigging, and with gillnets in open water and under the ice.

No extensive commercial fishery on saffron cod 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 locals, 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 (Appendix F10). No commercial harvest was reported again until the fall of 2009. Since then, total annual saffron cod harvest has ranged from 1,700 pounds to almost 34,000 pounds, all sold to NSSP in Nome for use as crab bait. NSSP would only buy saffron cod that were caught through the ice by jigging gear. No reported harvest has occurred since the 2016–2017 season.

MISCELLANEOUS FINFISH SPECIES

Other finfish species taken for subsistence in Norton Sound–Port Clarence and Arctic–Kotzebue 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 Subdistrict 1, both Nome and Solomon Rivers have been closed to subsistence fishing for Arctic grayling since 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 400 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 are roughly three-quarters of that of Dolly Varden (Appendix F3).

CAPELIN

Commercial Fishery

No reported commercial fishery has occurred for capelin *Mallotus villosus* and no stock assessment has been done since 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). In 2018, sightings of spawning capelin were actively solicited by a graduate student studying capelin in the Nome area, and in 2019, there were related follow-ups in solicitations for sightings; therefore, there were more sightings reported in 2018 and 2019 than in other years. No capelin sightings were reported in 2020. Many residents harvest capelin with various gear types, such as nets, buckets, plastic bags, and shovels.

SECTION 2: SALMON FISHERIES

2020 NORTON SOUND SALMON FISHERY

COMMERCIAL FISHERY SEASON SUMMARY

Poor runs of chum and coho salmon resulted in the poorest commercial salmon harvests since the record low harvests of the early 2000s. The sockeye salmon commercial harvest, although a small portion of the overall harvest, was the sixth-highest on record. The pink salmon run like recent years was one of the greatest runs with near record escapements to record escapements at the counting projects. However, there was little interest from the buyer in purchasing pink salmon. No commercial fishing targeting Chinook salmon was allowed, but the run was again improved when compared to most of the runs in the 2010s (Appendix A14; Menard et al. 2013), even though it was lower than last year.

The commercial fishery season started on June 24 in Subdistricts 1–6 (Nome, Golovin, Elim, Koyuk, Shaktoolik and Unalakleet), with a 24-hour fishing period targeting chum salmon. Weak catches of chum salmon occurred in all subdistricts, except in Subdistrict 2 where catches were near average and in Subdistrict 1 where no permit holders fished. Subdistrict 2 had two additional 24-hour fishing periods the following week, but fishing was delayed elsewhere until July 2 and that 24-hour fishing period in the other 5 subdistricts targeting chum salmon had weak catches. Chum salmon fishing was delayed an additional week before another 24-hour fishing period starting on July 9 in Subdistricts 2, 5, and 6. Catches continued to be poor in Subdistricts 5 and 6 and escapement counting projects had low passage of chum salmon but high passage of pink salmon. Chum salmon runs were much stronger in Subdistricts 1 and 2, and after mid-July in those subdistricts there were two 48-hour fishing periods per week and two 48-hour fishing periods per week continued into coho salmon season in August through early September.

The large runs of pink salmon provided an opportunity for a pink salmon directed commercial fishery and beginning July 16 there were 3 short fishing periods of 4, 6, and 12 hours spaced 3 days apart in Subdistricts 3 and 4. Only 1 person fished the first opening in Subdistrict 3, and no effort was recorded the next 2 openings, and no effort in Subdistrict 4. In Subdistrict 6 there were 2 pink salmon fishing periods of 4 hours and 6 hours each on July 16 and July 18 with 2 and 4 permit holders participating, and in Subdistrict 5 there was one 6-hour fishing period on July 18 with 1 permit holder participating. Because of limited permit holder interest in fishing for pink salmon and the buyer not wanting longer-duration pink salmon openings because of capacity concerns, there was no further interest in pink salmon fishing periods.

Coho salmon catches were above average in Subdistrict 1 and average in Subdistrict 2. Subdistrict 3 coho catches were much lower, but escapement was sufficient to allow for two 48-hour fishing periods a week. Limited fishing effort and catches in Subdistrict 4 resulted in no more fishing periods after mid-August. Poor coho salmon catches in Subdistricts 5 and 6 limited fishing time to one 24-hour fishing period each week during August instead of the normal two 48-hour fishing periods a week.

Total Norton Sound commercial salmon harvest was 906 Chinook, 6,950 pink, 26,366 chum, 14,651 coho, and 1,808 sockeye salmon (Table 1), and did not include 80 Chinook, 969 pink, 13 chum, 38 coho, and 254 sockeye salmon kept for personal use. The combined commercial (including personal use) harvest of all salmon species (52,035 fish) ranked the lowest since 2004 in Norton Sound (Appendix A14). The number of commercial permits fished in 2020 (122) was 23 less than last year and was the lowest since 2010 (Appendix A2). The 2020 fishery value to the permit holders of $290,302 was the lowest since 2004 and the first time the value did not exceed 1 million dollars since 2012 (Appendix A3).

Average dock prices per pound in 2020 were $2.99 for Chinook salmon, $0.19 for pink salmon, $0.52 for chum salmon, $1.40 for sockeye salmon, and $1.76 for coho salmon (Appendix A4). Chinook salmon prices were down $0.01, pink salmon prices were up $0.06, chum salmon prices were up $0.02, sockeye salmon prices were up $0.01, and coho salmon prices were up $0.19 from their average per pound prices last year. Average commercial weights by species were 11.1 pounds for Chinook salmon, 2.5 pounds for pink salmon, 6.9 pounds for chum salmon, 5.6 pounds for sockeye salmon, and 5.7 pounds for coho salmon (Appendix A5). The weights for sockeye and coho salmon were record lows with sockeye salmon only 0.1 pound below the previous record low, but average coho salmon was 0.7 pounds below the previous record low of 6.4 pounds last year.

Only 1 salmon buyer operated in Norton Sound during the 2020 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 fishery participants 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. Unlike recent years this was the first year the permits were available online and except for White Mountain there were no visits by ADF&G personnel to villages because of Covid-19 restrictions. The lack of visits to villages resulted in few village residents getting a subsistence permit, and residents who had received permits in previous years were called in October and November for after-season reporting on their catches. Like the last several years, the return rate in 2020 was close to 100% (Table 2). Except Subdistrict 1, subsistence catches in 2020 in northern Norton Sound were below recent 5-year averages, but those averages were taken from catches that were some of the highest in over 10 years (Appendices A6–A8). The Port Clarence District total subsistence catch was well below the 5-year average, but that average was taken from catches that were the highest on record (Appendix B3).

In southern Norton Sound, in 2020, postseason household surveys were conducted in Unalakleet and attempts were made to contact 100% of the households. However, Koyuk and Shaktoolik surveys were not conducted in 2020, largely because Covid-19 travel restrictions did not allow for traditional in-person interviews, and recent 5-year averages were used as subsistence harvest totals. Unalakleet total subsistence harvest was below the 5-year average in 2020 (Appendices A9–A11).

In Norton Sound District, only certain rivers in Subdistrict 1 have subsistence salmon harvest limits, in place since 1985. In 2020, an above average chum salmon run was forecasted for Subdistrict 1 and it was not closed to salmon fishing in mid-June for the 15th year in a row.

Regulations allow for cash sales of up to $500 worth of subsistence-taken finfish per household. In 2020 there was a total of 3 customary trade permits issued in Norton Sound and Port Clarence Districts. Cash sales of $385 were recorded in 2020 for both Norton Sound and Port Clarence Districts combined (Appendix A32).

SEASON SUMMARY BY SUBDISTRICT

Nome–Norton Sound Subdistrict 1

In Subdistrict 1, 2020 chum salmon run abundance was projected to achieve escapement goal ranges and the amounts necessary for subsistence (ANS) range of 3,430–5,716 chum salmon. As such, a Tier II fishery was not implemented in 2020. There has not been a Tier II fishery or Tier II subsistence fishing restrictions implemented since 2005.

There are 3 rivers with chum salmon escapement goal ranges in Subdistrict 1. West of Cape Nome, Nome and Snake Rivers typically have chum salmon runs of less than 10,000 fish combined. East of Cape Nome, the Eldorado River chum salmon run is usually well over double the chum salmon runs of the Nome and Snake Rivers combined, highlighting the disparity in river productivity within the subdistrict. The Eldorado River chum salmon escapement goal range of 4,400–14,200 has been reached for 10 years and exceeded in 8 of the last 10 years (Appendix A19). The chum salmon escapement goal ranges of Nome River (1,600–5,300) and Snake River (2,000–4,200) have been reached or exceeded in all 10 years at Nome River (Appendix A24) and 8 of 10 years at Snake River (Appendix 20). (Note that, in 2019, the upper bound of the escapement goal ranges increased from 9,200 to 14,200 for Eldorado River, from 4,300 to 5,300 for Nome River, and from 2,500 to 4,200 at Snake River.) Although chum salmon runs are greater east of Cape Nome (Appendix A30), for pink salmon the run strength is much greater west of Cape Nome (Appendix A31). Both 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-numbered year) in Subdistrict 1 and in 2020 had the greatest pink salmon escapement of any river in the subdistrict with over 2 million fish counted through the weir, which was second only to the 2018 Nome River escapement of over 3 million fish (Appendix A24). No coho salmon escapement goals have been established in Subdistrict 1. In recent years Nome and Snake Rivers have had good coho salmon escapements compared to years where there are reliable escapement estimates and no large-scale flooding events.

The 2020 season was the eighth consecutive year that commercial fishing was allowed in Subdistrict 1 since the mid–1990s. There were 10 permit holders that fished this year, the most since fishing resumed in 2013 (Appendix A2). Permit holders fished during 12 of the 13 fishing periods, foregoing fishing during the first period because of financial concerns. During the first fishing period of the season that permit holders participate in, no money will be taken from permit holders by the buyer for loan payments. Therefore, permit holders wait for the run to build for a higher payment to take advantage of this program (Table 4). Total commercial harvest including personal use was 37 Chinook, 861 sockeye, 7,101 chum, 1,007 pink and 6,663 coho salmon (Appendix A6). The sockeye salmon harvest was a record, and the coho salmon harvest was the third highest on record. The chum salmon harvest was the third highest since fishing resumed in 2013 (Menard et al. 2013).

In recent years subsistence fishing time was liberalized in Subdistrict 1 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 2020

the chum salmon run to Subdistrict 1 was lower than recent years but still strong enough to allow for commercial fishing.

In 2020, the chum salmon subsistence catch was one of the lowest recorded, except for years of subsistence closures, catch limits, or Tier II fishing restrictions. There were ideal weather and water level conditions for most of the 2020 salmon fishing season. Possible explanations for the low chum salmon catch were low chum salmon returns to Subdistrict 1, subsistence permit holders going to Pilgrim River to harvest sockeye salmon, and another big pink salmon run for an even-numbered year in Subdistrict 1 having resulted in less gillnet fishing for chum salmon because nets were being plugged with pink salmon. Although the coho salmon run to Subdistrict 1 occurs 1 month later, usually by early August, and is much smaller than the chum salmon run, the subsistence harvest of coho salmon was nearly 3 times the chum salmon subsistence harvest. The pink salmon subsistence harvest was over 11 times the chum salmon harvest.

For over 40 years subsistence salmon permits have been required for the Subdistrict 1, and during the 2020 season 665 permits were issued, the highest on record. Of the 665 permits issued, 661 were returned (Table 2). Reported subsistence harvest was 66 Chinook, 1,002 chum, 11,184 pink, 2,869 coho, and 462 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 Subdistrict 2 from 1995–2012, but the project was discontinued in 2013. The Niukluk River is a tributary of Fish River, a major salmon-producing river in the Subdistrict 2. 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 Subdistrict 2 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 A22). 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. In 2020 operation of this tower began June 25 but there were multiple interruptions in operations throughout the season due to high water equipment failures, and Covid-19 complications that resulted in counting for only 23 days. The cumulative count of pink salmon (2,647,626 fish) was the second highest in project history and cumulative count of coho salmon (3,156 fish) was the lowest on record (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; however, the aerial survey was not completed in 2020 because of high water.

The season began with a 24-hour fishing periods starting June 24 followed by one or two 24-hour fishing periods weekly through mid-July. After mid-July fishing was expanded to one or two 48-hour fishing periods weekly until early September and the last fishing period was shortened to 24 hours because of weather concerns (Table 5). Throughout the season Subdistrict 2 had better catches when compared to other subdistricts except for Subdistrict 1. Total commercial catch including personal use was 64 Chinook, 227 sockeye, 1,964 coho, 1,987 pink, and 11,536 chum salmon (Table 5; Appendix A7). The chum salmon commercial harvest was less than one-half of

last year and ranked seventh highest since fishing resumed in 2008. Coho salmon commercial harvest was 81% of last year and ranked eighth highest since 2008. There were 17 permit holders that fished in 2020, 1 less than the 18 permit holders that fished the last 2 years.

This was the 17th year that subsistence salmon permits were required in Subdistrict 2 and all 190 permits issued were returned (Table 2). Subsistence fishing was allowed 7 days a week with no catch limits throughout the season. Reported subsistence harvest in Subdistrict 2 was 77 Chinook, 65 sockeye, 862 coho, 5,270 pink, and 139 chum salmon (Appendix A7). The total number of salmon reported harvested for subsistence (6,413) was below both the 5- and 10-year averages and was the second lowest in 20 years. Chum salmon had a poor run and the reported subsistence harvest reflected that with the lowest subsistence harvest on record. Coho salmon subsistence harvest was well below average and was the fifth lowest in 20 years. Pink salmon subsistence harvest was just below the 5-year average; however, sockeye salmon subsistence harvest was 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. Historical data indicate that by July 7 the majority of the chum salmon run is in river, and commercial pink salmon fishing would be expected to have little impact on chum salmon escapement or subsistence needs.

In 2020 escapement past the Kwiniuk tower was 417 Chinook, 87 sockeye, 4,953 chum, 1,767,447 pink, and 5,361coho salmon (Appendix A21). Chinook salmon passage was above the escapement goal of 250 fish for the first time in 5 years, but the chum salmon passage was below the escapement goal range of 9,100–32,600 for the first time since 2016. Pink salmon escapement was the fifth highest in the 56-year project history and was above 1.7 million fish for the third even-numbered year in a row. Coho salmon escapement was just a few hundred fish below last year and likely met the aerial survey goal of 650–1,300 fish, but no survey was flown because of poor weather conditions and aircraft availability.

Commercial fishing in Subdistrict 3 was greatly reduced compared to recent years. There were only two 24-hour chum salmon fishing periods early in the season before July 4. The management plan allows for pink salmon fishing periods after July 6, but there was little interest from permit holders. There were 3 short-duration pink salmon fishing periods in mid-July and 1 permit holder participated in only 1 of the 3 fishing periods. In August there were usually two 48-hour coho salmon fishing periods each week, but catches were often poor even though coho escapement was sufficient at the Kwiniuk River tower. There is the possibility that the gillnets were not as effective in catching the much smaller coho this season. Total commercial catch including personal use was 145 Chinook, 238 sockeye, 2,013 coho, 331 pink, and 857 chum salmon caught by 25 permit holders (Appendix A2 and A8). The total catch of 3,584 salmon was the lowest since fishing resumed in 2007.

There were 51 subsistence salmon permits issued for Subdistrict 3 in 2020 and all were returned. The number of salmon reported harvested (4,093) was less than two-thirds the 5-year average. Estimated subsistence harvests by species were 125 Chinook, 17 sockeye, 365 coho, 3,462 pink, and 124 chum salmon (Appendix A8). Reported subsistence harvests were well below average for all species except Chinook salmon, which was above average.

Norton Bay–Norton Sound Subdistrict 4

Until recently, Subdistrict 4 has typically been managed based on Subdistricts' 5 and 6 salmon run assessments due to a lack of ground-based escapement projects in Norton Bay. In 2011, an enumeration tower project was initiated by NSEDC on the Inglutalik River to provide an index of salmon escapement to Norton Bay. Most years high water prevents operating the project during coho salmon season but this year the project did not become operational until July 30 and counts were suspended after August 23 because of high water. Escapements counts should be considered minimal and were 2,109 chum, 55,317 pink and 1,305 coho salmon (Appendix A27). 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. A counting tower on the Ungalik River was operated by NSEDC for the second year. High water resulted in a late start to counting, but the pink count was still nearly 1 million fish (Table 3).

In 2020, the Subdistrict 4 commercial fishing schedule was the same as Subdistrict 3, fishing for chum and pink salmon in June and July. No permit holders fished the pink salmon fishing periods, 1 permit holder fished the first chum salmon fishing period, and 2 permit holders fished the second chum salmon fishing period. There were 3 coho salmon fishing periods the first half of August and no permit holders fished the first 24-hour fishing period. The second and third fishing periods were 48 hours, and 6 permit holders fished the second period and 2 permit holders fished the third period. Total commercial catch by species for Subdistrict 4 including personal use was 11 Chinook, 17 sockeye, 251 coho, 24 pink, and 378 chum salmon caught by 7 permit holders (Appendix A2 and A9). The total catch of 681 salmon was the lowest since fishing resumed in 2008.

Traditional household subsistence salmon surveys were not conducted in the village of Koyuk in 2020 due to Covid-19 restrictions (Appendix A9). As a result, the 5-year average subsistence salmon harvest was used in place of traditional household subsistence salmon surveys to estimate subsistence salmon harvest. An estimated 194 Chinook, 162 sockeye, 1,155 coho, 2,560 pink, and 3,465 chum salmon were reported as subsistence harvest in Subdistrict 4 in 2020.

Shaktoolik and Unalakleet–Norton Sound Subdistricts 5 and 6

The salmon runs to Subdistricts 5 and 6 are usually the largest in Norton Sound and in most years, the Shaktoolik and Unalakleet combined harvest is well over half of the total Norton Sound commercial salmon harvest. However, in 2020 the salmon runs were very poor except for the Chinook salmon run that was above average and the pink salmon run that was well above average. Despite the large pink salmon run there was minimal fishing effort during the one directed pink salmon fishing period. Otherwise, commercial fishing was limited to one 24-hour period per week, and chum and coho salmon catches were well below average.

Subdistricts 5 and 6 are usually managed concurrently; 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. If the midpoint of the Chinook salmon escapement goal is not expected to be reached, commercial fishing is still allowed for other salmon species if there have been no mesh size restrictions for subsistence fishing and no reductions to the subsistence salmon fishing schedule. Otherwise, commercial fishing for other salmon species cannot begin until after June 30.

Directed commercial Chinook salmon fishing has only occurred in 2 of the previous 20 years and has not occurred since 2005. Restrictive action had been taken in the subsistence and sport fisheries from 2003 to 2004 and since 2006 through 2019. However, in 2019 the Chinook salmon run was above average and in 2020 there were no additional restrictions on the sport and subsistence fisheries, and there was one 24-hour commercial fishing period in June targeting chum salmon in Shaktoolik and Unalakleet. Poor commercial chum catches resulted in no additional commercial fishing time until early July.

In 2020, the Subdistrict 5 chum salmon commercial catch of 3,838 fish was the lowest since the early 2000s and the Subdistrict 5 coho salmon commercial catch of 1,646 fish was the second lowest in over 40 years (Table 8, Appendix A10). The Subdistrict 6 chum salmon commercial catch in 2020 was even poorer with less than 2,645 fish and was also the lowest since the early 2000s (Table 9, Appendix A11). The 2020 Subdistrict 6 coho salmon commercial catch of less than 2,152 fish was the second lowest in over 40 years.

High water early in the season and Covid-19 restrictions prevented the operation of the Unalakleet River floating weir and delayed the start of Shaktoolik and North River counting towers. The chum and coho salmon escapements were well below average and the pink salmon escapement was well above average. The Chinook salmon escapement was average, but the North River Chinook salmon escapement was below the low end of the escapement goal range and the late start to counting likely resulted in the lower Chinook salmon count (Table 3). There were no restrictions on subsistence fishing and the normal Chinook salmon fishing schedule occurred for the first time in several years; locals reported very good Chinook salmon catches.

In 2020 traditional household subsistence salmon surveys were not conducted in the village of Shaktoolik due to Covid-19 restrictions but were conducted in the village of Unalakleet (Appendices A10 and A11). As a result, the 5-year average subsistence salmon harvest was used in place of traditional household subsistence salmon surveys to estimate subsistence salmon harvest for Subdistrict 5 subsistence salmon harvest in 2020 (Appendix A10). An estimated 1,778 Chinook, 381 sockeye, 4,183 coho, 9,235 pink, and 685 chum salmon were reported as subsistence harvest in Subdistrict 6 in 2020 (Appendix A11).

ESCAPEMENT

Table 3 summarizes escapement assessments for the major index river systems of Norton Sound and Port Clarence Districts. In 2020, there were 6 counting towers and 5 weirs in operation (Figure 11) including a combination sonar/tower project on the Shaktoolik River, but the project was still in development and was not used for inseason management. Appendices A19–A29 present passage numbers for Chinook, chum, coho, pink, and sockeye salmon at various enumeration projects in Norton Sound. Aerial survey assessments are indices and relative to historical escapement sizes.

Escapement projects in Norton Sound include counting towers on North, Inglutalik, Ungalik, Fish, and Kwiniuk Rivers; a sonar/tower on Shaktoolik River; and weirs on Unalakleet, Snake, Nome, Solomon, Eldorado, Bonanza, and Pilgrim Rivers.

Escapement project operations were a result of multiple collaborators, including ADF&G and NSEDC. 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.

A combination of high water and Covid-19 restrictions created delays of several weeks at most southern Norton Sound projects and prevented the operation of the Unalakleet River weir in 2020. High water and lack of available aircraft also prevented some aerial surveys in 2020. As usual, the Subdistrict 1 streams received the most 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.

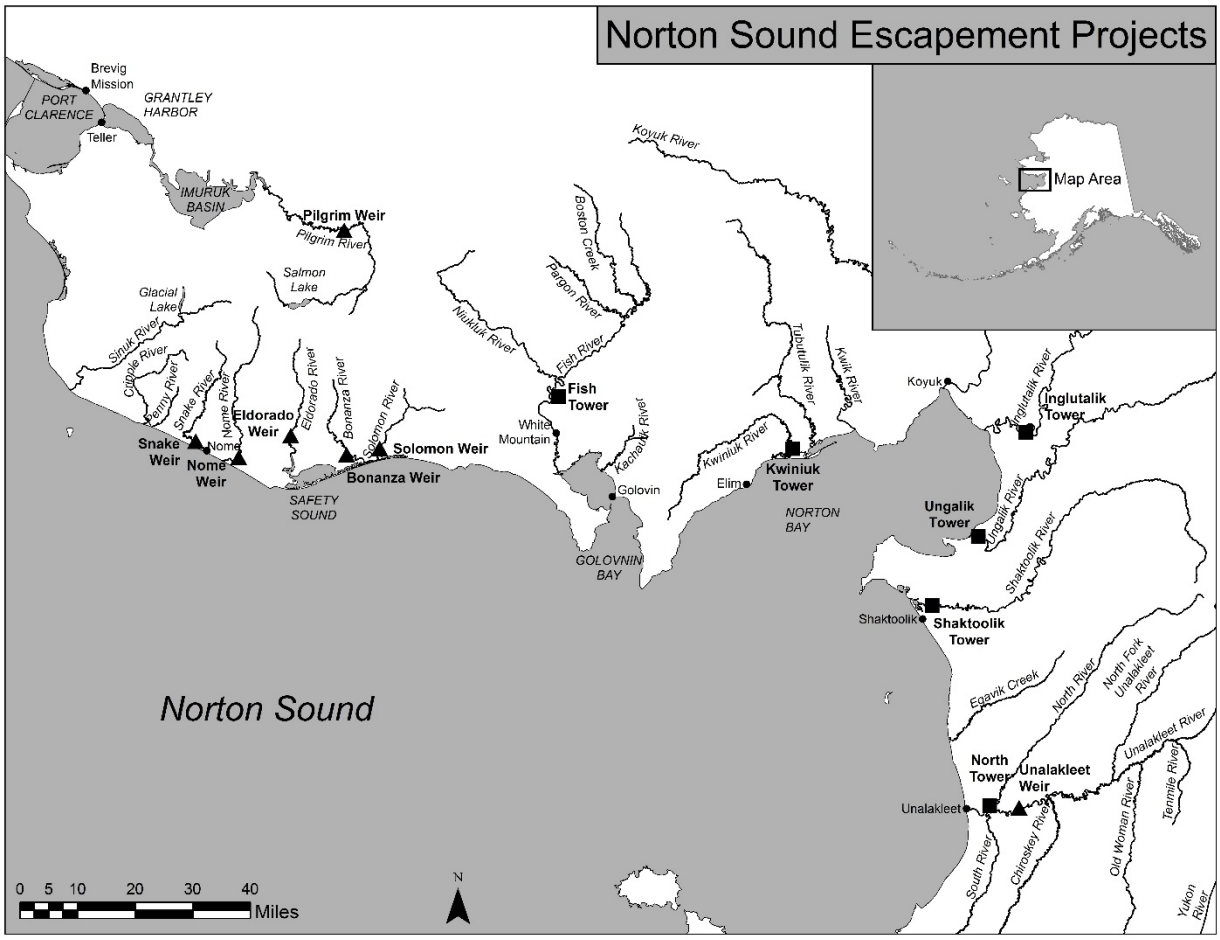

Figure 11.–Norton Sound escapement projects.

Chinook Salmon

The 2020 Chinook salmon run was much stronger than expected in northern Norton Sound with a Kwiniuk River tower count of 417 fish (Appendix A21) exceeding the escapement goal of 250 fish for the first time since 2015. In southern Norton Sound the North River tower count fell short of the low end of the escapement goal range of 1,200–2,600 with 1,068 fish (Appendix A28) counted. The North River tower start was delayed because of high water and the Chinook escapement may have been slightly higher. The regular subsistence fishing schedule was in effect in 2020 and subsistence fishery participants reported their best harvests in years.

Chum Salmon

In northern Norton Sound chum salmon escapement goal ranges were reached or exceeded in all rivers except for Kwiniuk and Snake River (Table 3). The Kwiniuk River chum salmon count of

4,953 fish was below the low end of the escapement goal range of 9,100–32,600 for the first time since 2016. The Snake River chum salmon count of 842 fish was the first time below the low end of the escapement goal range of 2,000–4,200 since 2012. There were some problems with the Snake River weir being fish tight during the season so the chum count should be considered a minimum.

In southern Norton Sound the North River had the lowest number of chum salmon since counting began in 1996 with an estimate of 1,439 fish (Appendix A28). Inglutalik River tower was not operational until the end of the chum salmon run (Appendix A27).

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 information can be somewhat incomplete. Streams in the northern subdistricts of Norton Sound are typically surveyed.

The 2020 coho salmon run was much poorer than forecast. Historically the coho salmon run has been much larger in southern Norton Sound than in northern Norton Sound, but in 2020 this trend was reversed.

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 in 2020 because of high water and a lack of available aircraft. The North River goal was not projected to be reached because the coho count of 1,938 fish was the lowest count on record with counting operations occurring at least through the first week of September (Appendix A28). The Fish River tower, downstream of Niukluk River, was operational for only 2 weeks because of high water, but when the project was terminated after the first week of August, near the midpoint of the coho salmon run, the count was 3,156 fish. Based on the coho salmon relationship between Fish River and Niukluk River described earlier in this report, where 33% of the chum salmon in the Fish River are destined for the Niukluk River, the Niukluk River and Ophir Creek combined escapement goal range was at least met. The Kwiniuk River counting tower had a count of 5,361 coho salmon, the lowest since 2013 (Appendix A21).

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. There are 3 pink salmon escapement goals in Norton Sound, Kwiniuk (8,400), Nome (13,000), and North (25,000) Rivers, were all easily exceeded in 2020 (Table 3). The Snake River pink salmon count of 375,815 was the second highest on record in the 26-year project history (Appendix A20). The Nome River pink salmon count of 2,270,248 fish was the second highest on record in the 28-year project history (Appendix A24). The Kwiniuk River pink salmon count of 1,767,447 (Appendix A21) was the third even-numbered year in a row with the count exceeding 1.7 million fish. The Fish River pink salmon count of 2,647,626 fish was the second highest on record; if counting had not been suspended throughout the season due to high water and Covid-19 restrictions, it would have probably exceeded the record even-numbered year count of 2,759,770

fish in 2018 (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome).

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 A26), which was operated from 2000 to 2015. In 2020, the aerial survey escapement goal range of 800–1,600 at Glacial Lake was obtained with a count of 945 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 2020. In addition, Nome ADF&G Division of Commercial Fisheries has 7 deputized staff with the ability to issue citations.

2021 NORTON SOUND SALMON OUTLOOK

Salmon outlooks and harvest projections for the 2021 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. The poor chum and coho salmon run in 2020 resulted in the lowest salmon harvests since the record low harvests in the early 2000s (Appendix A14; Menard et al. 2013). A poor showing of 4-year-old chum salmon would be expected to result in a much lower than average return of 5-year-old chum salmon in 2021. Returning coho salmon are predominantly 4-year-old fish, and the trend the last 2 years were very small size coho salmon with an above-average run in 2019 and well below average run in southern Norton Sound in 2020. ADF&G does expect better chum and coho salmon returns in 2021, but not above average to well above average runs that have occurred in recent years. The Chinook salmon run is expected to be similar to the 2020 run and, although no commercial fishing for Chinook salmon is expected, incidentally caught Chinook salmon in commercial gillnet fisheries may be allowed to be sold depending on run strength. The chum salmon harvest is expected to be 70,000–120,000 fish. ADF&G expects the pink salmon run to be well above average for an odd-numbered year, but harvest will depend on buyer interest and could range from 25,000–75,000 fish. Unless there is buyer interest, no pink salmon directed fishing periods are expected. The coho salmon run is expected to be below average with a harvest of 50,000–100,000 fish.

2020 PORT CLARENCE SALMON FISHERY

COMMERCIAL FISHERY SEASON SUMMARY

Port Clarence is immediately to the northwest of Norton Sound and has the largest run of sockeye salmon in the Norton Sound–Port Clarence Area. In 2020, the sockeye salmon run was much lower than recent years. To have a commercial fishery the Pilgrim River inriver goal of 30,000 sockeye salmon must be projected; the criteria to prosecute a commercial fishery were not met. Also, no buyer interest has existed for a commercial fishery in over 10 years.

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 592 Pilgrim River subsistence permits were issued in 2020, the highest on record. Pilgrim River estimated subsistence harvests by species were 14 Chinook salmon, 50 coho salmon, 73 chum salmon, 5,946 sockeye salmon, and 455 pink salmon (Table 2). The sockeye salmon harvest was 49% of the record harvest of 12,148 sockeye salmon caught in 2017. 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, 2020 was the 17th 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 193 permits (Table 2).

In 2020 there were 2 customary trade permits issued in Port Clarence District. Cash sales of $385 were recorded in 2020 for both Norton Sound and Port Clarence Districts combined (Appendix A32).

ESCAPEMENT

The Pilgrim River weir project began operations in 2003. Because of a lack of staff in 2020, the project was pulled on August 13, the earliest date on record. Cumulative escapement counts were 55 Chinook, 5,580 chum, 105,686 pink, 15,298 sockeye, and 184 coho salmon (Appendix B2). The chum count was the second lowest in project history. This year's pink escapement was second only to last year's record count of 387,799 pink salmon. Although pink salmon have been the second-highest salmon species harvested after sockeye salmon, there is little interest in pink salmon as harvests have only ranged from 10 to 593 fish since 2003. Salmon Lake sockeye spawning populations seldom exceeded 10,000 fish in years prior to 2003, but like Glacial Lake in Norton Sound, record-breaking runs were counted through the Pilgrim River weir in the mid-2000s. Because the sockeye salmon run was smaller in 2020, the subsistence sockeye salmon catch limit was not waived as had happened in the previous 5 years and the subsistence sockeye salmon catch limit was increased from 25 to 50 sockeye salmon per household only after escapement objectives were projected to be met and additional subsistence harvest would not harm the run.

Aerial surveys are not typically flown in Port Clarence District except for Salmon Lake because a higher priority is assigned to Subdistrict 1 and surrounding areas where commercial fishing occurs. The escapement goal range at Pilgrim River weir is 6,800–36,000 sockeye salmon (Table 3). The previous escapement goal was by aerial survey of Salmon Lake and Grand Central River and was 4,000–8,000 sockeye salmon and this year's aerial survey count was 5,901 sockeye salmon (Appendix B1). The former goal has been reached for 10 consecutive years, but in 3 of those years, subsistence closures were required in the Pilgrim River in order to achieve the goal.

ENFORCEMENT

In 2020, 1 AWT officer patrolled Pilgrim River in Port Clarence District.

2021 Port Clarence Salmon Outlook

The guideline harvest range (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 the inriver goal of 30,000 sockeye salmon in the Pilgrim River to allow a commercial fishery is not expected to be reached. Subsistence fishing closures in the Pilgrim River are possible and ADF&G will limit sockeye salmon subsistence harvest to 25 fish but will increase or waive the limit if the run is better than expected.

2020 KOTZEBUE SOUND SALMON FISHERY

Commercial Fishery Season Summary

In 2020, the Kotzebue Sound District commercial salmon fishery had 2 buyers, Copper River Seafoods (CRS) and E & E Seafoods doing business as Pacific Star Seafoods.

The commercial salmon season was opened July 10 and closed on August 31 by regulation. The last day buyers bought fish was August 28. During July, commercial fishing was allowed 6 days a week, from 8 a.m. to 6 p.m., with no fishing on Saturday due to the lack of plane availability to ship the catch out on the following day, and to allow a 1-day window for fish passage to provide for more opportunity to subsistence users.

Below-average commercial catches compared to historical data, low catches at the Kobuk River test fish project near Kiana, and concerns expressed by Kobuk River village residents of poor subsistence catches resulted in ADF&G limiting commercial fishing to 8 hours a day every other day during the first 3 weeks of August. Commercial chum salmon daily catches were the highest the second week of August and at the Kobuk River test fish project the third week of August. Commercial catches declined the third week of August and the buyers indicated they did not want to continue operations until the regulatory closure date. ADF&G then allowed 8-hour commercial fishing periods for 5 days during the fourth week of August before the buyers ceased operations.

The commercial harvest of 149,808 chum salmon was the lowest since 2007 (Appendix C1; Menard et al. 2013). Also, 3 Chinook salmon and 9 sockeye salmon were sold. There were 33 Chinook salmon, 63 sockeye salmon, 2 chum salmon, 873 pink salmon, 15 coho salmon, 389 Dolly Varden, 41 sheefish, and 2 whitefish in the commercial catch kept for personal use (Table 10).

There were 68 permit holders that sold fish in 2020, much less than last year when 92 permit holders sold fish; this was the lowest participation since 2013 (Figure 1 and Table 1). The highest daily fishing effort occurred on August 11 when 47 permit holders fished.

A total of 1,204,780 pounds of chum salmon (average weight 8.0 pounds) were sold at an average of $0.45 per pound. This year's average price was higher than last year's price of $0.39 per pound. The total exvessel value was $542,308 and was down nearly two-thirds from the 10-year average of $1,353,226. This was the first time since 2015 that the exvessel value was below $1 million (Appendix C3).

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 2020, commercial catch samples were 13% age-0.2 fish, 28% age-0.3 fish, 55% age-0.4 fish, 4% age-0.5 fish, and less than 1% age-0.6 fish. The percentage of age-0.4 fish was the lowest in 10 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. Subsistence harvesters reported difficulty in fishing this season because of high water conditions and that fishing for chum salmon on the Kobuk River was poor in July and improved in August. Subsistence harvesters on the Noatak River reported that fishing was good.

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 for the Kotzebue Sound District.

This year's test fishery chum salmon CPUE daily cumulative index at the ADF&G test fishery project on Kobuk River near Kiana was 692 and was the third lowest in the 28-year project history (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome).

Kobuk River test fishery catch samples in 2020 were 16% age-0.2 fish, 31% age-0.3 fish, 52% age-0.4 fish, and 1% age 0.5 fish. The percentage of age-0.3 was the lowest in 10 years.

No aerial surveys were conducted in 2020.

ENFORCEMENT

In 2020, 2 AWT officers patrolled the Kotzebue Sound District.

2021 KOTZEBUE SALMON OUTLOOK

The outlook for the 2021 season is based on the parent-year returns and returning age classes observed in the commercial catch samples and in test fishery catch samples from the Kobuk River in 2020. During the 2021 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 below 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 200,000 to 300,000 chum salmon.

SECTION 3: PACIFIC HERRING FISHERIES

2020 NORTON SOUND PACIFIC HERRING FISHERY

COMMERCIAL FISHERY SEASON SUMMARY

Sac Roe Fishery

A commercial fishery directed on sac roe did not occur in 2020. As in prior seasons, the lack of a sac roe fishery in 2020 was due to a lack of market interest.

Historical information for the Norton Sound commercial sac roe fishery can be found in Appendix D2 and Menard et al. (2013). Current and other historical fisheries information is presented in Appendices D1 and D3.

Spawn-on-Kelp Fishery

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 2020. The Norton Sound commercial bait herring fishery was opened by emergency order on May 19 and NSSP purchased 84 short tons of herring from May 23 to May 25 with 7 permit holders making deliveries (Appendix D2).

COMMERCIAL FISHERY MANAGEMENT

Due to ice conditions that made surveying and accurately estimating herring biomass impossible during the 2012–2014 seasons, and due to budget limitations starting in 2015, ADF&G has not flown any aerial surveys to estimate biomass since the 2011 season. With the decline in market demand, there was no expectation that commercial harvest would exceed 20% of actual biomass.

Due to ice conditions in 2014 and budget reductions starting in 2015, no ADF&G field crew has deployed to Cape Denbigh or taken any commercial ASL samples since the 2013 season. No test fishery operations have been conducted from Unalakleet since 2014.

CATCH REPORTING AND ENFORCEMENT

No AWT officers were on Norton Sound herring grounds during the 2020 fishery because there was no sac roe fishery.

BIOMASS DETERMINATION

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

SECTION 4: KING CRAB FISHERIES

NORTON SOUND CRAB FISHERY

ABUNDANCE

The ADF&G length-based population model estimated harvestable legal (≥4.75-inch carapace width) male crab biomass for the 2020 commercial crab fishery at 2.4 million pounds, based on the model results from the winter of 2020 that included data from the 2019 summer fishery and the 2019 trawl survey (NPFMC 2020). The North Pacific Fishery Management Council set an allowable biological catch (ABC) of 201,000 pounds for 2020, which includes the winter and summer commercial harvests, estimated winter and summer subsistence harvests, and estimated incidental mortality of nontarget crab discards. By regulation, a harvest rate of up to 13.0% is allowed when the legal male biomass is 2.0–3.0 million pounds; however, total harvest plus discard mortality cannot exceed the ABC. ADF&G applied a harvest rate of 7.0% to the LMB, yielding a GHL of 170,100 pounds for the commercial red king crab fisheries (5 AAC 34.915). By regulation 8.0% of the GHL is allocated to the winter commercial fishery resulting in a 13,608-pound allocation (5 AAC 34.915(a)(1)(A)). The CDQ fishery assigned to NSEDC is allocated 7.5% by regulation resulting in a 12,758-pound allocation.

Winter Open-Access Commercial Fishery

The 2020 winter open-access fishery was opened at 12:00 noon, February 29, but no buyer registered to buy crab. Two people applied for a catcher-seller permit to sell crab dockside. The winter commercial fishery closed by regulation on April 30.

Summer Open-Access Commercial Fishery

By BOF regulation, the area east of 167 degrees west longitude was closed to commercial crabbing for the 2020 summer commercial crab season. The 2020 summer open access commercial king crab fishery was opened by emergency order at 12:00 noon, June 15, with a GHL of over 140,000 pounds, but no buyers registered to purchase crab and no catcher-sellers registered to sell crab. The summer commercial fishery closed by regulation on September 3.

Commercial Harvest Summary

NSSP, the major buyer for Norton Sound crab, did not purchase crab during the 2020 winter or summer season. For the winter commercial fishery, 1 catcher-seller made sales and catch information is confidential. No catcher-sellers registered for the summer fishery.

CDQ Fishery

NSEDC did not harvest any of their (or that of YDFDA, by transfer) CDQ allocation in 2020; this was the first time since 2001 the CDQ allocation was not harvested.

Harvest Areas and Commercial Catch Sampling

Harvest area(s) are confidential for the winter commercial fishery because fewer than 3 permit holders delivered. No commercial catch sampling occurred in either commercial fishery in 2020. No summer or winter observing took place in 2020 due to lack of fishing effort.

Enforcement

No AWT trooper made dockside checks during the 2020 summer crab fishery.

SUBSISTENCE FISHERY

For the 2019–2020 winter crab season, all except 1 of the 80 permits issued were returned. The 50 permit holders that fished reported catching 814 crab (including crab returned to the ocean), which was less than a tenth of the average catch from the previous 10 years (Appendices E6 and E7). A total of 548 crab were retained and the average number of crab kept per permit fished was 11, the lowest in the last 20 years. Residents of Brevig Mission, Unalakleet, and White Mountain had a combined harvest of only 19 crab, with 97% of the total overall harvest going to Nome residents. Residents of Koyuk and Stebbins signed up to fish but reported no crab. All crab were caught with pots (no handlines), and out of at least 91 pots reported fishing, 33 (36%) were reported lost during the season due to moving ice. Subsistence harvest of crab occurred predominantly in March (45%) and April (43%) with January (1%), February (8%), and May (3%) making up the remainder (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome).

During the 2020 Norton Sound summer subsistence crab season, all 64 permits issued were returned. The 17 permit holders that fished reported harvesting a total of 1,054 crab, which averaged 62 crab per permit holder. Total pounds harvested in 2020 was 3 times more than in 2019 and was two-thirds of the 5-year average (Appendix E6). Of the total harvest, 68% came from the Stebbins area, 25% came from the Nome area, and 7% came from the Unalakleet area, with 0 pots reported lost (data on file with Arctic Management Group, ADF&G, Division of Commercial Fisheries, Nome). Residents of other areas signed up for subsistence permits in 2020 but did not fish.

SPORT FISHERY

In 2020, no harvest logs were issued, and no harvest was reported.

ANNUAL TRAWL SURVEY

Red king crab abundance estimates from Norton Sound trawl surveys are an integral part of the length-based population model used to project the red king crab legal biomass and determine GHL for the commercial red king crab fishery. Starting in 2018, the trawl surveys have taken place annually. Prior to 2018, they occurred every 3 years.

Results from the 2020 trawl survey were a legal male red king crab abundance of 227,854 crab and a prerecruit 1 abundance of 349,376 crab. Legal male red king crab abundance decreased by almost half and the prerecruit 1 abundance increased by almost a third since the 2019 survey. The 2020 legal male red king crab and prerecruit 1 abundance estimates were the lowest and the seventh lowest in the history of the trawl survey (Appendix E9; Menard et al. 2013). Estimated prerecruit 2 abundance (850,655 crab) decreased by almost a third since the 2019 survey and was the fourth highest in the history of the trawl survey. The number of female red king crab captured in 2020 (185 crab) was the fifth highest number of females captured during the trawl survey (Bell and

Hamazaki *In prep*). The 2020 trawl survey data will be used to project the 2021 legal male biomass and GHL.

ST. LAWRENCE ISLAND CRAB FISHERY

COMMERCIAL FISHERY OVERVIEW

In 2006, the BOF split the St. Lawrence Island Section between north and south of 66° 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 user groups to expand fishing opportunity to an area with little commercial utilization since 1995. No harvest was reported from this area in 2020. No permit holders fished in the Kotzebue Section in 2020.

SECTION 5: MISCELLANEOUS SPECIES

INCONNU (SHEEFISH)

Commercial Fishery

In Kotzebue Sound District, for the winter of 2019–2020, there were no reported sales of inconnu, commonly known as sheefish (Appendix F1). Sheefish are not commonly found in either Norton Sound or Port Clarence Districts.

Subsistence and Sport Fishery

No subsistence surveys have taken place since 2014. From 2012–2014, there were comprehensive subsistence surveys for fish and wildlife harvests from 6–9 Kotzebue area villages conducted by the Division of Subsistence. In 2013 the Division of Subsistence 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 2019 indicate a harvest of 406 sheefish, over 100 more sheefish than in 2018 (Appendix F3). Sheefish sport harvests in the last 10 years have averaged less than 500 fish annually. Information for 2020 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 give an index of abundance, but the test fishery is designed to produce an index of chum salmon abundance and begins operation well after sheefish have begun to pass the project site. In 2020, the Kobuk River test fishery resulted in 116 sheefish caught in 158 drifts, for a cumulative CPUE of 185, the sixth-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 incidentally caught in commercial salmon fisheries in Norton Sound and Kotzebue Districts. During the 2020 commercial salmon fishery, Kotzebue District reported 389 Dolly Varden caught but not sold (Appendix F4) and Norton Sound reported 4 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 Division of Subsistence from 2012–2014. During those years, the Division of

Subsistence surveyed Noatak households, which reported harvesting from 6,223 to 9,289 Dolly Varden annually (Appendix F5). No surveys have been conducted since 2014.

Sport fish harvest was 411 Dolly Varden in Norton Sound and 230 Dolly Varden in Kotzebue/Chukchi Sea areas in 2019 (Appendix F3). Information is not yet available for 2020. Overall, Dolly Varden sport fish harvests in the last 10 years in Norton Sound averaged 1,200 fish annually, with the most fish usually harvested out of the Unalakleet River, which was what happened in 2019 (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 2020, aerial surveys on the Wulik and Kivalina Rivers counted a total of 74,406 and 24,675 Dolly Varden, respectively (Appendix F7).

WHITEFISH

Commercial Fishery

No whitefish were harvested during the 2019–2020 season in Norton Sound District. No participants registered (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 Division of Subsistence was conducted in 6–9 Kotzebue area villages from 2012–2014. During those 3 years, survey data showed that an average of 74,000 whitefish were harvested annually for 8 villages in the 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 2019–2020 season, no saffron cod *Eleginus gracilis*, commonly known as tomcod, was harvested in Norton Sound and no participants registered (Appendix F10). However, average harvest for the last 5 years (for which harvest was reported) 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 2020, Norton Sound household subsistence surveys were conducted; however, subsistence harvest information of tomcod was not collected.

CAPELIN

Subsistence

No sightings of capelin were reported in 2020 by Nome residents. No other information on capelin harvest is available.

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TABLES

Table 1.–Norton Sound commercial salmon harvest summary by subdistrict, 2020.

		Subdistricts						
		1	2	3	4	5	6	Total
Number of fishery participants [a]		10	17	25	7	27	55	122
Chinook	Number	19	44	121	11	236	475	906
	Weight (lb)	152	494	1,336	102	2,529	5,408	10,021
Sockeye	Number	692	206	222	17	359	312	1,808
	Weight (lb)	3,898	1,202	1,185	107	1,972	1,788	10,152
Coho	Number	6,640	1,963	2,011	251	1,645	2,141	14,651
	Weight (lb)	39,911	11,330	11,210	1,528	8,936	10,915	83,830
Pink	Number	42	1,987	331	24	1,292	3,274	6,950
	Weight (lb)	111	4,545	828	79	3,777	7,896	17,236
Chum	Number	7,099	11,530	853	378	3,864	2,642	26,366
	Weight (lb)	48,513	81,573	5,769	2,529	26,261	18,228	182,873
Total	Number	14,492	15,730	3,538	681	7,396	8,844	50,681
	Weight (lb)	92,585	99,144	20,328	4,345	43,475	44,235	304,112

Notes: The above harvests do not include personal use. Average commercial weights by species were 11.1 lb for Chinook salmon, 5.6 lb for sockeye salmon, 5.7 lb for coho salmon, 2.5 lb for pink salmon, and 6.9 lb for chum salmon.

[a] Number of fishery participants 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, 2020.

	Permits fished [a]	Number of salmon harvested					
		Chinook	Sockeye	Coho	Pink	Chum	Total
Marine waters	50	23	99	979	739	730	2,570
Bonanza River - above weir	4	0	0	14	27	0	41
Bonanza River - below weir	14	0	1	66	651	75	793
Eldorado River - above weir	1	0	0	1	0	0	1
Eldorado River - below weir	9	1	12	119	649	95	876
Flambeau River	1	0	0	0	11	25	36
Safety Sound	1	0	0	0	0	0	0
Nome River- above weir	17	3	2	126	216	37	384
Nome River- below weir	262	0	48	581	7,207	18	7,854
Cripple Creek	25	0	2	162	36	0	200
Penny River	21	0	7	60	114	0	181
Sinuk River	30	0	108	79	75	0	262
Snake River - above weir	7	0	2	35	35	0	72
Snake River - below weir	101	36	31	506	1,084	2	1,659
Solomon River - above weir	10	0	1	22	70	0	93
Solomon River - below weir	17	3	6	116	47	1	173
Other Rivers and Creeks	12	0	143	3	223	19	388
Subdistrict 1 Total [b]	399	66	462	2,869	11,184	1,002	15,583
Cape Woolley [c]	2	0	0	0	6	0	6
Marine Waters	10	51	54	97	1,443	86	1,731
Kachavik River	7	1	5	62	78	6	152
McKinley River	3	0	0	22	0	0	22
Chinik Creek	9	0	3	118	154	0	275
Fish River - above tower	16	16	0	226	1,663	8	1,913
Fish River - below tower	21	9	3	223	1,856	38	2,129
Niukluk River	11	0	0	113	67	1	181
Other Rivers and Creeks	3	0	0	1	9	0	10
Subdistrict 2 Total [d]	66	77	65	862	5,270	139	6,413
Marine Waters	3	20	2	0	0	11	33
Kwiniuk River - above tower	10	5	5	51	1,039	13	1,113
Kwiniuk River - below tower	23	29	6	171	1,765	49	2,020
Next Creek	2	0	0	0	24	0	24
Tubutulik River	15	71	2	72	169	51	365
Iron Creek	10	0	2	71	465	0	538
Subdistrict 3 Total [e]	32	125	17	365	3,462	124	4,093
Port Clarence - Marine Waters	55	26	1,543	484	5,169	1,848	9,070
Tuksuk Channel	7	0	262	26	498	374	1,160
Imuruk Basin	2	0	0	0	4	8	12
Kougarok River	1	0	0	0	0	0	0
Kuzitrin River	2	0	3	0	3	0	6
Pilgrim River- above weir	147	11	2,550	28	162	33	2,784
Pilgrim River- below weir	176	3	3,396	22	293	40	3,754
Salmon Lake [f]							
Other Rivers and Creeks	2	0	0	0	1	0	1
Port Clarence District Total [g]	377	40	7,754	560	6,130	2,303	16,787
Total		308	8,298	4,656	26,052	3,568	42,882

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Table 2.–Page 2 of 2.

[a] Subsistence permits were issued in 6 locations in 2020 for northern Norton Sound: (1) Subdistrict 1; (2) Cape Woolley; (3) Subdistrict 2; (4) Subdistrict 3; (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 665 Subdistrict 1 permits issued, 661 were returned.

[c] All 65 Cape Woolley permits issued were returned.

[d] All 190 Subdistrict 2 permits issued were returned.

[e] All 51 Subdistrict 3 permits issued were returned.

[f] No Salmon Lake permits were issued.

[g] Of 592 Pilgrim River permits issued, 589 were returned. All 193 Port Clarence District permits issued were returned.

Table 3.–Salmon counts of rivers and associated salmon sustainable escapement goal ranges (SEG), Norton Sound and Port Clarence, 2020.

	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]
Salmon L.						
Grand Central R.						
Pilgrim R.	55			5,580		
Glacial L.						
Sinuk R.						
Cripple R.						
Penny R.						9
Anvil Creek						
Snake R.	9			842	2,000–4,200 [b]	
Nome R.	8			2,822	1,600–5,300 [b]	
Flambeau R.						3,051
Eldorado R.	19			11,333	4,400–14,200 [b]	
Bonanza R.	15			2,471		
Solomon R.	10			830		
Fish R.	96			9,024		
Boston Cr.						
Niukluk R.						
Ophir Cr.						
Kwiniuk R.	417	250		4,953	9,100–32,600 [c]	
Tubutulik R.					3,100–9,900 [c,d]	
Ungalik R.	135			7,881		
Inglutalik R	0			2,109		
Shaktoolik R.	927			9,864		
Unalakleet R. [f]						
Old Woman R.						
North R.	1,068	1,200–2,600		1,439		

-continued-

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.					921	Combined			
Grand Central R.					4,980	4,000–8,000			
Pilgrim R.	184			15,298			105,686		
Glacial L.					945	800–1,600			80 [e]
Sinuk R.		1,112			10				1,800,000
Cripple R.		379			5				121,000
Penny R.		349			5				20,000
Anvil Creek									
Snake R.	3,069			678			375,815		
Nome R.	3,667			414			2,270,248	13,000	
Flambeau R.		649			5				
Eldorado R. [b]	33	707		79	55		164,064		
Bonanza R.	11			27			226,405		
Solomon R.	402	596		142	26		474,968		
Fish R.	3,156			150			2,647,626		
Boston Cr.									
Niukluk R.			Combined						
Ophir Cr.			750–1,600						
Kwiniuk R.	5,361		650–1,300	87			1,767,447	8,400	
Tubutulik R.									
Ungalik R.	1,644			219			972,855		
Inglutalik R	1,305			6			55,317		
Shaktoolik R.	4,176			186			1,985,763		
Unalakleet R. [f]									
Old Woman R.									
North R.	1,938		550–1,100	111			690,036	25,000	

Note: Data not available for all streams (blank cells). 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] Prior to 2019, the Alaska Board of Fisheries (BOF) established an OEG that was the same as the previous SEG, which had ranges of 1,600–2,500 fish for Snake River, 2,900–4,300 fish for Nome River, and 6,000–9,200 fish for Eldorado River.

[c] Prior to 2019, the BOF established an OEG that was the same as the previous SEG of 10,000–20,000 for the Kwiniuk River and 8,000–16,000 for the Tubutulik River.

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

[e] The pink salmon were located in the creek flowing into Glacial Lake.

[f] Starting in 2018, the Unalakleet River weir picket spacing was increased to allow pink salmon to pass through; therefore, pink salmon are no longer enumerated. There were no counts in 2020 due to high water and Covid-19 restrictions.

Table 4.–Commercial salmon set gillnet catches from Nome, Subdistrict 1, Norton Sound, 2020.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	chum	6/24–6/25	24	0	ND	ND	ND	ND	ND
2	chum	7/02–7/03	24	4	7	1,648	0	23	0
3	chum	7/15–7/16	24	6	2	1,121	9	29	3
4	chum	7/17–7/19	48	6	0	1,423	33	23	0
5	chum	7/24–7/26	48	6	1	1,358	0	88	71
6	chum	7/31–8/02	48	6	4	757	0	171	341
7	coho	8/07–8/09	48	6	0	382	0	68	570
8	coho	8/12–8/14	48	6	2	192	0	68	1,012
9	coho	8/18–8/20	48	8	2	70	0	101	949
10	coho	8/24–8/26	48	8	0	52	0	51	1,241
11	coho	8/27–8/29	48	8	1	43	0	15	1,275
12	coho	9/01–9/03	48	5	0	31	0	30	878
13	coho	9/04–9/05	24	6	0	22	0	25	300
Total			528	10	19	7,099	42	692	6,640

Note: An additional 18 Chinook, 2 chum, 965 pink, 169 sockeye, and 23 coho salmon were retained for personal use in 2020.

Table 5.–Commercial salmon set gillnet catches from Golovin, Subdistrict 2, Norton Sound, 2020.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	chum	6/24–6/25	24	7	10	2,646	147	4	0
2	chum	6/29–6/30	24	9	9	1,391	198	5	0
3	chum	7/01–7/02	24	10	9	1,309	262	10	0
4	chum	7/09–7/10	24	8	3	1,630	311	23	0
5	chum	7/15–7/16	24	8	3	1,048	269	26	0
6	chum	7/17–7/19	48	9	4	2,023	800	30	2
7	chum	7/24–7/26	48	9	2	955	0	45	26
8	chum	7/31–8/02	48	7	2	325	0	14	146
9	coho	8/07–8/09	48	3	0	136	0	0	304
10	coho	8/12–8/14	48	4	2	36	0	1	466
11	coho	8/18–8/20	48	4	0	16	0	17	364
12	coho	8/24–8/26	48	5	0	9	0	13	329
13	coho	8/27–8/29	48	3	0	2	0	5	198
14	coho	9/01–9/03	48	1	[a]	[a]	[a]	[a]	[a]
15	coho	9/04–9/05	24	2	[a]	[a]	[a]	[a]	[a]
Total			576	17	44	11,530	1,987	206	1,963

Note: An additional 20 Chinook, 6 chum, 21 sockeye, and 1 coho salmon were retained for personal use in 2020.

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

Table 6.–Commercial salmon set gillnet catches from Elim, Subdistrict 3, Norton Sound, 2020.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	chum	6/24–6/25	24	10	107	414	9	0	0
2	chum	7/02–7/03	24	6	13	259	110	1	0
3	pink	7/16	4	0	ND	ND	ND	ND	ND
4	pink	7/19	6	1	[a]	[a]	[a]	[a]	[a]
5	pink	7/22	12	0	ND	ND	ND	ND	ND
6	coho	8/01–8/02	24	12	1	37	0	33	30
7	coho	8/07–8/09	48	12	0	85	0	45	231
8	coho	8/12–8/14	48	11	0	23	0	13	300
9	coho	8/18–8/20	48	15	0	7	0	36	461
10	coho	8/24–8/26	48	14	0	9	0	26	384
11	coho	8/27–8/29	48	13	0	5	0	24	274
12	coho	9/01–9/03	48	15	0	11	0	38	271
13	coho	9/04–9/05	24	5	0	3	0	6	60
Total [b]			406	25	121	853	119	222	2,011

Note: An additional 24 Chinook, 4 chum, 16 sockeye, and 2 coho salmon were retained for personal use in 2020.

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

[b] Confidential harvest is excluded from harvest totals.

Table 7.–Commercial salmon set gillnet catches from Norton Bay, Subdistrict 4, Norton Sound, 2020.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	chum	6/24–6/25	24	1	[a]	[a]	[a]	[a]	[a]
2	chum	7/02–7/03	24	2	[a]	[a]	[a]	[a]	[a]
3	pink	7/16	4	0	ND	ND	ND	ND	ND
4	pink	7/19	6	0	ND	ND	ND	ND	ND
5	pink	7/22	12	0	ND	ND	ND	ND	ND
6	coho	8/01–8/02	24	0	ND	ND	ND	ND	ND
7	coho	8/07–8/09	48	6	1	174	0	13	200
8	coho	8/11–8/13	48	2	[a]	[a]	[a]	[a]	[a]
Total			190	7	11	378	24	17	251

Note: No salmon were reported as retained for personal use in 2020.

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

Table 8.–Commercial salmon set gillnet catches from Shaktoolik, Subdistrict 5, Norton Sound, 2020.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho Harvest
1	chum	6/24–6/25	24	11	126	508	23	4	0
2	chum	7/02–7/03	24	11	45	788	666	29	0
3	chum	7/09–7/10	24	12	35	1,148	222	49	1
4	chum	7/15–7/16	24	18	22	891	264	71	1
5	pink	7/18–7/18	6	1	[a]	[a]	[a]	[a]	[a]
6	coho	7/25–7/26	24	13	6	257	0	82	46
7	coho	8/01–8/02	24	10	0	126	0	33	76
8	coho	8/08–8/09	24	11	1	107	0	59	518
9	coho	8/15–8/16	24	18	1	38	0	28	590
10	coho	8/28–8/29	24	15	0	1	0	4	413
Total [b]			222	27	236	3,864	1,175	359	1,645

Note: An additional 2 Chinook, 5 sockeye, and 1 coho salmon were retained for personal use in 2020.

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

[b] Confidential harvest is excluded from harvest totals.

Table 9.–Commercial salmon set gillnet catches from Unalakleet, Subdistrict 6, Norton Sound, 2020.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	chum	6/24–6/25	24	21	241	310	249	2	0
2	chum	7/02–7/03	24	25	201	1,486	619	34	0
3	chum	7/09–7/10	24	13	16	163	28	18	0
4	pink	7/16–7/16	4	2	[a]	[a]	[a]	[a]	[a]
5	pink	7/18–7/18	6	4	0	0	2,347	0	0
6	coho	7/25–7/26	24	24	4	232	0	31	40
7	coho	8/01–8/02	24	24	5	187	0	143	233
8	coho	8/08–8/09	24	33	6	165	0	41	749
9	coho	8/15–8/16	24	29	1	51	0	25	728
10	coho	8/28–8/29	24	27	1	14	0	17	391
Total [b]			202	55	475	2,608	3,243	311	2,141

Note: An additional 16 Chinook, 1 chum, 4 pink, 43 sockeye, and 11 coho salmon were retained for personal use in 2020.

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

[b] Confidential harvest is excluded from harvest totals.

Table 10.–Kotzebue District commercial chum salmon catch and average weight by date, 2020.

Period	Date	Permits fished	Catch	Pounds	Average weight
1	7/10	9	443	3,595	8.12
2	7/12	4	349	2,802	8.03
3	7/13	7	1,309	10,512	8.03
4	7/14	15	1,611	12,961	8.05
5	7/15	14	1,506	12,221	8.11
6	7/16	13	861	6,649	7.72
7	7/17	15	2,046	16,757	8.19
8	7/19	22	3,520	29,075	8.26
9	7/20	27	4,416	36,604	8.29
10	7/21	30	3,436	29,143	8.48
11	7/22	24	3,083	25,868	8.39
12	7/23	16	2,545	21,101	8.29
13	7/24	24	3,145	25,847	8.22
14	7/26	30	4,360	35,936	8.24
15	7/27	15	2,366	19,783	8.36
16	7/28	30	5,356	43,996	8.21
17	7/29	33	7,246	60,703	8.38
18	7/30	29	3,695	30,805	8.34
19	7/31	27	7,493	62,757	8.38
20	8/3	42	8,946	73,051	8.17
21	8/5	45	6,129	49,487	8.07
22	8/7	44	9,437	78,959	8.37
23	8/9	44	11,721	95,738	8.17
24	8/11	47	13,216	105,113	7.95
25	8/13	43	9,802	74,211	7.57
26	8/16	40	6,747	51,204	7.59
27	8/18	43	7,531	58,884	7.82
28	8/20	43	5,090	38,336	7.53
29	8/23	28	3,542	26,838	7.58
30	8/24	28	3,102	23,502	7.58
31	8/26	30	2,638	19,202	7.28
32	8/27	25	2,008	14,914	7.43
33	8/28	15	1,113	8,226	7.39
	Total	68	149,808	1,204,780	8.04

Notes: A total of 3 Chinook salmon with an average weight of 13.7 lb and 9 sockeye salmon with an average weight of 5.6 lb were harvested and sold during the 2020 commercial fishery. Also harvested during the 2020 commercial fishery and kept for personal use were 33 Chinook, 2 chum, 873 pink, 63 sockeye, and 15 coho salmon, and 2 whitefish, 389 Dolly Varden, and 41 sheefish.

Table 11.–Historical chum salmon catch for Kobuk River drift test fishery, 1993–2020.

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
2019	7/17–8/28	194	1,509	8/14
2020	7/24–8/29	158	692	8/13

[a] Cumulative 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.

APPENDIX A: NORTON SOUND FISHERIES

Appendix A1.–Commercial salmon catch by species, Norton Sound District, 1990–2020.

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
2019	1,390	7,013	139,837	76,408	157,938	382,586
2020	906	1,808	14,651	6,950	26,366	50,681
Avg 2015–19	571	3,884	169,621	81,078	151,540	406,693
Avg 2010–19	320	2,047	117,245	83,931	127,555	331,099

Note: Some harvest numbers may differ from numbers in previous reports (e.g., Menard et al. 2013) because all personal use harvest has been removed from this table starting in 2016.

[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, 1990–2020.

	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
2019	7	18	27	9	36	77	145
2020	10	17	25	7	27	55	122
Avg 2015–2019	6	14	28	15	31	70	140
Avg 2010–2019	3	14	26	15	29	65	132

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

Appendix A3.–Round weight and value of commercially caught salmon by species, Norton Sound District, 1990–2020.

	Pounds caught (round wt. in lb)					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
2019	15,017	42,156	899,679	262,577	1,064,005	0	2,078,034
2020	10,021	10,152	83,830	17,236	182,873	0	290,302

[a] Information not available.

Appendix A4.–Estimated mean prices paid to commercial salmon fishery participants in dollars, Norton Sound District, 1990–2020.

Year	Chinook	Sockeye	Coho	Pink	Chum
1990	1.01	[a]	0.50	(0.75 for roe)[b]	0.23
1991	0.87	[a]	0.36 (3.00 for roe)	[a]	0.27 (3.00 for roe)
1992	0.66	[a]	0.33 (1.50 for roe)	0.16	0.22
1993	0.72	0.40	0.22 (1.76 for roe)	0.15	0.24
1994	1.02	[a]	0.52	0.15	0.29
1995	0.66	[a]	0.43	0.18	0.18
1996	0.54	[a]	0.28	0.10	0.08
1997	1.00	[a]	0.47	0.06	0.11
1998	0.74	[a]	0.29	0.14	0.09
1999	0.82	[a]	0.35	[a]	0.11
2000	1.30	[a]	0.30	0.10	0.15
2001	1.00	0.37	0.25	[a]	0.19
2002	0.39	[a]	0.20	[a]	0.07
2003	0.64	0.45	0.44	[a]	0.14
2004	[a]	[a]	0.39	[a]	0.14
2005	1.22	0.45	0.44	[a]	0.15
2006	1.49	[a]	0.44	[a]	0.14
2007	0.55	0.55	0.53	0.14	0.24
2008	0.73	0.56	0.77	0.23	0.34
2009	[a]	0.34	0.93	0.18	0.33
2010	2.25	0.63	1.47	0.32	0.62
2011	3.01	1.04	1.70	0.25	0.68
2012	[a]	1.45	1.47	0.36	0.52
2013	[a]	1.49	1.77	0.22	0.55
2014	2.00	0.63	1.60	0.29	0.60
2015	2.25	0.60	1.10	0.14	0.50
2016	2.45	0.90	1.39	0.10	0.48
2017	3.00	1.40	1.40	0.03	0.79
2018	2.99	1.40	1.40	0.25	0.80
2019	3.00	1.39	1.57	0.13	0.50
2020	2.99	1.40	1.76	0.19	0.52
Avg 2015–19	2.74	1.14	1.37	0.13	0.61

[a] None sold.

[b] None sold except for roe.

Appendix A5.–Mean commercial salmon harvest weights, Norton Sound District, 1990–2020.

	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
2019 [b]	10.8	6.0	6.4	3.4	6.7
2020 [b]	11.1	5.6	5.7	2.5	6.9

[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 Subdistrict 1, Norton Sound District, 1990–2020.

	Subdistrict 1 (Nome)																	
	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]	21	404	4,603	2,488	7,558	15,074	16	598	3,267	6,919	2,076	12,876	37	1,001	7,870	9,408	9,634	27,950
10-year avg [e,f]	12	225	2,562	1,512	4,361	8,672	23	390	2,554	5,814	2,436	11,217	34	593	4,860	7,175	6,361	19,021

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Appendix A6.–Page 2 of 2.

	Subdistrict 1 (Nome)																	
	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
2019	42	816	7,832	4,941	15,274	28,905	14	366	3.389	5,351	629	9,749	56	1,182	11,221	10,292	15,903	38,654
2020	37	861	6,663	1,007	7,101	15,669	66	462	2,869	11,184	1,002	15,583	103	1,323	9,532	12,191	8,103	31,252
5-year avg [d,e]	21	404	4,603	2,488	7,558	15,074	16	598	3,267	6,919	2,076	12,876	37	1,001	7,870	9,408	9,634	27,950
10-year avg [e,f]	12	225	2,562	1,512	4,361	8,672	23	390	2,554	5,814	2,436	11,217	34	593	4,860	7,175	6,361	19,021

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] 2015–2019.

[e] Confidential information is excluded from averages.

[f] 2010–2019.

Appendix A7.–Commercial and subsistence salmon catch by species, by year in Subdistrict 2, Norton Sound District, 1990–2020.

	Subdistrict 2 (Golovin)																	
	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]	32	330	2,001	5,771	16,739	24,874	59	41	1,242	5,413	1,088	7,843	91	371	3,244	11,184	17,828	32,717
10-year avg. [e]	20	171	2,654	7,102	14,145	24,092	59	47	1,340	6,099	1,473	9,018	79	218	3,995	13,201	15,618	33,111

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Appendix A7.–Page 2 of 2.

	Subdistrict 2 (Golovin)																	
	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
2019 [c]	33	122	2,424	7,412	25,598	35,591	39	9	1,277	5,174	375	6,874	72	131	3,703	12,586	25,973	42,465
2020 [c]	64	227	1,964	1,987	11,536	15,778	77	65	862	5,270	139	6,413	141	292	2,826	7,257	11,675	22,191
5-year avg. [d]	32	330	2,001	5,771	16,739	24,874	59	41	1,242	5,413	1,088	7,843	91	371	3,244	11,184	17,828	32,717
10-year avg. [e]	20	171	2,654	7,102	14,145	24,092	59	47	1,340	6,099	1,473	9,018	79	218	3,995	13,201	15,618	33,111

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] 2015–2019.

[e] 2010–2019.

Appendix A8.–Commercial and subsistence salmon catch by species, by year in Subdistrict 3, Norton Sound District, 1990–2020.

	Subdistrict 3 (Elim)																	
	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	145,669	2,311	149,547	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]	182	801	15,843	13,815	20,171	50,813	115	61	1,439	3,927	934	6,476	298	862	17,282	17,742	21,105	57,288
10-year avg. [e]	104	422	12,235	16,278	16,906	45,944	119	37	1,519	4,475	1,706	7,855	223	458	13,753	20,753	18,612	53,799

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	Subdistrict 3 (Elim)																	
	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
2019 [c]	121	724	11,450	14,911	13,803	41,009	105	20	853	3,065	570	4,613	226	744	12,303	17,976	14,373	45,622
2020 [c]	145	238	2,013	331	857	3,584	125	17	365	3,462	124	4,093	270	255	2,378	3,793	981	7,677
5-year avg. [d]	182	801	15,843	13,815	20,171	50,813	115	61	1,439	3,927	934	6,476	298	862	17,282	17,742	21,105	57,288
10-year avg. [e]	104	422	12,235	16,278	16,906	45,944	119	37	1,519	4,475	1,706	7,855	223	458	13,753	20,753	18,612	53,799

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] 2015–2019.

[e] 2010–2019.

Appendix A9.–Commercial and subsistence salmon catch by species, by year in Subdistrict 4, Norton Sound District, 1990–2020.

	Subdistrict 4 (Norton Bay)																	
	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	[a]	[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]	95	208	4,165	10,529	17,164	32,162	194	162	1,155	2,560	3,465	7,536	289	369	5,320	13,090	20,629	39,697
10-year avg. [d]	57	110	4,669	13,475	15,726	34,037	194	83	914	2,333	3,504	7,028	227	248	5,642	16,048	19,422	40,520

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Appendix A9.–Page 2 of 2.

	Subdistrict 4 (Norton Bay)																	
	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
2019	8	106	199	1,320	1,982	3,615	16	135	1,544	4,466	2,306	8,467	24	241	1,743	5,786	4,288	12,082
2020 [f]	11	17	251	24	378	681	194	162	1,155	2,560	3,465	7,536	205	179	1,406	2,584	3,843	8,217
5-year avg. [c]	95	208	4,165	10,529	17,164	32,162	194	162	1,155	2,560	3,465	7,536	289	369	5,320	13,090	20,629	39,697
10-year avg. [d]	57	110	4,669	13,475	15,726	34,037	194	83	914	2,333	3,504	7,028	227	248	5,642	16,048	19,422	40,520

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] 2015–2019.

[d] 2010–2019.

[e] A limited survey took place.

[f] 5-year average subsistence harvest used because traditional subsistence survey did not take place due to Covid-19 restrictions.

Appendix A10.–Commercial and subsistence salmon catch by species, by year in Subdistrict 5, Norton Sound District, 1990–2020.

	Subdistrict 5 (Shaktoolik)																	
	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]	92	709	41,730	13,288	33,125	88,944	225	141	2,319	3,838	531	7,054	317	850	44,049	17,125	33,656	95,997
10-year avg. [d]	56	375	27,036	12,349	30,436	70,252	219	112	1,919	4,019	712	6,982	275	487	28,955	16,368	31,148	77,234

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Appendix A10.–Page 2 of 2.

	Subdistrict 5 (Shaktoolik)																	
	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
2019	318	1,995	35,381	19,015	42,827	99,536	317	129	2,167	3,295	605	6,513	635	2,124	37,548	22,310	43,432	106,049
2020 [e]	238	364	1,646	1,292	3,864	7,404	225	141	2,319	3,838	531	7,054	462	500	3,965	5,130	4,369	14,426
5-year avg. [c]	92	709	41,730	13,288	33,125	88,944	225	141	2,319	3,838	531	7,054	317	850	44,049	17,125	33,656	95,997
10-year avg. [d]	56	375	27,036	12,349	30,436	70,252	219	112	1,919	4,019	712	6,982	275	487	28,955	16,368	31,148	77,234

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] 2015–2019.

[d] 2010–2019.

[e] 5-year average subsistence harvest used because traditional subsistence survey did not take place due to Covid-19 restrictions.

Appendix A11.–Commercial and subsistence salmon catch by species, by year in Subdistrict 6, Norton Sound District, 1990–2020.

	Subdistrict 6 (Unalakleet)																	
	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]	499	1,710	101,396	36,035	56,973	196,613	948	367	6,853	9,245	2,839	20,252	1,447	2,077	108,249	45,280	59,812	216,865
10-year avg. [d]	310	938	68,431	33,892	46,480	150,051	832	288	5,844	9,073	3,125	19,162	1,142	1,226	74,275	42,965	49,605	169,213

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	Subdistrict 6 (Unalakleet)																	
	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
2019	1,035	3,440	82,626	29,417	58,990	175,508	1,459	571	5,584	8,055	1,795	17,464	2,494	4,011	88,210	37,472	60,785	192,972
2020	491	355	2,152	3,278	2,643	8,919	1,778	381	4,183	9,235	685	16,262	2,269	736	6,335	12,513	3,328	25,181
5-year avg. [c]	499	1,710	101,396	36,035	56,973	196,613	948	367	6,853	9,245	2,839	20,252	1,447	2,077	108,249	45,280	59,812	216,865
10-year avg. [d]	310	938	68,431	33,892	46,480	150,051	832	288	5,844	9,073	3,125	19,162	1,142	1,226	74,275	42,965	49,605	169,213

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] 2015–2019.

[d] 2010–2019.

Appendix A12.–Subsistence salmon catch by species and year for St. Michael in Norton Sound District, 1994–2020.

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.					
2019	Subsistence surveys were not conducted.					
2020	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, 1994–2020.

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.					
2019	Subsistence surveys were not conducted.					
2020	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, 1990–2020.

	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
5-yr avg. [c]	922	4,162	169,739	81,927	151,730	408,479	1,557	1,369	16,275	31,902	10,933	62,036	49	155	5,682	2,939	324	9,150
10-yr avg. [d]	557	2,218	117,330	84,458	127,617	332,180	1,447	957	14,090	31,812	12,956	61,261	37	89	5,389	2,761	487	8,762

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Appendix A14.–Page 2 of 2.

	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	184	5,944	962	473	7,576
2018	906	3,623	260,707	40,449	238,029	543,714	1,161	845	15,873	29,595	6,572	54,046	0	19	6,251	1,649	218	8,137
2019	1,557	7,203	139,914	77,016	158,474	384,164	1,950	1,230	14,814	29,406	6,280	53,680	155	220	6,942	2,334	114	9,765
2020	986	2,062	14,689	7,919	26,379	52,035	2,465	1,228	11,753	35,549	5,946	56,941	[b]	[b]	[b]	[b]	[b]	[b]
5-yr avg. [c]	922	4,162	169,739	81,927	151,730	408,479	1,557	1,369	16,275	31,902	10,933	62,036	49	155	5,682	2,939	324	9,150
10-yr avg. [d]	557	2,218	117,330	84,458	127,617	332,180	1,447	957	14,090	31,812	12,956	61,261	37	89	5,389	2,761	487	8,762

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 not available.

[c] 2015–2019.

[d] 2010–2019.

Appendix A15.–Sport salmon harvest by species, by year, for the Unalakleet River, 1990–2020.

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	0	5,333	30	49	5,412
2019	155	5,144	96	282	5,677
2020	Information is not yet available.				
Avg 2015–2019	49	4,255	97	313	4,714
Avg 2010–2019	36	3,556	147	375	4,114

Appendix A16.–Sport salmon harvest by species, by year for the Fish and Niukluk Rivers, 1990–2020.

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	0	400	30	82	512
2019	0	182	0	0	182
2020	Information is not yet available.				
Avg 2015–2019	0	341	12	62	415
Avg 2010–2019	0	675	23	108	806

Appendix A17.–Sport salmon harvest by species, by year for the Nome River, 1990–2020.

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	0	914	188	1,600	2,702
2019	0	832	0	980	1,812
2020	Information is not yet available.				
Avg 2015–2019	0	742	111	1,325	2,177
Avg 2010–2019	1	538	75	1,215	1,829

Appendix A18.–Subdistrict 1 chum salmon estimated escapement, 1999–2020.

Year	Rivers	Aerial survey counts	Estimated escapement [a]
1999	Nome	–	1,048
	Snake[b]	–	484
	Eldorado[b]	–	4,218
	Flambeau	51	637
	Solomon	51	637
	Sinuk	1,697	6,370
	Bonanza	361	2,304
			15,698
2000	Nome	658	4,056
	Snake[b]	–	1,394
	Eldorado[b]	3,383	11,617
	Flambeau	819	3,947
	Solomon	150	1,294
	Sinuk[c]	–	7,198
	Bonanza	1,130	4,876
			34,382
2001	Nome	946	3,166
	Snake[b]	752	1,945
	Eldorado[b]	4,450	11,635
	Flambeau	3,612	10,465
	Solomon	280	1,949
	Sinuk	3,746	10,718
	Bonanza	1,084	4,745
			44,623
2002	Nome	–	1,720
	Snake[b]	402	2,776
	Eldorado[b]	–	10,215
	Flambeau	1,876	6,804
	Solomon	325	2,150
	Sinuk	1,682	6,333
	Bonanza	595	3,199
			33,197
2003	Nome	888	1,958
	Snake	440	2,201
	Eldorado	1,257	3,591
	Flambeau	647	3,380
	Solomon	73	806
	Sinuk	677	3,482
	Bonanza	220	1,664
			17,082
2004	Nome	–	4,095
	Snake	–	2,165
	Eldorado	–	3,277
	Flambeau	2,250	7,667
	Solomon[c]	–	1,507
	Sinuk[c]	–	3,198
	Bonanza[c]	–	2,167
			24,076
2005	Nome	2,082	5,584
	Snake	1,842	2,967
	Eldorado	5,445	10,369
	Flambeau	2,261	7,692
	Solomon	775	3,806
	Sinuk	1,072	4,710
	Bonanza	1,370	5,534
			40,662
2006	Nome	394	5,204
	Snake	840	4,160
	Eldorado	2,355	42,105
	Flambeau	16,000	27,828
	Solomon	305	2,062
	Sinuk	1,115	4,834
	Bonanza	60	708
			86,901
2007	Nome	1,449	7,034
	Snake	1,702	8,147
	Eldorado	6,315	21,312
	Flambeau	4,452	12,006
	Solomon	673	3,469
	Sinuk	7,210	16,481
	Bonanza	2,628	8,491
			76,940
2008	Nome	106	2,607
	Snake	–	1,294
	Eldorado	–	6,746
	Flambeau	4,235	11,618
	Solomon[c]	–	959
	Sinuk[c]	–	5,367
	Bonanza[c]	–	3,636
			32,227
2009	Nome	–	1,565
	Snake	–	891
	Eldorado	1,069	4,943
	Flambeau	860	4,075
	Solomon	89	918
	Sinuk	344	2,232
	Bonanza	1,851	6,744
			21,368
2010	Nome	2,998	5,906
	Snake	2,625	6,974
	Eldorado[d]	30,600	42,612
	Flambeau	13,600	25,009
	Solomon	454	2,678
	Sinuk	3,955	11,107
	Bonanza	686	3,513
			97,799

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Appendix A18.–Page 2 of 3.

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	–	4,846	2014	Nome	–	5,789
	Snake	–	2,995		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]	–	1,504
	Sinuk	19,500	31,691		Sinuk	9,050	19,136
	Bonanza	5,284	13,437		Bonanza	8,602	18,508
			108,405				97,436
2015	Nome	–	6,166	2016	Nome	–	7,093
	Snake	–	4,442		Snake	–	3,677
	Eldorado	–	25,560		Eldorado	–	18,938
	Flambeau	4,455	12,011		Flambeau	5,175	13,254
	Solomon [e]	–	1,128		Solomon [e]	–	2,016
	Sinuk	17,615	29,643		Sinuk	–	9,408
	Bonanza	–	13,212		Bonanza	–	6,374
			92,162				60,760
2017	Nome	–	8,340	2018	Nome	–	5,240
	Snake	–	5,165		Snake	–	3,133
	Eldorado	–	73,882		Eldorado	–	42,361
	Flambeau	8,063	17,738		Flambeau	4,921	12,823
	Solomon [e]	–	3,931		Solomon [e]	–	2,917
	Sinuk	2,081	7,284		Sinuk	–	11,061
	Bonanza	2,280	7,734		Bonanza [f]	–	7,903
			124,074				85,438
2019 [g]	Nome	–	6,014	2020	Nome	–	2,822
	Snake	–	2,375		Snake	–	842
	Eldorado	–	28,427		Eldorado	–	11,333
	Flambeau	5,057	13,054		Flambeau	3,051	9,366
	Solomon [e]	–	1,226		Solomon [e]	–	830
	Sinuk	–	13,024		Sinuk	–	3,638
	Bonanza [f]	–	8,824		Bonanza [f]	–	2,471
			72,944				31,302

-continued-

Notes: 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. Also, hierarchical Bayesian analysis was done for years prior to 2019 for chum salmon for Nome, Snake, and Solomon Rivers, so some numbers might have changed compared to the previous annual management reports. Dashes indicate that no aerial surveys were conducted for those rivers in those years.

[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.

[f] Bonanza escapement was a weir count beginning in 2018.

[g] High water resulted in a late start and early pulling of counting projects. Except for Flambeau and Sinuk Rivers, all counts should be considered minimal.

Appendix A19.–Historical escapement of salmon and Dolly Varden at Eldorado River counting tower, 1997–2002, and weir, 2003–2020.

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
2019 [b]	July 11–July 29	15	28,427	54,882	4	36	8
2020	June 25–Aug 01	19	11,333	164,064	33	79	28

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

[b] Project started late because water was too high to install weir and count fish.

Appendix A20.–Historical escapement of salmon and Dolly Varden at Snake River counting tower 1995–2002 and weir 2003–2020.

Year	Operating period	Chinook	Chum	Pink	Coho	Sockeye	Dolly Varden
1995	July 01–Aug 18	0	3,498	919	857	0	ND
1996	July 03–Aug 22	5	2,772	44,558	1,638	0	ND
1997	July 07–Aug 18	12	4,811	6,742	1,157	0	ND
1998	July 01–Aug 11	0	7,952	219,679	178	0	ND
1999	July 01–Aug 14	20	484	116	90	0	ND
2000	June 29–Aug 25	28	1,394	4,723	406	0	ND
2001	July 08–Sept 05	33	1,945	1,295	1,335	0	ND
2002 [a]	June 28–Sept 16	9	2,776	4,103	851	8	149
2003	June 26–Sept 11	50	2,201	2,856	489	84	111
2004	June 23–Sept 03	17	2,165	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	1,294	145,761	5,206	143	452
2009 [b]	July 08–Aug 30	6	891	769	50	2	14
2010	July 03–Sept 11	43	6,974	51,099	2,243	124	198
2011	July 08–Sept 11	1	4,352	7,090	343	14	5
2012	July 06–Aug 15	1	978	8,601	22	3	3
2013	July 19–Sept 10	8	2,995	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	6	4,442	16,321	1,638	56	67
2016	July 01–Sept 20	15	3,677	204,641	1,115	120	277
2017	July 01–Sept 11	8	5,165	22,252	2,974	269	116
2018	July 07–Sept 13	12	3,133	463,742	7,491	455	215
2019 [c]	July 14–Sept 05	7	2,375	101,151	3,408	251	43
2020	July 06–Sept 14	9	842	375,815	3,069	678	100

Notes: Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods were standardized in 2015 and 2018. Also, hierarchical Bayesian analysis was done for years prior to 2019 for chum salmon, so some numbers might have changed compared to previous annual management reports.

[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 the last week of August and hundreds of coho salmon passed through the weir without being counted.

[c] Counts should be considered minimal because project started late, the weir was inoperable August 1–20, and project was pulled early, all because of high water.

Appendix A21.–Historical salmon escapement at Kwiniuk River counting tower, 1990–2020.

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	16,999	8,423	261	9,532
2002	June 17–Sept 11	37,995	1,114,410	778	6,459
2003	June 15–Sept 15	12,125	22,329	747	5,490
2004	June 16–Sept 14	10,362	3,054,684	639	11,240
2005	June 17–Sept 13	12,102	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	71,409	634,169	138	8,058
2011	June 20–Sept 11	32,263	30,913	57	3,290
2012	June 23–Aug 16	5,765	393,030	60	781
2013	June 24–Sept 11	5,631	13,212	15	3,729
2014	June 15–Sept 08	40,195	322,830	429	14,637
2015	June 15–Sept 03	37,812	67,295	312	6,252
2016	June 17–Sept 16	8,528	1,909,949	135	9,210
2017	June 15–Sept 12	32,564	506,593	63	13,593
2018	July 04–Sept 16	41,658	1,804,752	87	17,172
2019 [a]	July 02–Sept 06	21,363	808,156	122	5,649
2020	June 25–Sept 07	4,953	1,767,447	417	5,361

Notes: 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. Also, hierarchical Bayesian analysis was done for 2001–2019 for Chinook and chum salmon, so some numbers might have changed compared to previous annual management reports.

[a] Project started late and was pulled early because of high water.

Appendix A22.–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 A23.–Salmon escapement at Bonanza River weir, 2018–2020.

Year	Operating period	Chum	Pink	Chinook	Coho	Sockeye
2018	July 08–Aug 19	7,903	885,735	11	1,030	189
2019 [a]	July 09–July 30	8,824	167,516	8	159	9
2020 [b]	June 25–July 27	2,471	226,405	15	11	27

Note: The Bonanza River weir was initiated in 2018.

[a] Project was pulled early because of high water.

[a] Project was pulled early because of a lack of staff.

Appendix A24.–Historical salmon escapement at Nome River counting tower, 1993–1995, and weir, 1996–2020.

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	2,984	142,604	55	726	ND
1995	June 22–Sept 06	4,934	13,893	5	1,650	ND
1996	June 26–July 23	3,339	95,681 [a]	5	66	ND
1997	June 27–Aug 27	5,664	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	3,166	3,138	7	2,418	55
2002	June 29–Sept 11	1,720	35,057	7	3,418	29
2003	July 05–Sept 10	1,958	11,402	12	548	47
2004	June 25–Sept 12	4,095	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	5,204	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	5,906	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	4,846	10,257	9	2,624	38
2014	July 05–Sept 11	5,789	96,397	8	2,637	34
2015	July 01–Sept 20	6,166	75,603	23	2,418	96
2016	July 01–Sept 20	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	5,240	3,246,072	56	8,902	245
2019 [b]	July 10–Sept 02	6,014	656,033	6	1,905	20
2020	June 29–Sept 14	2,822	2,270,248	8	3,667	414

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. Also, hierarchical Bayesian analysis was done for years prior to 2019 for chum salmon, so some numbers might have changed compared to previous annual management reports.

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

[b] Project started late and was pulled early because of high water.

Appendix A25.–Salmon escapement at Solomon River weir, 2013–2020.

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	1,504	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	456,035	11	161	18
2019 [a]	July 14–Aug 01	1,226	40,440	0	45	27
2020	July 01–Aug 19	830	474,968	10	402	142

Notes: The Solomon River weir was initiated in 2013. Hierarchical Bayesian analysis was done for years prior to 2019 for chum salmon, so some numbers might have changed compared to previous annual management reports.

[a] Project started late and was pulled early because of high water.

Appendix A26.–Historical sockeye salmon escapement at Glacial Lake weir, 2000–2015.

Year	Operating period	Chum [a]	Pink [b]	Sockeye
2000	July 11–July 30	ND	ND	884
2001	July 02–July 28	1	ND	2,487
2002	June 25–July 26	ND	ND	1,047
2003	June 24–July 28	ND	ND	2,004
2004	June 18–July 25	1	ND	8,115
2005	June 20–July 25	ND	ND	11,135
2006	July 04–July 18	ND	ND	6,849
2007	July 05–July 20	ND	ND	4,533
2008	June 27–July 28	10	614	1,794
2009	June 20–July 27	ND	ND	826
2010	June 26–July 28	ND	ND	1,047
2011	June 28–July 26	4	ND	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	ND	ND	4,211
2015 [e]	June 24–July 12	ND	ND	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 A27.–Historical salmon escapement at Inglutalik River counting tower, 2011–2020.

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
2019	June 19–Aug 02 [e]	24,624	209,025	172	918
2020	July 30–Aug 23 [f]	2,109	55,317	0	1,305

Notes: The Inglutalik River tower was initiated in 2011. 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 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.

[e] Counts should be considered minimal because tower was inoperable July 25–30 and project was pulled early.

[f] Counts should be considered minimal because tower became operational late in the salmon run.

Appendix A28.–Historical salmon escapement at North River counting tower, 1996–2020.

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	5,751	127,926	2,940	5,768
1998	June 15–Aug 12	1,526	74,045	1,773	3,361
1999	June 30–Aug 31	3,563	48,993	1,022	4,792
2000	June 17–Aug 12	4,971	69,703	1,046	6,959
2001	July 05–Sept 15	5,606	24,737	895	12,383
2002	June 19–Aug 29	6,491	321,756	1,484	2,966
2003	June 15–Sept 13	10,182	280,212	1,223	5,837
2004	June 15–Sept 14	10,036	1,162,978	1,125	11,187
2005	June 15–Sept 15	11,878	1,670,934	1,015	19,189
2006	June 18–Sept 11	6,034	2,169,890	906	9,835
2007	June 16–Sept 05	8,932	580,935	1,948	19,965
2008	June 19–Sept 13	9,502	241,798	909	15,648
2009	June 19–Sept 11	10,283	190,289	2,357	22,274
2010	June 19–Sept 07	16,438	150,688	1,219	7,723
2011	June 17–Sept 08	20,705	138,542	841	4,975
2012	June 21–Aug 19	9,860	137,012	975	3,258
2013	July 01–Aug 05	12,021	48,097	580	9,115
2014	June 14–Sept 01	13,872	246,075	2,225	4,995
2015	June 14–Aug 25	22,866	465,681	1,950	9,432
2016	June 13–Sept 07	21,681	1,045,410	522	2,259
2017	June 14–Sept 12	26,025	1,530,582	1,045	2,346
2018	June 26–Aug 26	26,728	477,429	2,583	20,010
2019 [a]	June 15–Aug 01	11,223	2,070,267	3,315	1,533
2020 [b]	July 06–Sept 07	1,439	690,036	1,068	1,938

Notes: 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. Also, hierarchical Bayesian analysis was done for years prior to 2019 for Chinook and chum salmon, so some numbers might have changed compared to previous annual management reports.

[a] Project was pulled early because of high water.

[b] Project started late because of high water.

Appendix A29.–Historical salmon escapement at Unalakleet River weir, 2010–2020.

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	680	25,550	217
2014	June 28–Aug 27	55,341	1,194,708	1,132	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	2,947	21,453	1,199
2018	July 02–Aug 08	128,253	[a]	3,650	58,755	630
2019	June 21–Aug 02	65,023	[a]	6,641	10,746	1,093
2020	No weir					

Notes: 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. Also, hierarchical Bayesian analysis was done for years prior to 2019 for Chinook salmon, so some numbers might have changed compared to previous annual management reports.

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

Appendix A30.–Chum salmon escapement by river, Subdistrict 1, 1993–2020.

	Rivers west of Cape Nome			Rivers east of Cape Nome				
Year	Sinuk [a]	Snake [b]	Nome [c]	Flambeau [a]	Eldorado [d]	Bonanza [a]	Solomon [a]	Total
1993	6,052	2,115	5,925	6,103	9,048	3,007	2,525	34,775
1994	4,905	3,519	2,984	12,889	13,202	5,178	1,066	43,743
1995	9,464	3,498	4,934	16,474	18,955	11,182	2,106	66,613
1996	6,658	2,772	3,339	13,613	32,970	7,049	2,141	68,542
1997	9,212	4,811	5,664	9,455	14,302	4,140	2,111	49,695
1998	6,720	7,952	1,930	9,129	13,808	4,552	925	45,016
1999	6,370	484	1,048	637	4,218	2,304	637	15,698
2000	7,198	1,394	4,056	3,947	11,617	4,876	1,294	34,382
2001	10,718	1,945	3,166	10,465	11,635	4,745	1,949	44,623
2002	6,333	2,776	1,720	6,804	10,215	3,199	2,150	33,197
2003	3,482	2,201	1,958	3,380	3,591	1,664	806	17,082
2004	3,198	2,165	4,095	7,667	3,277	2,167	1,507	24,076
2005	4,710	2,967	5,584	7,692	10,369	5,534	3,806	40,662
2006	4,834	4,160	5,204	27,828	42,105	708	2,062	86,901
2007	16,481	8,147	7,034	12,006	21,312	8,491	3,469	76,940
2008	5,367	1,294	2,607	11,618	6,746	3,636	959	32,227
2009	2,232	891	1,565	4,075	4,943	6,744	918	21,368
2010	11,107	6,974	5,906	25,009	42,612	3,513	2,678	97,799
2011	15,028	4,352	3,578	15,056	16,273	7,357	4,529	66,173
2012	10,537	978	2,028	17,517	13,348	6,002	1,377	51,787
2013	31,691	2,995	4,846	27,928	26,131	13,437	1,377	108,405
2014	19,136	3,983	5,789	21,462	27,054	18,508	1,504	97,436
2015	29,643	4,442	6,166	12,011	25,560	13,212	1,128	92,162
2016	9,408	3,677	7,093	13,254	18,938	6,374	2,016	60,760
2017	7,284	5,165	8,340	17,738	73,882	7,734	3,931	124,074
2018	11,061	3,133	5,240	12,823	42,361	7,903	2,917	85,438
2019	13,024	2,375	6,014	13,054	28,427	8,824	1,226	72,944
2020	3,638	842	2,822	9,366	11,333	2,471	830	31,302
Total	275,491	92,007	120,635	349,000	558,232	174,511	53,944	1,623,820

Notes: 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. Also, hierarchical Bayesian analysis was done for chum salmon for Nome, Snake, and Solomon Rivers in 2019, so some numbers might have changed compared to previous annual management reports.

[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 (2003–2020). Escapement goal range was 1,600–2,500 chum salmon from 2001–2018 and 2,000–4,200 chum salmon from 2091–2020.

[c] Nome River escapements are estimated by aerial survey expansion (1993), tower counts (1994–1995), and weir counts (1996–2020). Escapement goal range was 2,900–4,300 chum salmon from 2001–2018 and 1,600–5,300 chum salmon from 2019–2020.

[d] Eldorado River escapements are estimated by aerial survey (1993–1996), tower counts (1997–2002), and weir counts (2003–2020). Escapement goal range was 6,000–9,200 chum salmon from 2001–2018 and 4,400–14,200 chum salmon from 2019–2020.

Appendix A31.–Pink salmon escapement by year and river, Subdistrict 1, 1993–2020.

	Rivers west of Cape Nome			Rivers east of Cape Nome				
Year	Sinuk [a]	Snake [b]	Nome [c]	Flambeau [a]	Eldorado [d]	Bonanza [a]	Solomon [a]	Total
1993	5,120	ND	13,036	5,584	120	ND	ND	23,860
1994	492,100	63,860	142,604	19,202	53,890	20	ND	771,676
1995	1,250	919	13,893	8,086	4,243	619	350	29,360
1996	74,400	44,558	95,681	17,182	46,100	40,510	15,230	333,661
1997	1,200	6,742	8,035	2,117	1,022	ND	80	19,196
1998	342,100	219,679	359,469	8,720	137,283	167,130	45,175	1,279,556
1999	180	116	2,033	1,251	977	245	90	4,892
2000	12,175	4,723	41,673	2,159	55,992	12,410	2,899	132,031
2001	115	1,295	3,138	924	488	221	ND	6,181
2002	28,487	4,103	35,057	2,233	119,098	17,095	9,170	215,243
2003	9,907	2,856	11,402	194	173	1,540	157	26,229
2004	1,267,100	126,917	1,051,146	7,351	60,866	185,000	109,000	2,807,380
2005	211,285	13,813	285,759	873	12,356	55,000	11,100	590,186
2006	515,000	74,028	578,555	6,556	222,348	268,500	165,215	1,830,202
2007	6,810	4,634	24,395	336	833	1,360	2,400	40,768
2008	1,496,000	145,761	1,186,554	3,510	244,641	212,000	81,000	3,369,466
2009	6,740	769	16,490	175	1,119	3,276	1,565	30,134
2010	168,600	51,099	165,934	4,797	48,136	106,000	21,804	566,370
2011	21,100	7,090	14,384	58	507	11,050	5,580	59,769
2012	506,500	8,601	151,791	2,657	59,318	54,700	15,000	798,567
2013	143,921	1,333	10,257	ND	1,029	800	2,733	160,073
2014	115,000	20,067	96,397	25,000	46,746	71,000	20,691	394,901
2015	57,050	16,321	75,603	400	1,483	10,500	18,764	180,121
2016	405,200	204,641	1,175,723	1,450	42,699	139,200	128,046	2,096,959
2017	150,200	22,252	717,770	1,320	12,357	19,490	63,988	987,377
2018	1,068,000	463,742	3,246,072	1,320	197,119	885,735	456,035	6,318,023
2019	420,000	101,151	656,033	210	54,882	167,516	40,440	1,440,232
2020	1,800,0000	375,815	2,270,248	ND	164,064	226,405	474,968	5,311,500
Totall	9,325,540	1,986,8855	12,449,1322	123,665	1,589,8899	2,657,3222	1,691,4800	29,823,9133

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 (2003–2020).

[c] Nome River escapements are estimated by tower counts (1993–1995) and weir counts (1996–2020). 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 (2003–2020).

Appendix A32.–Number of customary trade permits issued, Norton Sound District and Port Clarence District, 2007–2020.

	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
2019	4	0	0	0	0	0	0	0	0	0	5	0	9	$1,390.00
2020	1	0	0	0	0	0	0	0	0	0	2	0	3	$385.00

APPENDIX B: PORT CLARENCE FISHERIES

Appendix B1.–Comparative sockeye salmon aerial survey indices, Port Clarence District, 1990–2020.

Year	Salmon Lake	Grand Central 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
2019	26,935	8,700	35,635
2020	921	4,980	5,901

[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 (2003–2020).

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	9,683	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]	85,543	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	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	8,824	229
2012	June 26–Aug 18	65	25,733	46,201	95	7,632	65
2013	June 27–Sept 08	37	47,557	1,060	890	12,428	27
2014	June 25–Aug 27	48	25,634	4,197	425	9,719	66
2015	July 02–Aug 25	99	41,121	2,807	296	36,150	76
2016	June 23–Aug 25	34	21,379	2,986	554	15,184	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	39,976	294
2019	July 11–Aug 18	164	18,480	387,799	240	30,451	206
2020	June 23–Aug 13	55	5,580	105,686	184	15,298	193

Note: Some numbers have changed compared to previous reports (e.g., Menard et al. 2013) because of postseason updating or because interpolation methods in calculating escapement counts were standardized in 2015. Also, hierarchical Bayesian analysis was done for years prior to 2019 for sockeye salmon, so some numbers might have changed compared to previous annual management reports.

[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.

Appendix B3.–Estimated number of subsistence fishing families and harvest in Port Clarence District, 1994–2020.

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
2019 [c]	575 [d]	60	12,309	733	5,654	2,906	21,662
2020 [c]	785 [d]	40	7,754	560	6,130	2,303	16,787
5-year avg. [e]	628	52	13,225	674	4,576	4,790	23,317
10-year avg. [f]	490	48	7,920	628	4,272	5,300	18,167

[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).

[e] 2015–2019.

[f] 2010–2019.

Appendix B4.–Application of 20-05-00 liquid blend of phosphorous and nitrogen fertilizer to Salmon Lake, 1997–2020.

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	NA
2003	0	NA
2004	27	NSEDC/ADF&G
2005	0	NA
2006	0	NA
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
2019	35	NSEDC
2020	10	NSEDC

Note: NSEDC = Norton Sound Economic Development Corporation; ADF&G = Alaska Department of Fish and Game; BLM = Bureau of Land Management.

APPENDIX C: KOTZEBUE FISHERIES

Appendix C1.–Kotzebue District chum salmon catch statistics, 1990–2020.

Year	Chum salmon		Other [a]	Number of participants	Season catch per participant
	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
2019	494,593	4,017,629	45	92	5,376
2020	149,808	1,204,780	12	68	2,203
Avg 2010–2019	407,708	3,335,932	7	88	4,625

[a] Can include Chinook, sockeye, 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 fishery participants by species, 1990–2020.

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]
2019	8.1	0.39	2.00	[a]	[a]
2020	8.0	0.45	3.50	[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, 1990–2020.

Year	Gross value of catch to participants [a]	Number of participants	Average value per participant
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
2019	$1,559,260	92	$16,948
2020	$542,308	68	$7,975
Avg 2010–2019	$1,353,226	88	$15,153

[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, 1990–2020.

	Commercial catch			Subsistence catch [a]			
Year	Chum [b]	Other [c]	Total	Chum	Number of participants interviewed	Average catch per participant	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.			
Average 2010–2019	407,720	971	408,691	Average 1998–2014	42,537	400	109	226,135

-continued-

Year	Commercial catch				Subsistence catch [a]			
	Chum [b]	Other [c]	Total		Chum	Number of participants interviewed	Average catch per participant	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.			
2019	494,593	3,523	498,116		Subsistence surveys were not conducted.			
2020	149,808	1,010	150,818		Subsistence surveys were not conducted.			
Average 2010–2019	407,720	971	408,691	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.

Year	Village					Kobuk River villages	Noatak village	Village					District total
	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, 1990–2014.

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 and 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]	[b]	
Beaver Creek mouth	2,515	–	–	–		–	–	914 [b]	[b]	
Above Beaver Creek	–	4,155	740	3,174		3,486	14,940	850 [b]	[b]	
Upper Kobuk River total	15,355	24,525	11,803	12,158		35,725	74,770	8,513 [b]	[b]	27,340
Squirrel River	5,500	4,606	2,765	4,463		10,605	10,740	4,779 [b]	[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 and 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 and 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	–	–	
Unknown					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. Dashes indicate no data because no survey was flown for that river in that year.

[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.

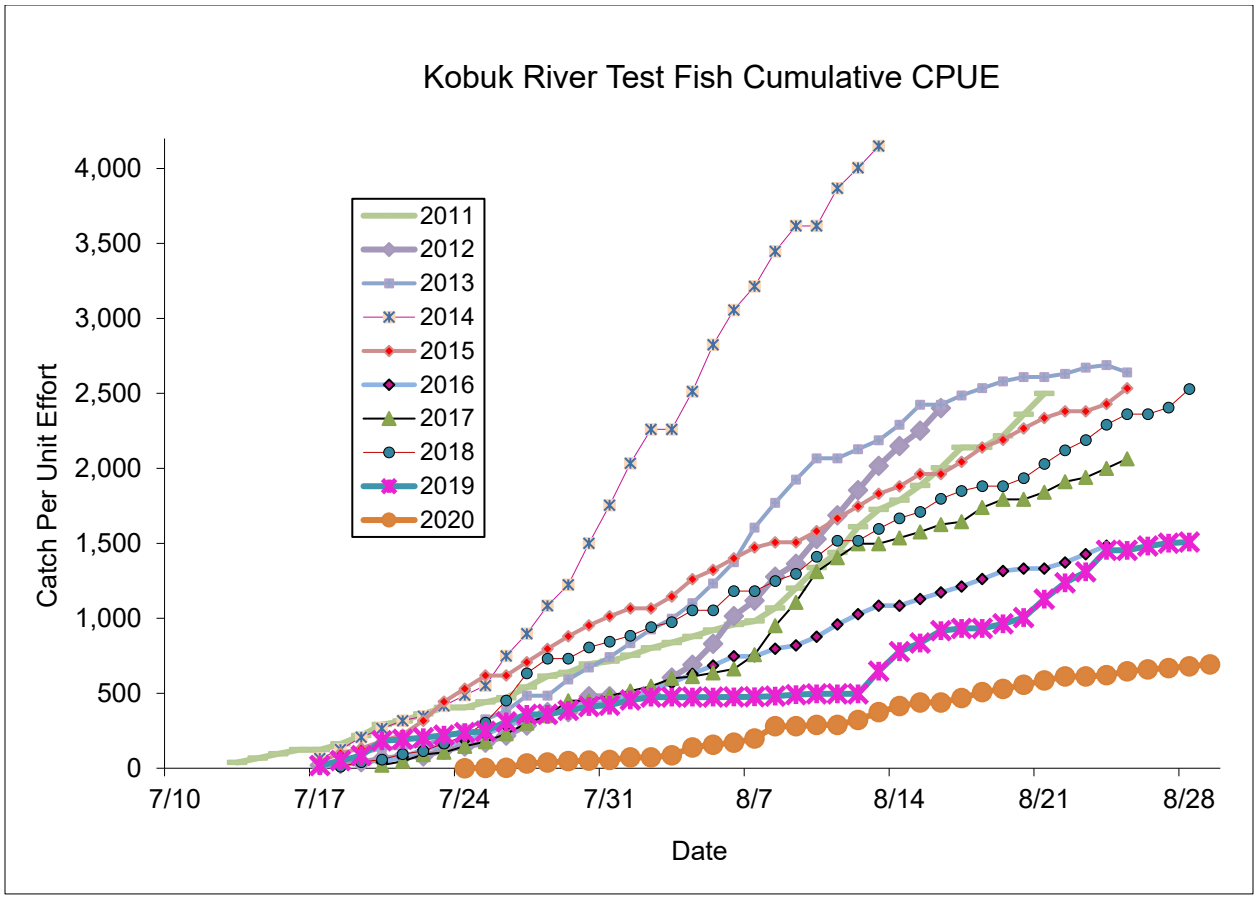
[b] Poor survey conditions or incomplete, early, or late survey.

[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), 2011–2020.

APPENDIX D: HERRING FISHERIES

Appendix D1.–Norton Sound herring and spawn-on-kelp harvests (in short tons) by U.S. commercial fishery participants, 1990–2020.

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
2019 [b]	0	42	42	0
2020 [b]	0	84	84	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, 1990–2020.

Year	Estimated biomass (tons)	Catch gillnet (tons)	Beach seine (tons)	Wild kelp (tons)	*Macrocystis* kelp (lb)	Number of participants	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

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Appendix D2.–Page 2 of 2.

Year	Estimated biomass (tons)	Catch gillnet (tons)	Beach seine (tons)	Wild kelp (tons)	*Macrocystis* kelp (lb)	Number of participants	Dollar value (millions)	Number of buyers	Average roe %	Peak catch day	Fishery duration
2016 [a]	35,612	14	0	0	0	6	0.01	1	[a]	5/16	5/16–05/22
2017 [a]	34,180 [f]	55	0	0	0	6	0.03	1	[a]	5/18	5/17–05/30
2018 [a]	34,180 [f]	81	0	0	0	6	0.05	1	[a]	5/16	5/15–05/19
2019 [a]	34,180 [f]	42	0	0	0	7	0.03	1	[a]	5/11	5/10–05/12
2020 [a]	34,180 [f]	84	0	0	0	7	0.05	1	[a]	5/24	5/23–05/25

[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 2013 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. Some estimates were refined postseason and thus might be different than in previous FMRs.

Appendix D3.–Norton Sound commercial herring harvest (short tons) by subdistrict, by year, 1990–2020.

	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	
2019	0	42	0	0	0	0	0	42	
2020	0	84	0	0	0	0	0	84	

[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).

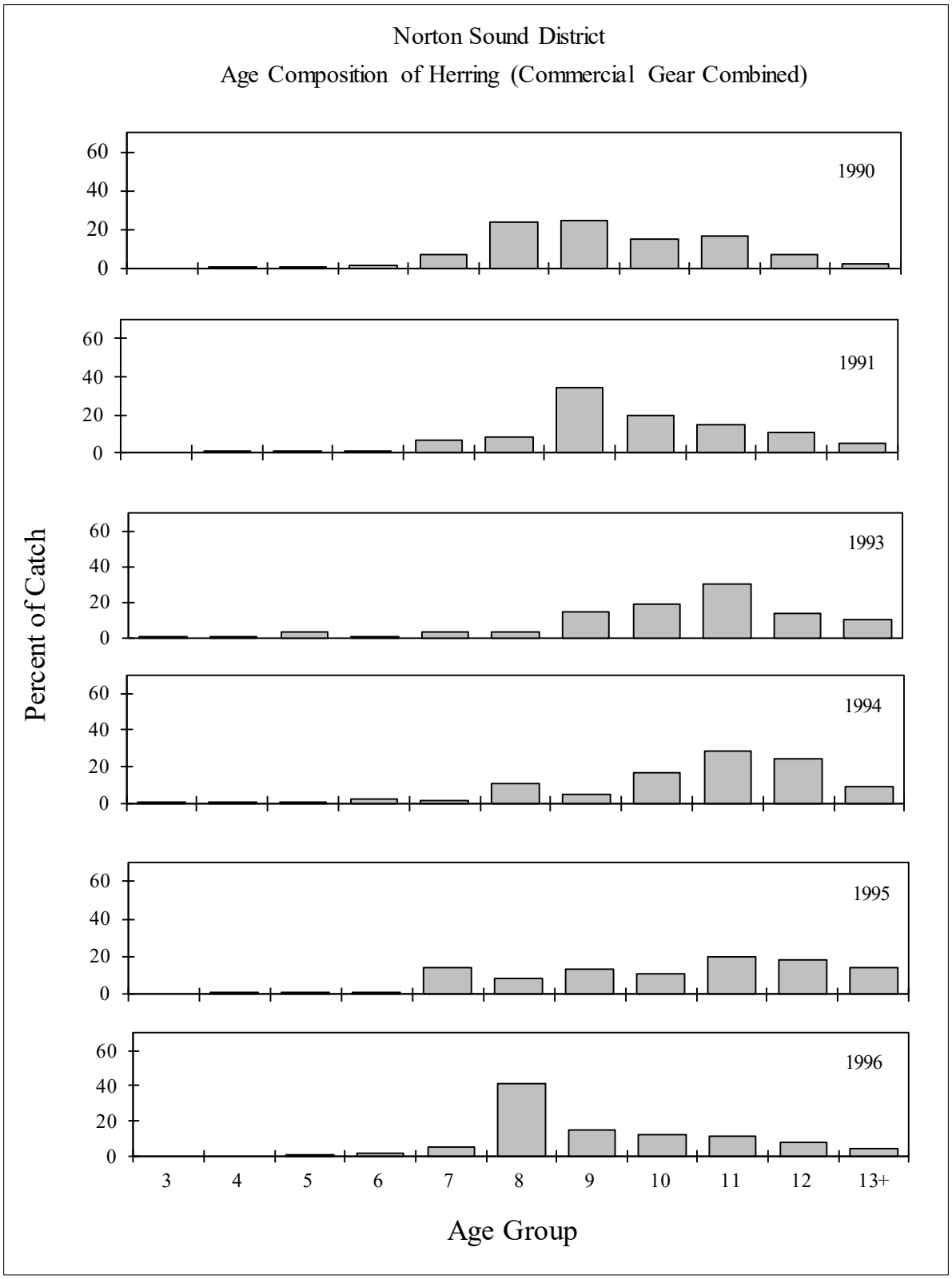
[h] Does not include an estimated 5 st of wastage.

[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.

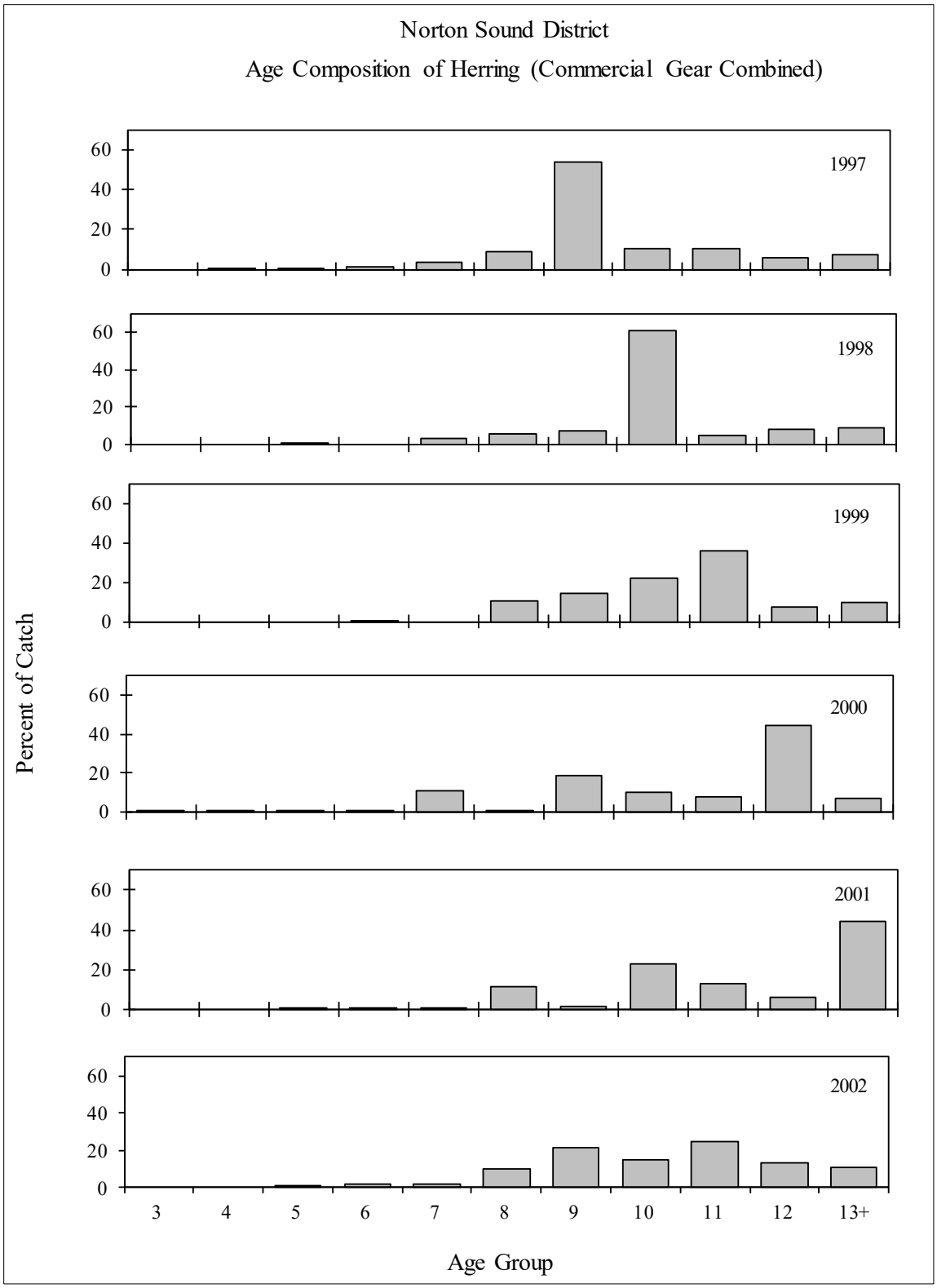
Appendix D4.–Port Clarence District commercial herring fishery, 1986–1996.

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



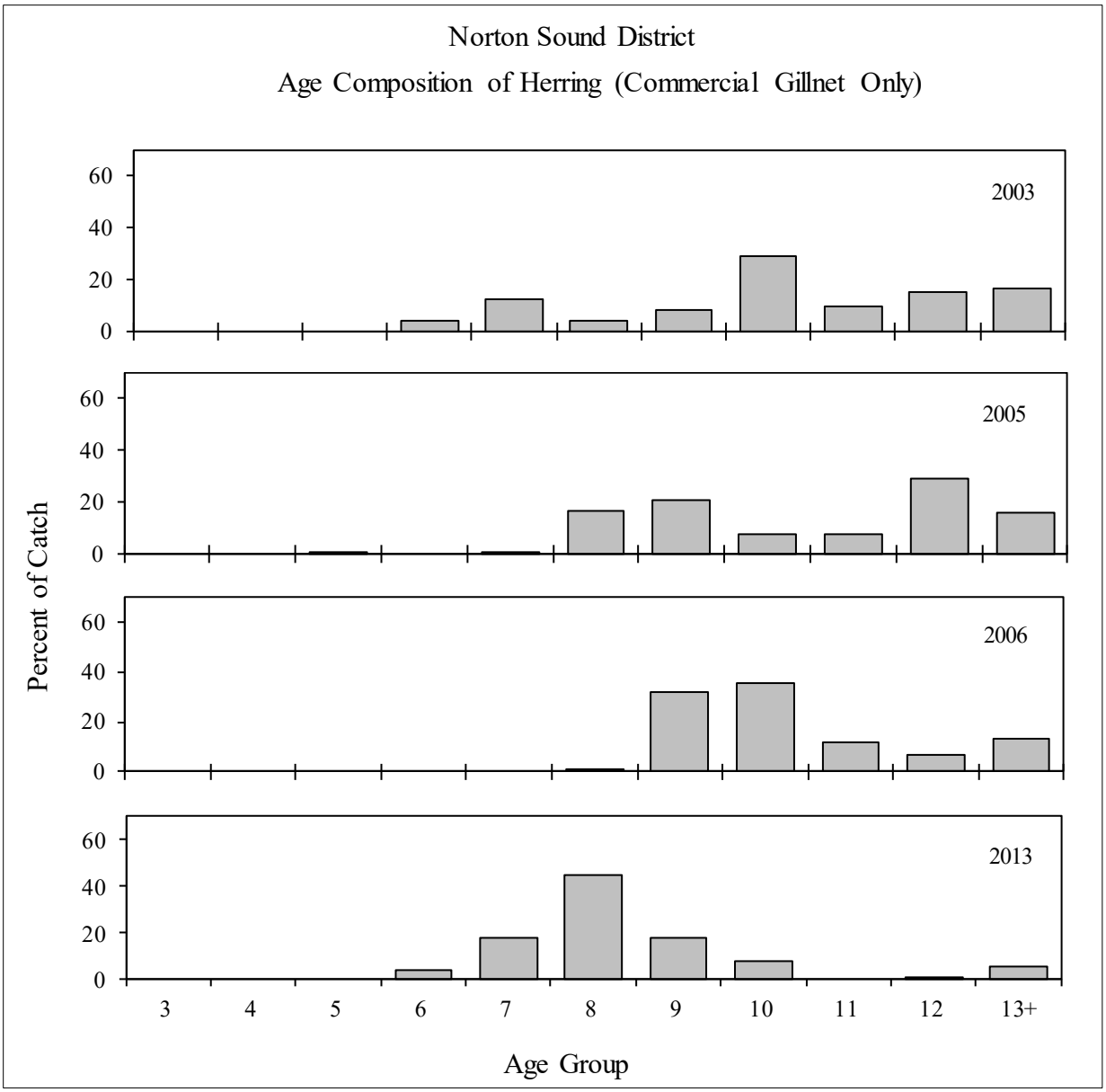
Appendix D5.–Norton Sound herring age class composition by percentage of commercial catch, commercial gear combined (beach seine and gillnet), 1990–1996.

Note: No commercial fishing occurred in 1992.



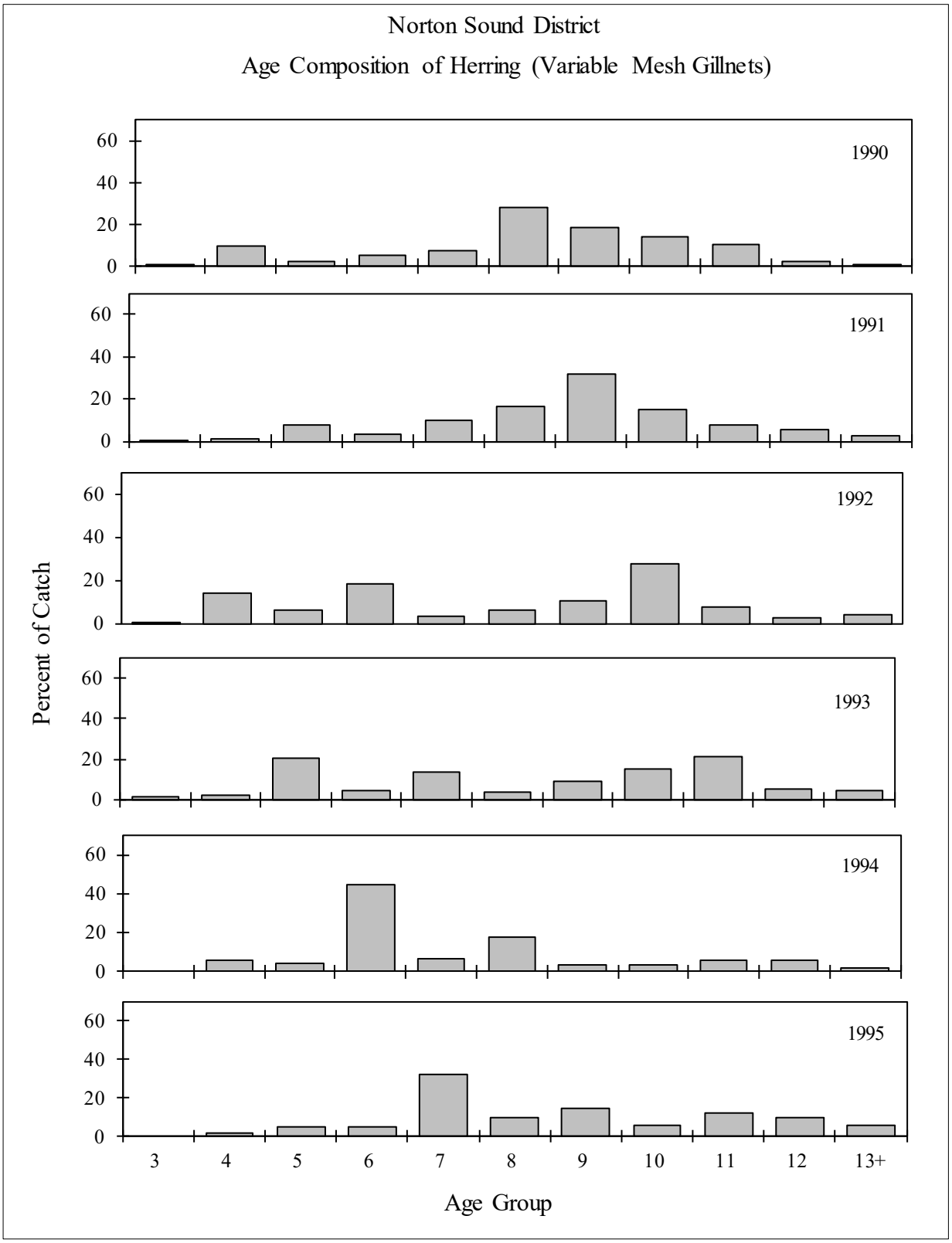
Appendix D6.–Norton Sound herring age class composition by percentage of commercial catch, commercial gear combined (beach seine and gillnet), 1997–2002.

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

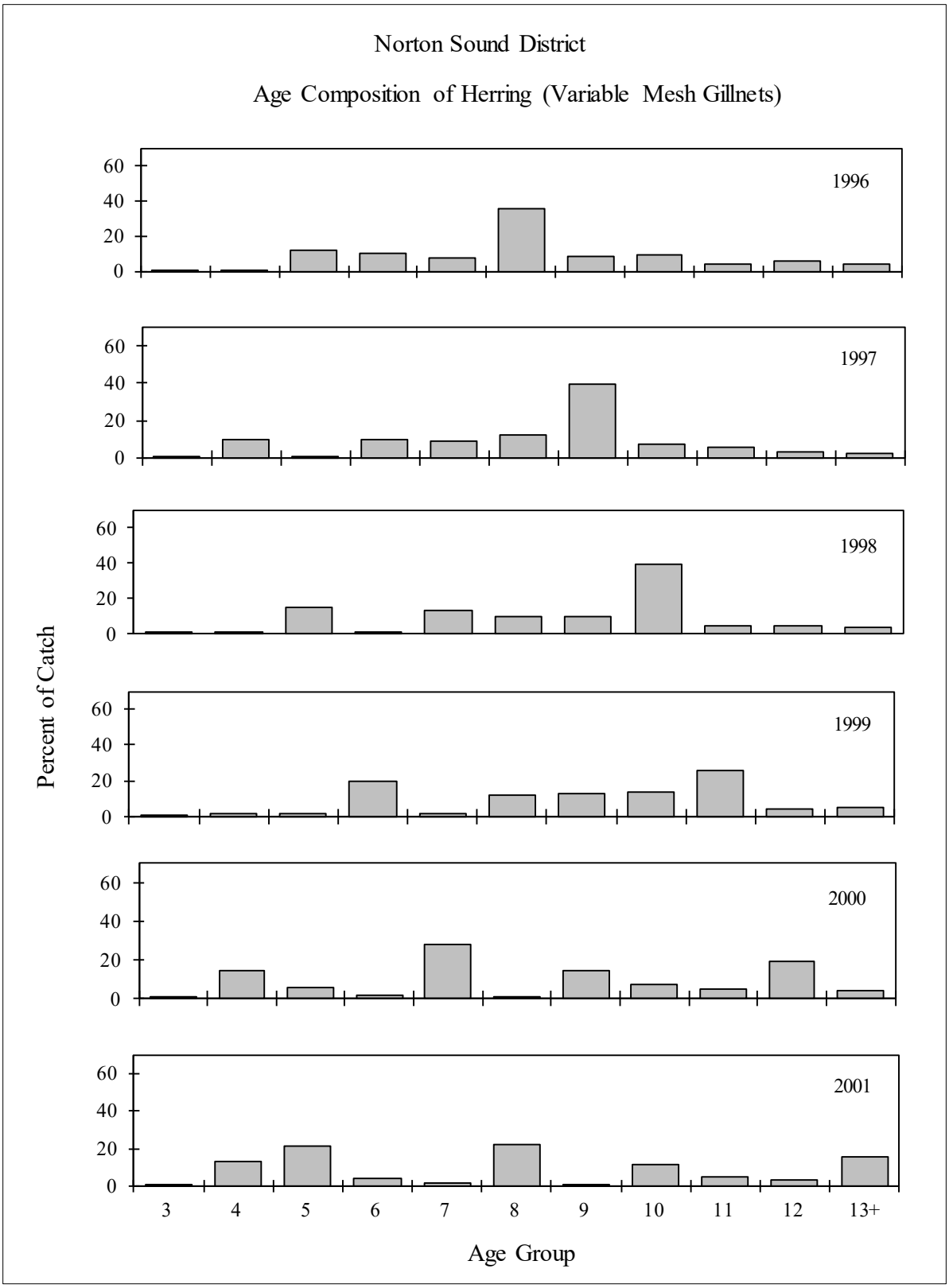


Appendix D7.–Norton Sound herring age class composition by percentage of commercial catch, gillnet only, 2003–2013.

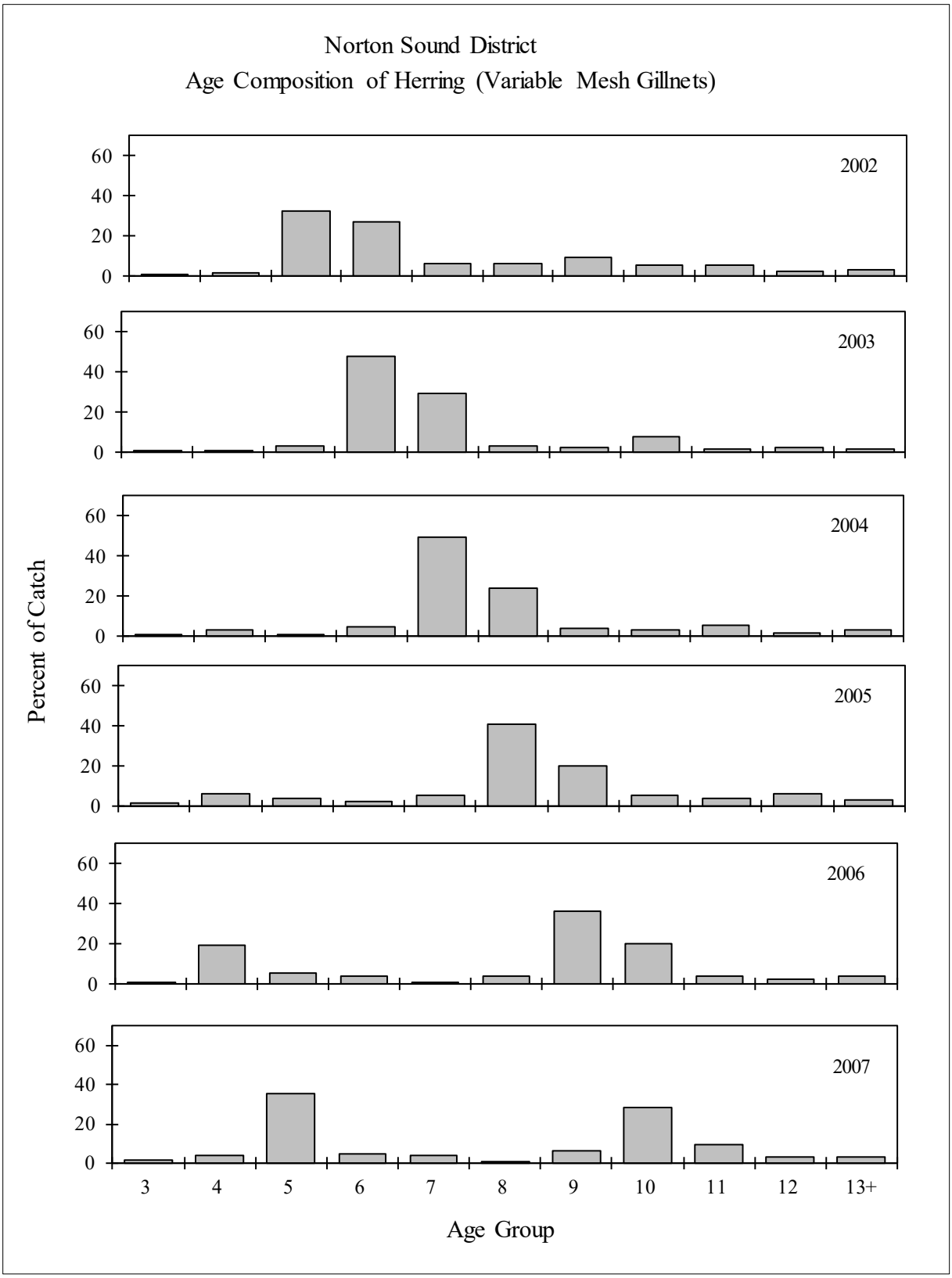
Note: No fishery in 2004. No commercial samples were available 2007–2012 and after 2013.



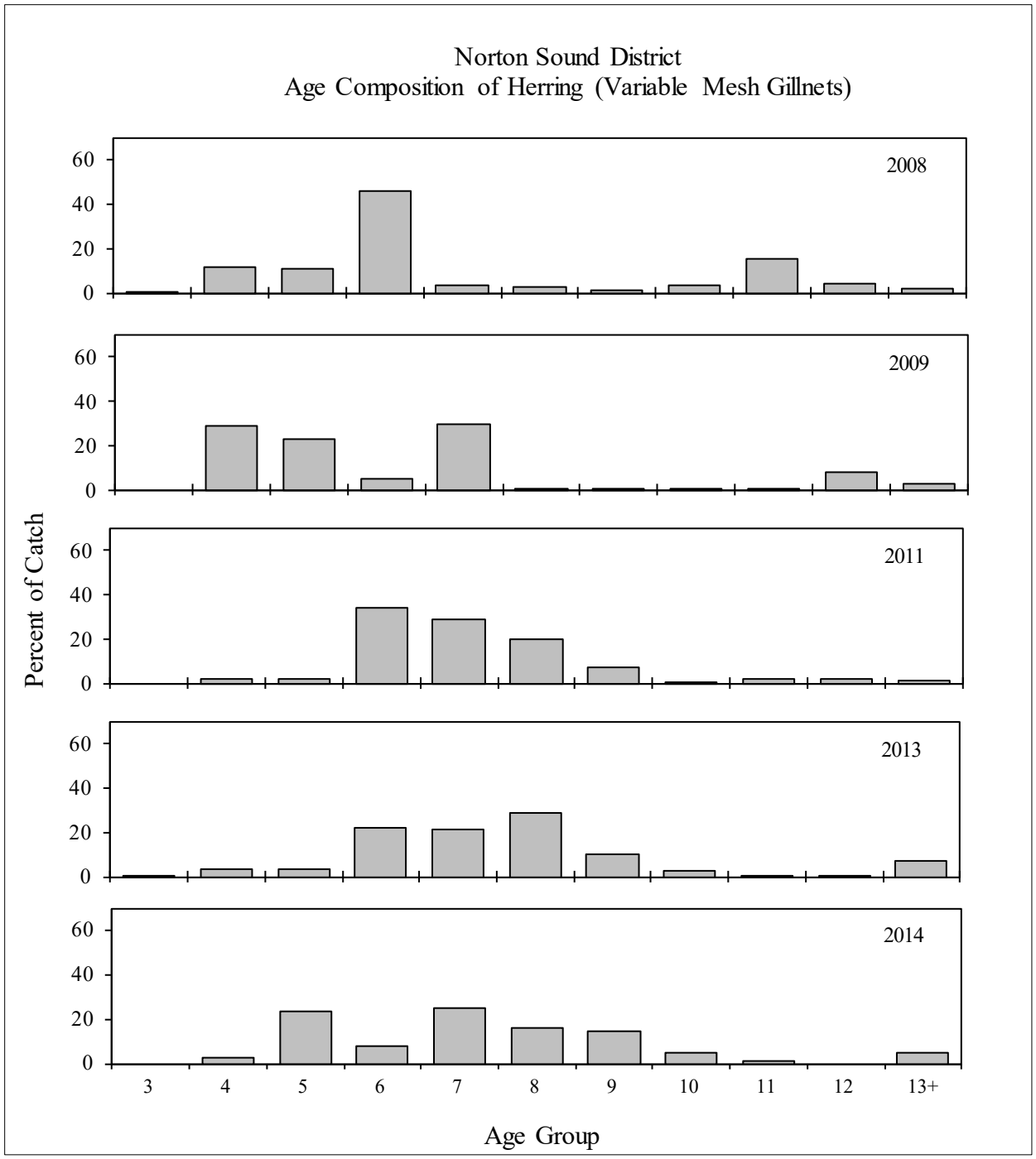
Appendix D8.–Norton Sound herring age class composition by percentage of total catch, variable mesh gillnets, 1990–1995.



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, 1990–2020.

		Commercial harvest (lb) [a,b]								Avg		Fishery	Season length		
	GHL	Open		Number of			Number of pots			weight	Exvessel	value		dates: Open	
Year	(lb) [b]	access	CDQ	Vessels	Permits	Landings	Registered	Pulls	CPUE	(lb)	price/lb	(millions $)	Days	access	CDQ
1990	0.20	0.19		4	4	[c]	1,388	3,172	19	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	4	3.0	1.75	0.130	2	8/01–8/03	[d]
1993	0.34	0.33		14	20	208	560	7,063	16	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	9	3.0	2.02	0.646	31	7/01–7/31	[d]
1995	0.34	0.32		48	81	665	1,900	18,782	6	3.0	2.87	0.926	67	7/01–9/05	[d]
1996	0.34	0.22		41	50	264	1,640	10,453	7	3.0	2.29	0.519	57	7/01–9/03 [f]	[d]
1997	0.08	0.09		13	15	100	520	2,982	11	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	7	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	5	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	18	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	8	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	14	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	11	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	15	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	16	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	17	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	12	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	16	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	12	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	15	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	21	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	16	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	9	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	13	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	17	2.8	5.40	2.130	26	6/29–7/24	6/29–7/24 [k]

-continued-

Year	GHL (lb) [b]	Commercial harvest (lb) [a,b] Open access	CDQ	Number of Vessels	Permits	Landings	Number of pots Registered	Pulls	CPUE	Avg weight (lb)	Exvessel price/lb	Fishery value (millions $)	Season length Days	dates Open access	CDQ
2016	0.52	0.46	0.04	36	38 [l]	229 [l]	1,520	8,009 [l]	17	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	14	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	10	3.3	6.25	1.846	35	6/24–7/28	winter only
2019	0.15	0.08	0.00	24	28 [m]	153 [m]	1,096	5,436 [m]	5	3.0	6.98	0.514	71	6/25–9/03 [n]	6/25–9/03 [n]
2020 [o]	0.17	0.00	0.00	0	0	0	0	0	0	0.0	0.00	0.000	0	6/15–9/03 [o]	none

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 a labor 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.

[m] Includes 2 permits, 7 landings, and 280 pot pulls from the CDQ fishery.

[n] Season ended by regulation on September 3, but NSSP stopped buying crab on 8/25.

[o] Season was open by regulation, but NSEDC did not purchase any crab and no catcher-seller registered to sell crab.

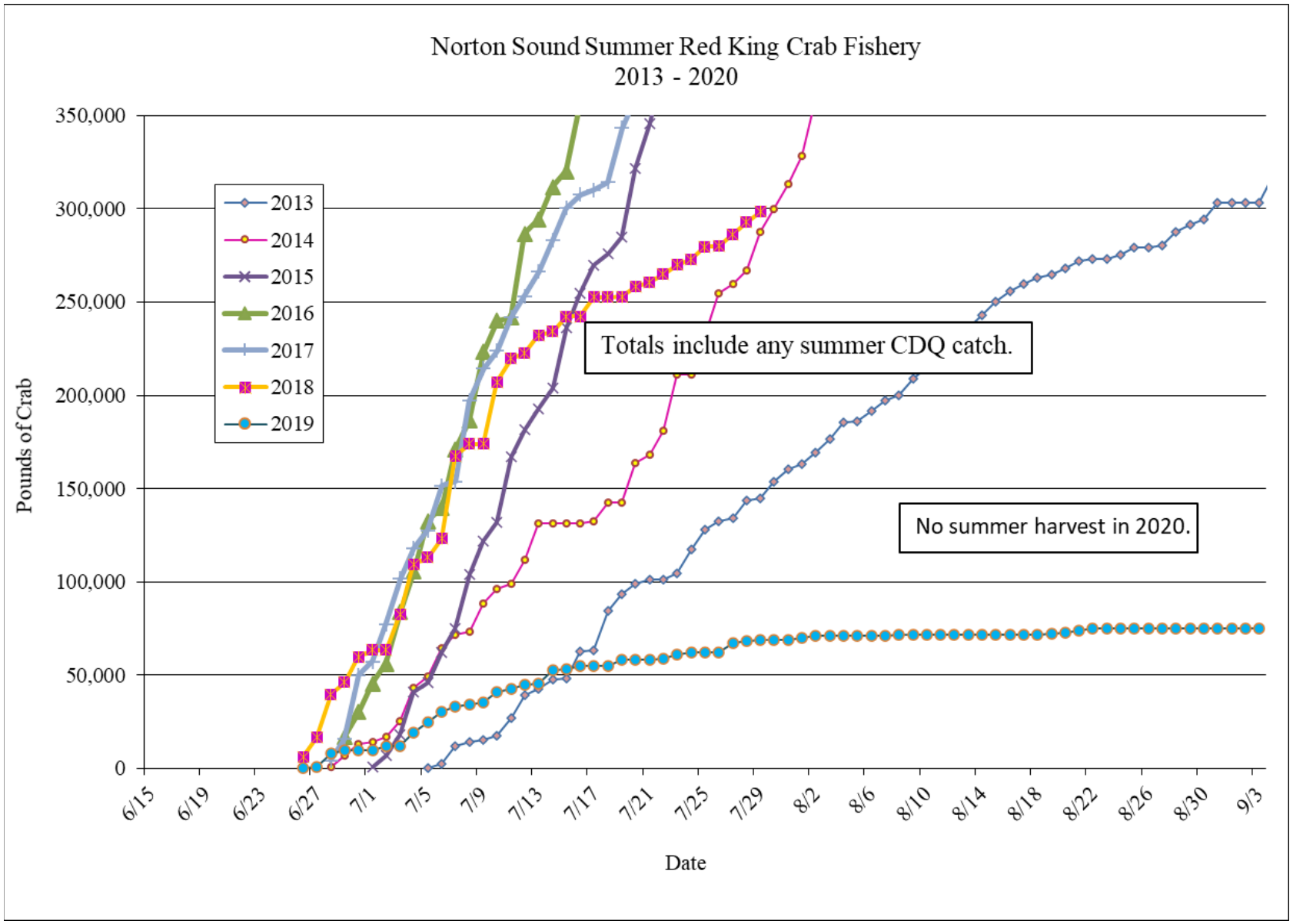
Appendix E2.–Average length and percentage of recruit and postrecruit male red king crab from summer commercial fishery catch samples in Norton Sound Section, Eastern Bering Sea, 1990–2020.

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
2019	119	38	62
2020 [c]			

[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, 2013–2020.

Appendix E4.–Historical winter commercial red king crab fishery catch statistics and economic performance, Norton Sound Section, Eastern Bering Sea, 1990–2020.

Year	Commercial harvest (lb) [a]	Permits fished	Landings	Pot pulls	CPUE	Average weight (lb)	Exvessel price/lb	Fishery value ($)	Season dates [b]
1990	9,792	12	199	257	14	2.8	5.33 [c]	19,327 [c]	11/15–5/15
1991	10,064	11	187	609	6	2.7	5.00 [c]	19,000 [c]	11/15–5/15
1992	21,177	13	287	1,823	4	2.8	3.60	76,283	11/15–5/15
1993	4,926	8	66	[d]	[d]	2.8	2.84 [c]	14,000 [c]	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	[e]	2	[e]	[e]	[e]	[e]	[e]	[e]	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 [f]	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	[e]	1	[e]	[e]	[e]	[e]	[e]	[e]	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 [g]	79,986	48	471	5,459	5	2.7	7.22	559,803	2/15–4/21
2017 [g]	77,843	88	435	3,225	8	3.0	6.73	483,797	2/07–3/22
2018 [g]	29,118	43	322	2,566	4	3.2	6.95	186,044	3/03–4/30
2019	3,295	6	21	195	5	3.1	6.97	20,699	2/25–4/30
2020 [e]	[e]	1	[e]	[e]	[e]	[e]	[e]	[e]	2/29–4/30
Average 2015–19	57,798	46	383	3,752	6	2.9	6.89	373,555	
Average 2010–19	43,060	33	336	3,415	5	2.7	6.17	272,693	

[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.

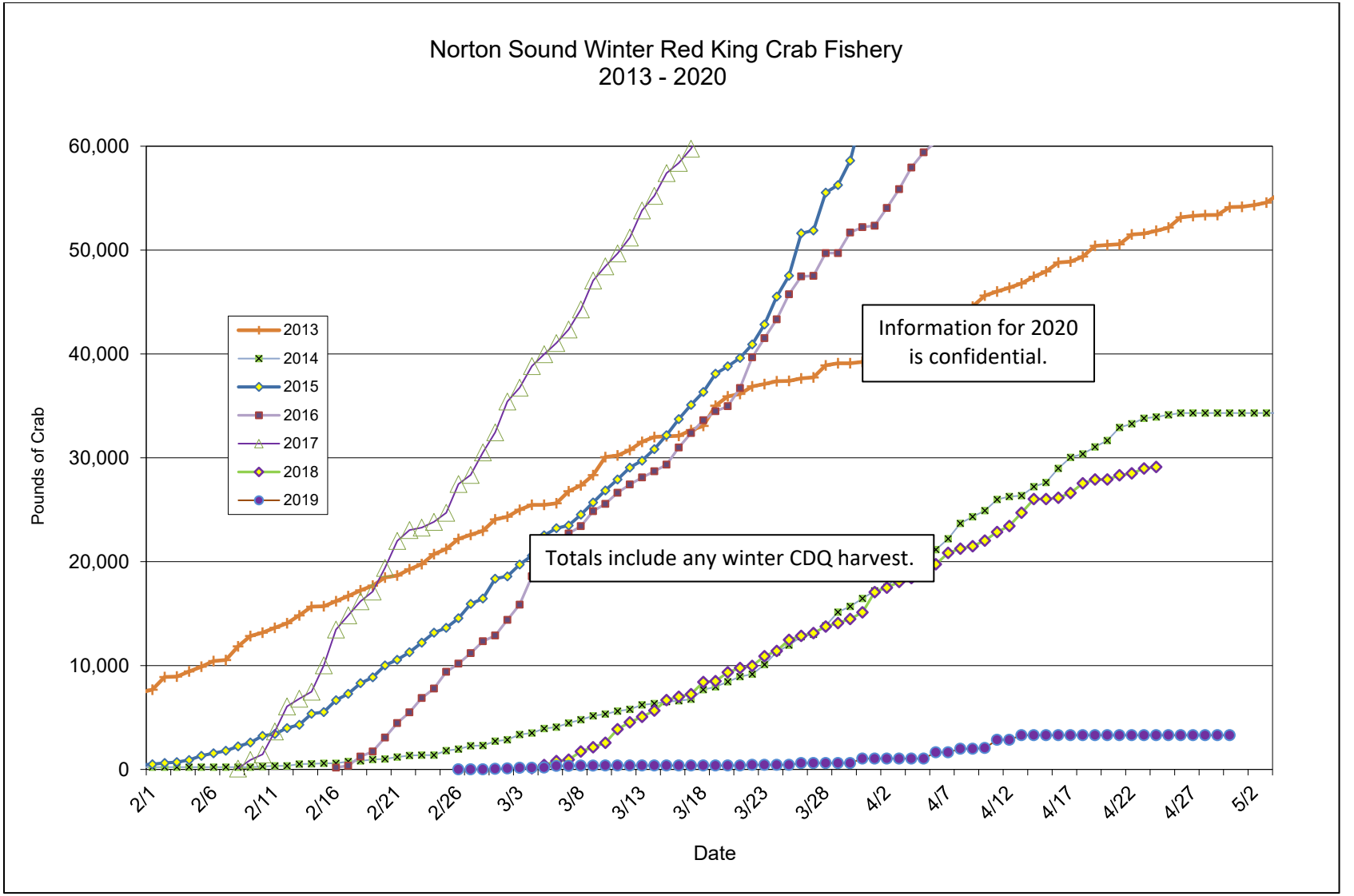
[c] Exvessel value is price per crab. Fishery value was derived by multiplying price per crab by number of crab harvested.

[d] Information is not available.

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

[f] Confidentiality was waived by the participants.

[g] 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, 2013–2020.

Notes: From 2016 to 2018, catch information include data from the winter CDQ fishery. In 2020, because less than 3 permit holders fished, information is confidential.

Appendix E6.–Summer subsistence red king crab harvests, Norton Sound, Eastern Bering Sea, 2004–2020.

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
2019	38	38	15	461	315	2.5	788	21
2020	64	64	17	1,752	1,054	2.3	2,424	62
Average 2015–19	34	34	15	2,443	1,511	2.5	3,693	100
Average 2010–19	37	37	18	2,396	1,486	2.5	3,605	83

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, 1989–2020.

Winter [a]	Permits issued	Permits returned	Permits fished	Crab caught [b]	Crab harvested [c]	Multiplier [d]	Pounds harvested [d]	Average number kept/ permits fished
1989–90	136	118	107	16,635	12,152	2.3	27,464	114
1990–91	119	104	79	9,295	7,366	2.2	15,911	93
1991–92	158	105	105	15,051	11,736	2.3	27,345	112
1992–93	88	79	37	1,193	1,097	2.3	2,479	30
1993–94	118	95	71	4,894	4,113	2.5	10,241	58
1994–95	166	131	97	7,777	5,426	2.4	12,968	56
1995–96	84	44	35	2,936	1,679	2.0	3,408	48
1996–97	38	22	13	1,617	745	2.0	1,512	57
1997–98	94	73	64	20,327	8,622	1.9	16,296	135
1998–99	95	80	71	10,651	7,533	2.1	15,744	106
1999–00	98	64	52	9,816	5,723	2.1	11,961	110
2000–01	50	27	12	366	256	2.2	558	21
2001–02	114	101	67	8,805	3,669	2.2	7,888	55
2002–03	107	73	64	9,052	4,140	2.0	8,114	65
2003–04	96	77	41	1,775	1,181	2.0	2,338	29
2004–05 [e]	170	102	60	6,496	3,973	2.2	8,542	66
2005–06	98	97	67	2,083	1,239	2.4	2,974	18
2006–07	129	127	116	21,444	10,690	1.9	20,525	92
2007–08	139	137	108	18,621	9,485	2.0	19,255	88
2008–09	105	105	70	6,971	4,752	2.0	9,456	68
2009–10	125	123	85	9,004	7,044	2.0	14,018	83
2010–11	148	148	95	9,183	6,640	2.1	13,811	70
2011–12	204	204	138	11,341	7,371	2.1	15,774	53
2012–13	149	148	104	21,752	7,662	2.3	17,240	74
2013–14	103	103	75	5,421	3,252	1.8	5,886	43
2014–15	155	154	108	9,849	7,660	1.9	14,631	72
2015–16	139	139	92	6,584	5,408	2.2	11,898	59
2016–17	163	163	109	7,185	6,039	2.5	15,098	55
2017–18	123	121	82	5,767	4,424	2.7	11,945	54
2018–19	101	101	60	2,080	1,545	2.6	4,017	26
2019–20	80	79	50	814	548	2.3	1,260	11
Average 2015–19	136	136	90	6,293	5,015	2.4	11,518	53
Average 2010–19	141	140	95	8,817	5,705	2.2	12,432	59

[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, 1990–2020.

	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	6,583	14,613	69	21,196	514,478
Average 2015–2019	321,286	57,798	13	379,085	375,722	3,705	11,514	77	15,219	392,987
Average 2010–2019	368,144	43,060	10	411,203	398,046	3,611	12,430	78	16,041	426,586

-continued-

	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
2019	75,023	3,295	4	78,318	150,600	788	4,017	84	4,805	83,123
2020	0	[e]	100	[e]	170,100	2,424	1,260	34	3,684	3,684 [f]
Average 2015–2019	321,286	57,798	13	379,085	375,722	3,705	11,514	77	15,219	392,987
Average 2010–2019	368,144	43,060	10	411,203	398,046	3,611	12,430	78	16,041	426,586

[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, and therefore no GHL was set.

[e] Information is confidential.

[f] Does not include 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 1990.

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
2019	7/17–07/27	ADF&G	1,215,222	106,332	407,525	1,222,575	764,608	53,261	132,697
2020	7/30–08/14	ADF&G	850,655	349,376	227,854	683,562	262,534	54,844	103,037

[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] Prerecruit-2 (pre-2) male crab were defined as 76–89 mm in carapace length (CL), and prerecruit-1 (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.

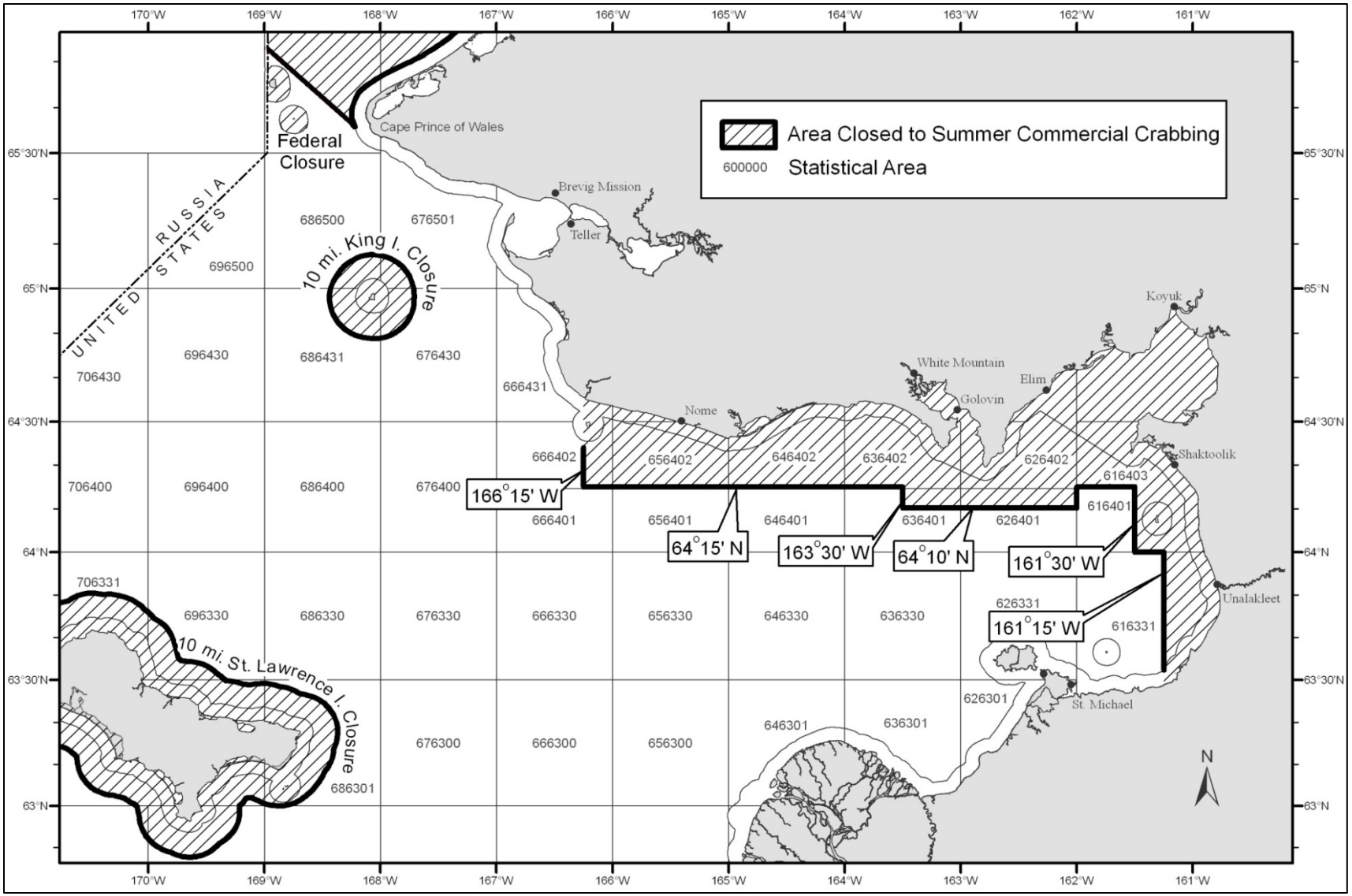
[c] Includes Prerecruit 3.

Appendix E11.–Reported number of crab pots lost during the commercial and subsistence winter crab fisheries, and ADF&G studies/surveys, 2005–2020.

Year	Commercial [a]	Subsistence	ADF&G winter study and spring/fall tagging [b]	Total
2005–06	ND	50	6	56
2006–07	ND	132	7	139
2007–08	ND	6	4	10
2008–09	ND	8	2	10
2009–10	30	23	2	55
2010–11	3	8	0	11
2011–12	64	19	4	87
2012–13	23	4	3	30
2013–14	105	16	1	122
2014–15	104	16	0	120
2015–16	38	20	No tagging studies done	58
2016–17	201	11	No tagging studies done	212
2017–18	179	33	No tagging studies done	212
2018–19	32	59	No tagging studies done	91
2019–20	3	33	No tagging studies done	36

[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, 1990–2020 (catch in pounds).

Statistical area	1990	19911	1992	1993	1994	1995	1996 [a]	1997	1998	1999
616331	0	0	0	0	48	0	0	0	0	633
616401	0	0	0	0	0	35	0	0	0	0
626331	0	0	0	0	0	0	61	0	0	0
626401	0	0	0	0	0	18,971	45,045	18,066	8,065	508
626402	0	0	0	0	0	0	0	0	0	0
636330	0	0	0	0	0	0	4,560	3,838	2,449	0
636401	0	0	1,159	1,373	3,340	24,329	70,677	59,206	10,771	14,201
636402	0	0	0	0	1,754	3,466	0	0	0	0
646301	0	0	0	0	0	4,628	13,888	0	0	0
646330	0	0	0	0	0	1,493	2,894	314	0	3,021
646401	0	0	0	1,963	37,510	105,045	22,834	1,052	3,194	221
646402	0	0	0	730	139,661	66,821	0	0	0	0
656300	0	0	0	0	0	0	0	0	0	0
656330	0	0	4,814	265	0	19,745	15,446	4,661	4,078	1,300
656401	171	0	53,119	105,341	34,686	32,289	9,985	4,035	1,127	2,739
656402	0	0	0	193,079	110,289	44,000	0	0	0	0
666230	0	0	0	0	0	0	0	0	0	0
666300	0	0	0	0	0	0	25,519	0	0	0
666330	27,185	0	4,305	31,758	0	730	0	0	0	0
666401	162,263	0	10,632	746	396	0	3,001	1,816	0	930
666402	0	0	0	535	1,221	0	0	0	0	0
666431	0	0	0	0	0	1,124	0	0	0	0
676300	0	0	0	0	0	0	546	0	0	0
676330	0	0	0	0	0	0	0	0	0	0
676400	3,212	0	0	0	0	0	9,775	0	0	0
676430	0	0	0	0	0	0	0	0	0	0
676501	0	0	0	0	0	0	0	0	0	0
686330	0	0	0	0	0	0	0	0	0	0
686431	0	0	0	0	0	0	0	0	0	0
Total	192,831	0	74,029	335,790	328,905	322,676	224,231	92,988	29,684	23,553
(tons)	96	0	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

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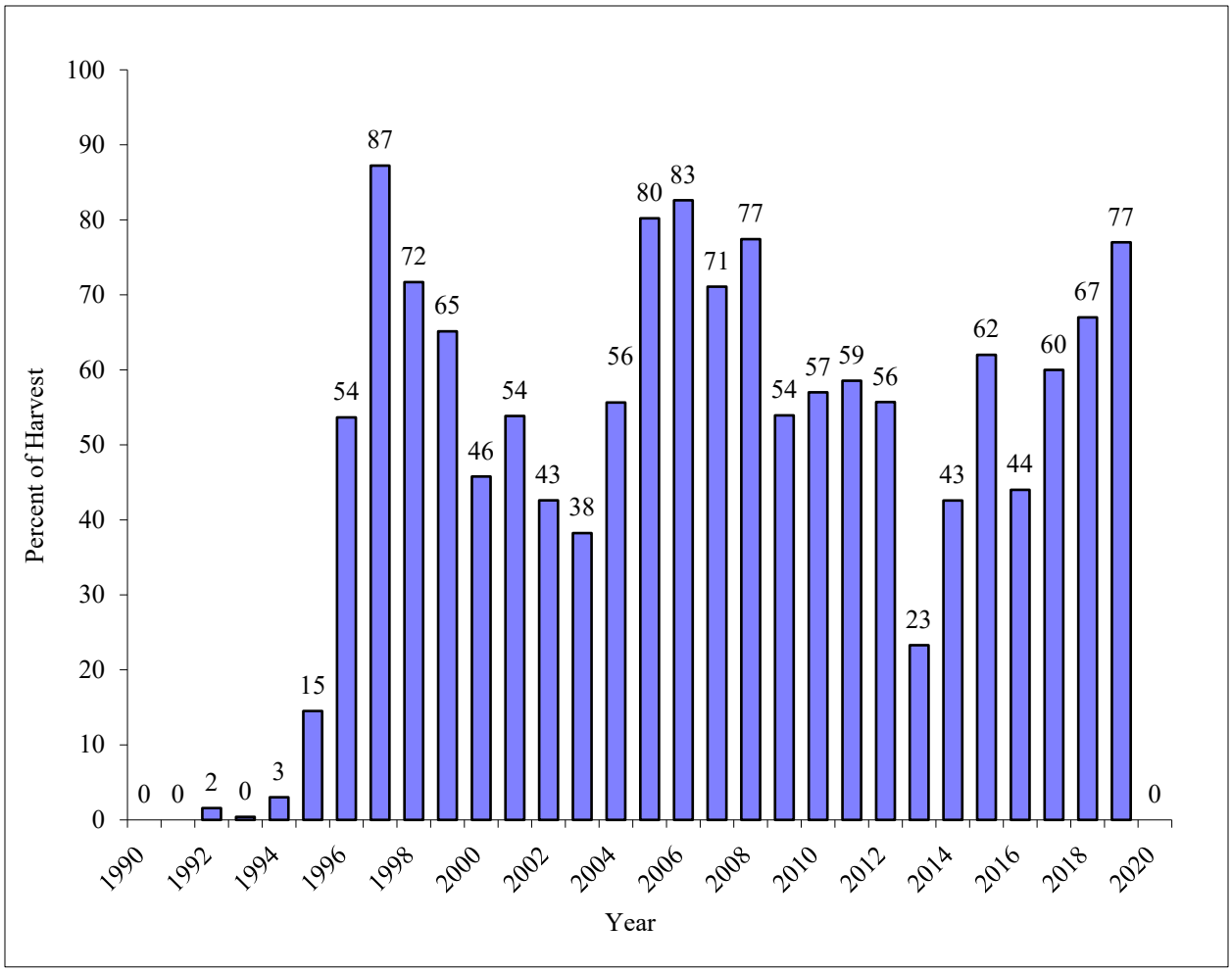
Statistical Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
616331	0	0	0	4,923	3,410	0	0	1,110	570	0	28,305
616401	0	0	7,729	4,692	1,929	0	2,368	0	0	0	23,570
626331	2,489	0	686	0	0	0	3,366	956	0	0	44,728
626401	85,271	115,524	36,802	69,936	103,881	19,488	53,398	22,520	16,300	0	1,298,277
626402	0	0	0	0	0	0	0	0	0	0	1,352
636330	0	1,454	12,035	7,565	2,680	10,122	3,429	949	479	0	98,832
636401	146,973	148,183	34,027	78,572	137,285	154,502	185,444	174,811	40,576	0	2,859,673
636402	0	0	0	0	0	0	0	0	0	0	5,220
646301	0	0	0	0	0	0	0	0	0	0	18,516
646330	0	1,204	4,195	5,390	1,812	0	388	0	592	0	43,010
646401	83,099	98,811	59,737	36,409	58,929	126,906	101,796	60,162	9,565	0	961,673
646402	0	0	5,271	0	0	0	0	0	0	0	212,483
656300	0	0	0	0	0	0	0	0	0	0	3,139
656330	1,546	8,168	8,515	0	4,828	307	2,317	0	0	0	277,037
656401	77,149	85,920	147,569	122,631	69,355	97,414	44,007	4,885	1,869	0	1,537,784
656402	0	0	37,743	0	0	0	0	0	0	0	389,993
666230	0	0	0	0	0	0	0	0	0	0	1,721
666300	0	0	0	0	0	0	0	0	0	0	43,764
666330	2,042	1,000	0	0	0	0	1,469	595	3,247	0	107,395
666401	0	15,726	33,469	38,099	9,308	6,030	12,412	9,963	341	0	594,176
666402	2,271	0	1,419	18,968	7,699	5,391	1,347	22,445	1,422	0	156,843
666431	0	0	2,669	1,825	0	0	0	0	49	0	9,986
676300	0	0	0	0	0	0	0	0	0	0	546
676330	0	0	0	0	0	0	0	0	0	0	0
676400	0	0	0	0	0	0	0	0	0	0	13,167
676430	0	0	0	0	0	0	0	0	0	0	0
676501	0	0	0	0	0	0	0	0	5	0	1,013
686330	0	0	0	0	0	0	0	0	0	0	0
686431	0	0	0	0	0	0	0	0	5	0	345
686500	0	0	0	0	0	0	0	0	5	0	5
Total	400,840	475,990	391,863	389,008	401,115	420,160	411,739	298,396	75,023	0	8,732,552
(tons)	200	238	196	195	201	210	206	149	38	0	4,366

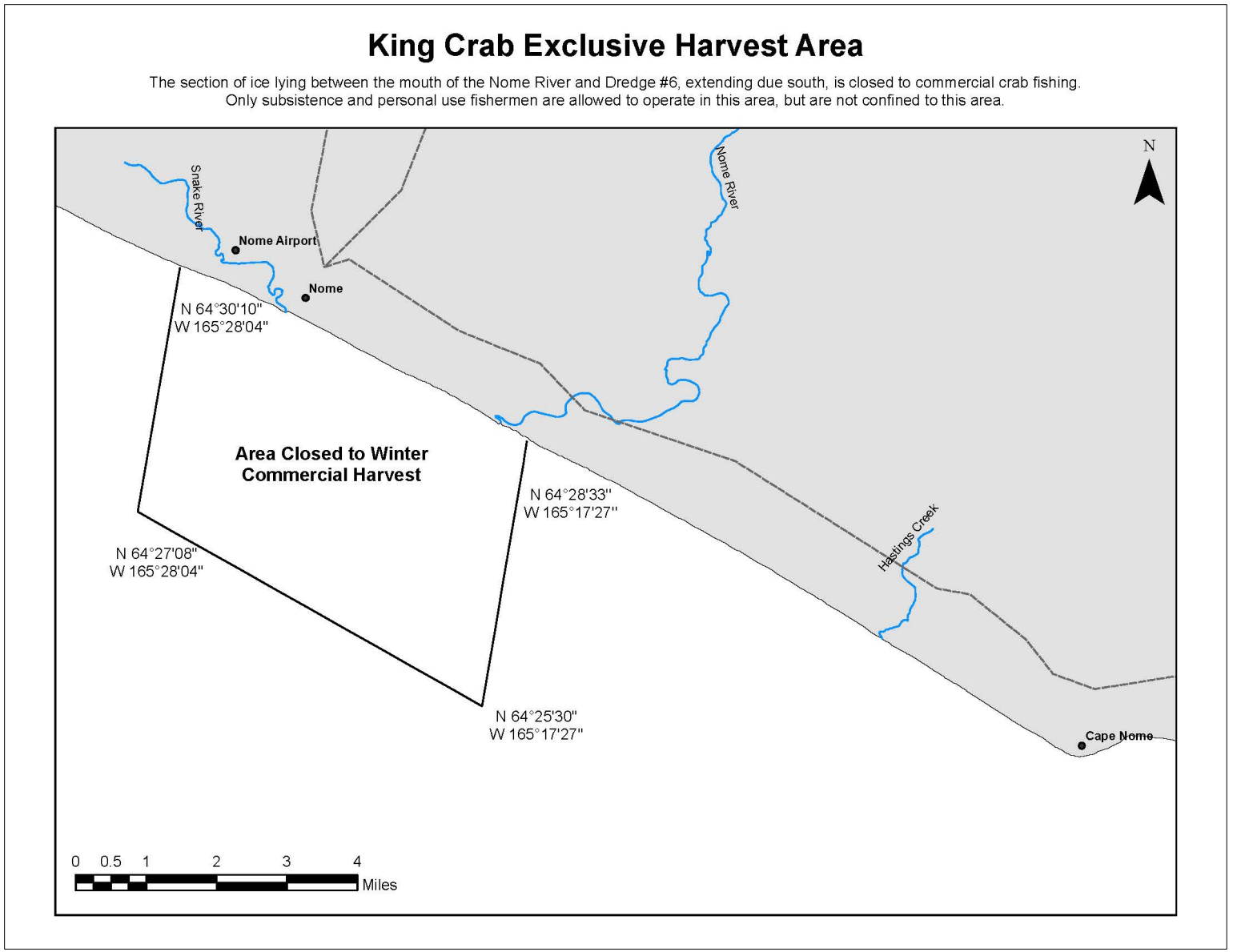
Note: No commercial fishery occurred in 1991 or 2020.

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

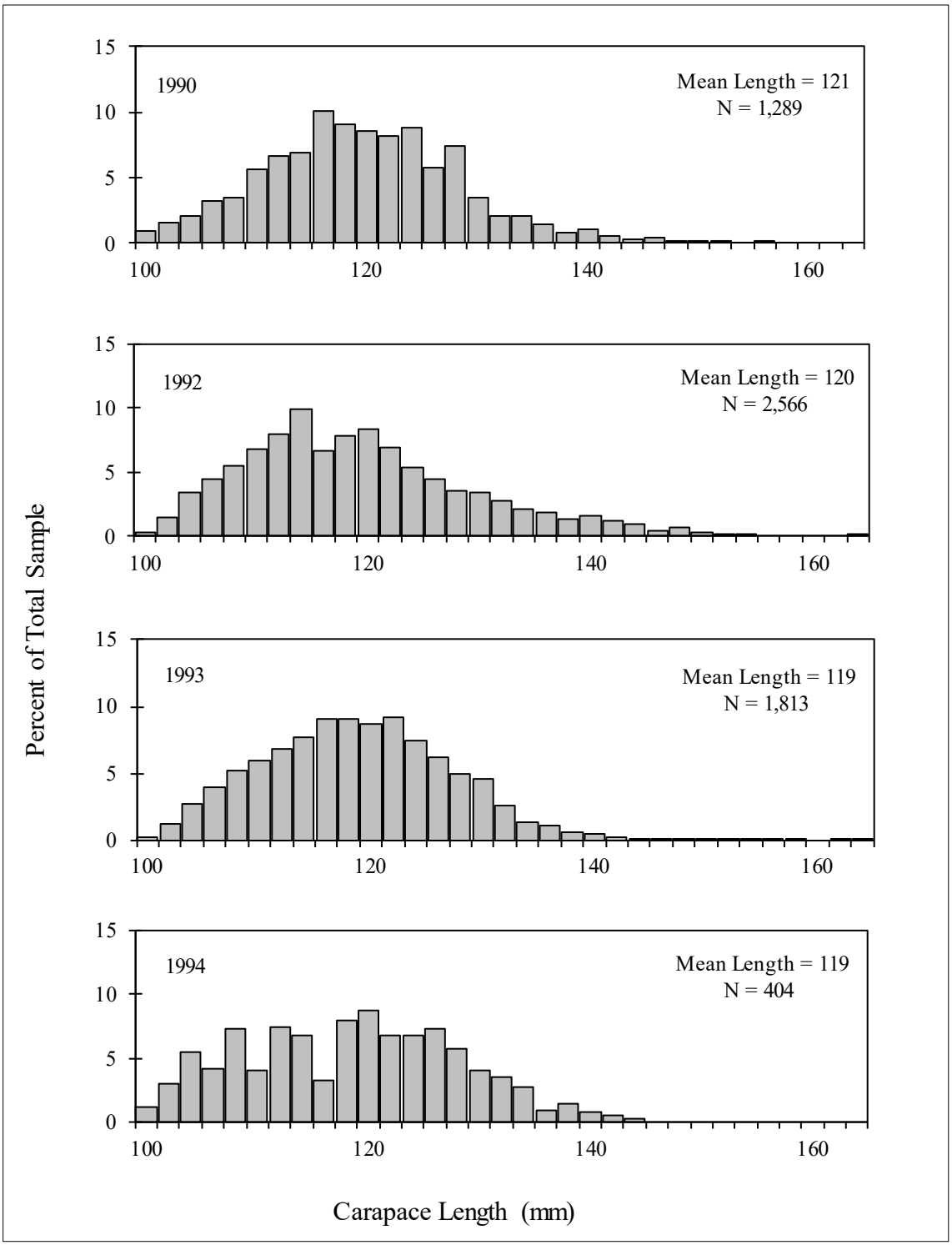


Appendix E14.–The percent of crab harvested during the Norton Sound summer commercial red king crab fishery east of 164°W longitude, 1990–2020.

Note: No commercial fishery occurred in 1991 or 2020.

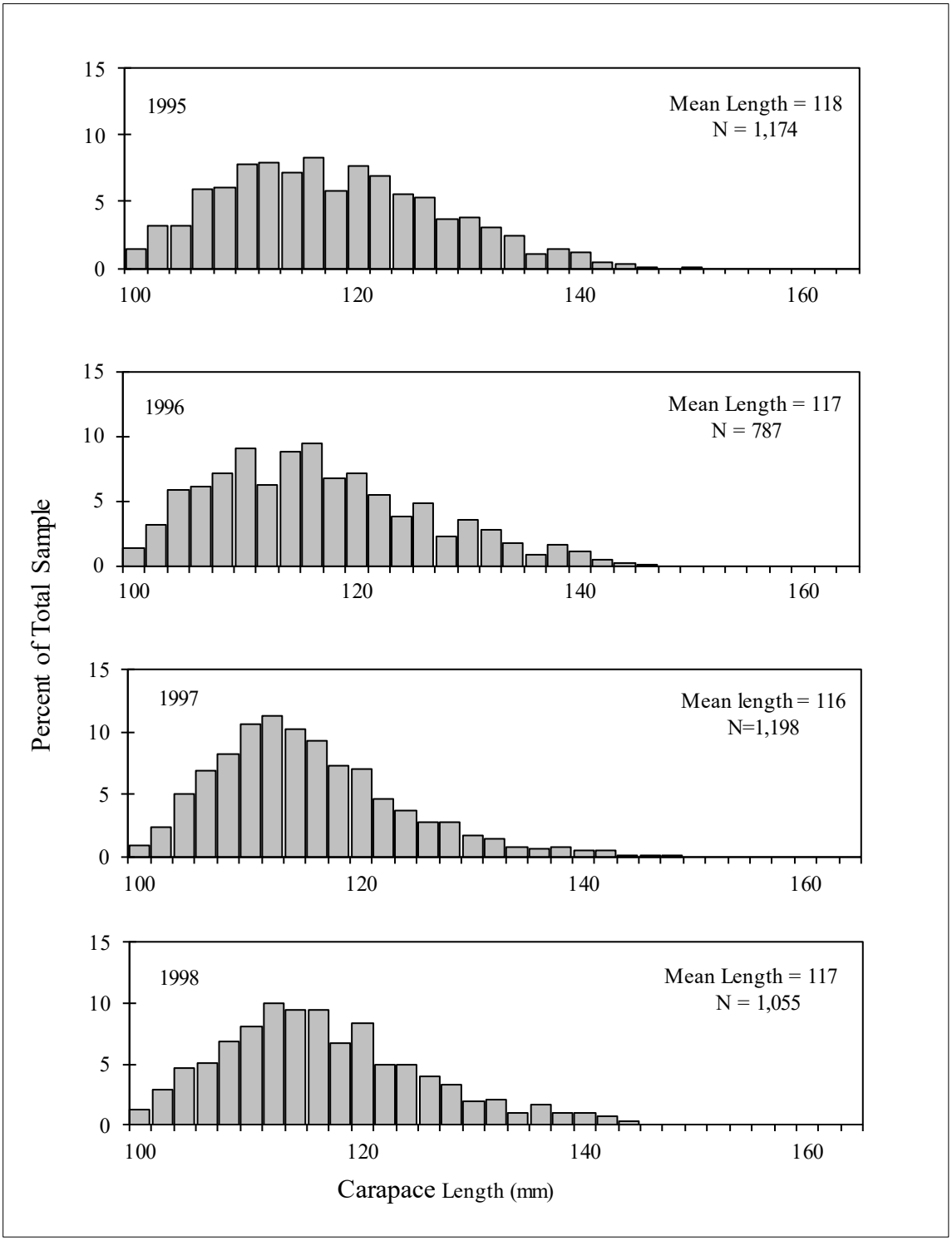


Appendix E15.–Closed waters area in effect for the Norton Sound winter commercial crab fishery.

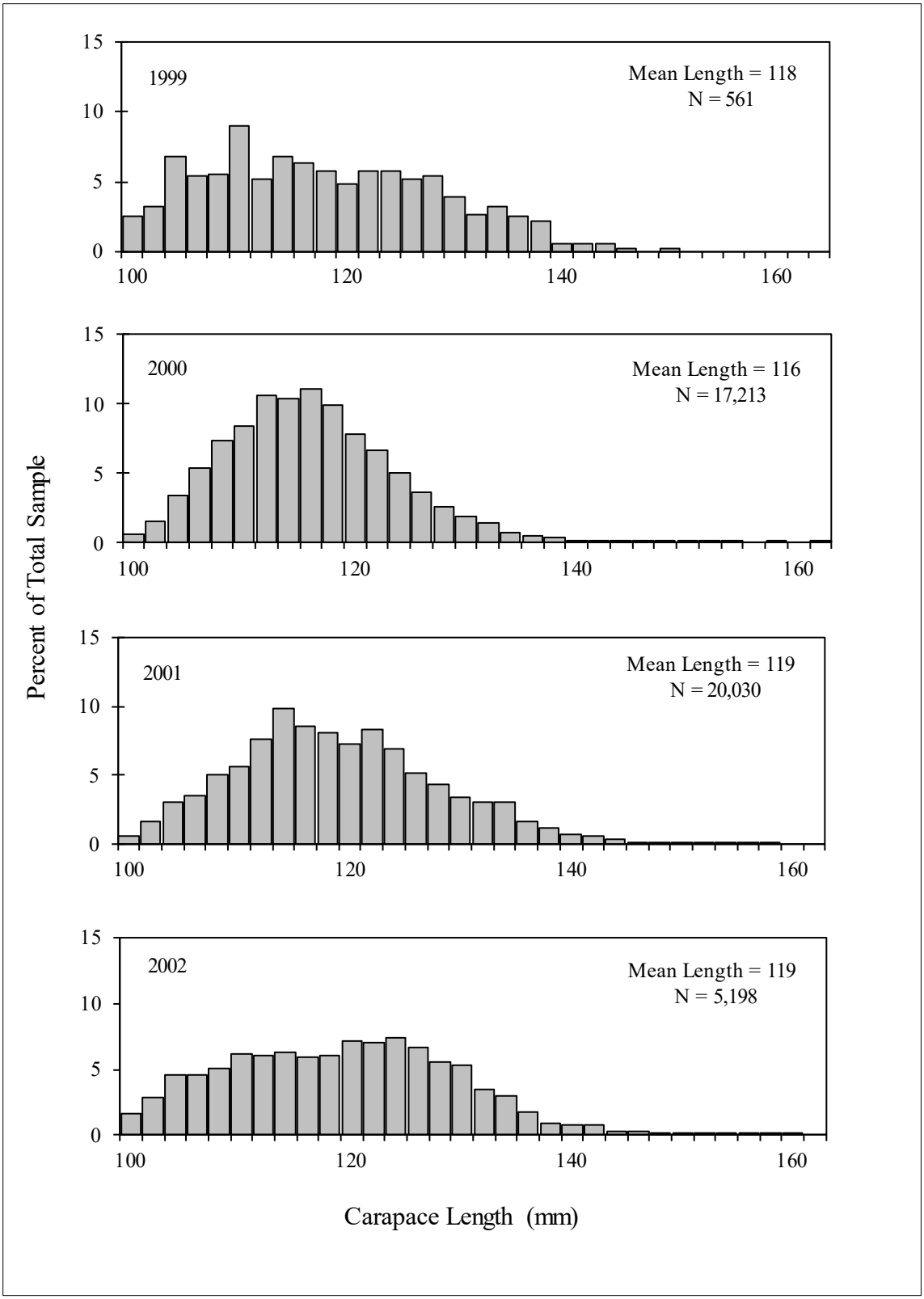


Appendix E16.–Length composition of Norton Sound red king crab summer commercial harvests, 1990–1994.

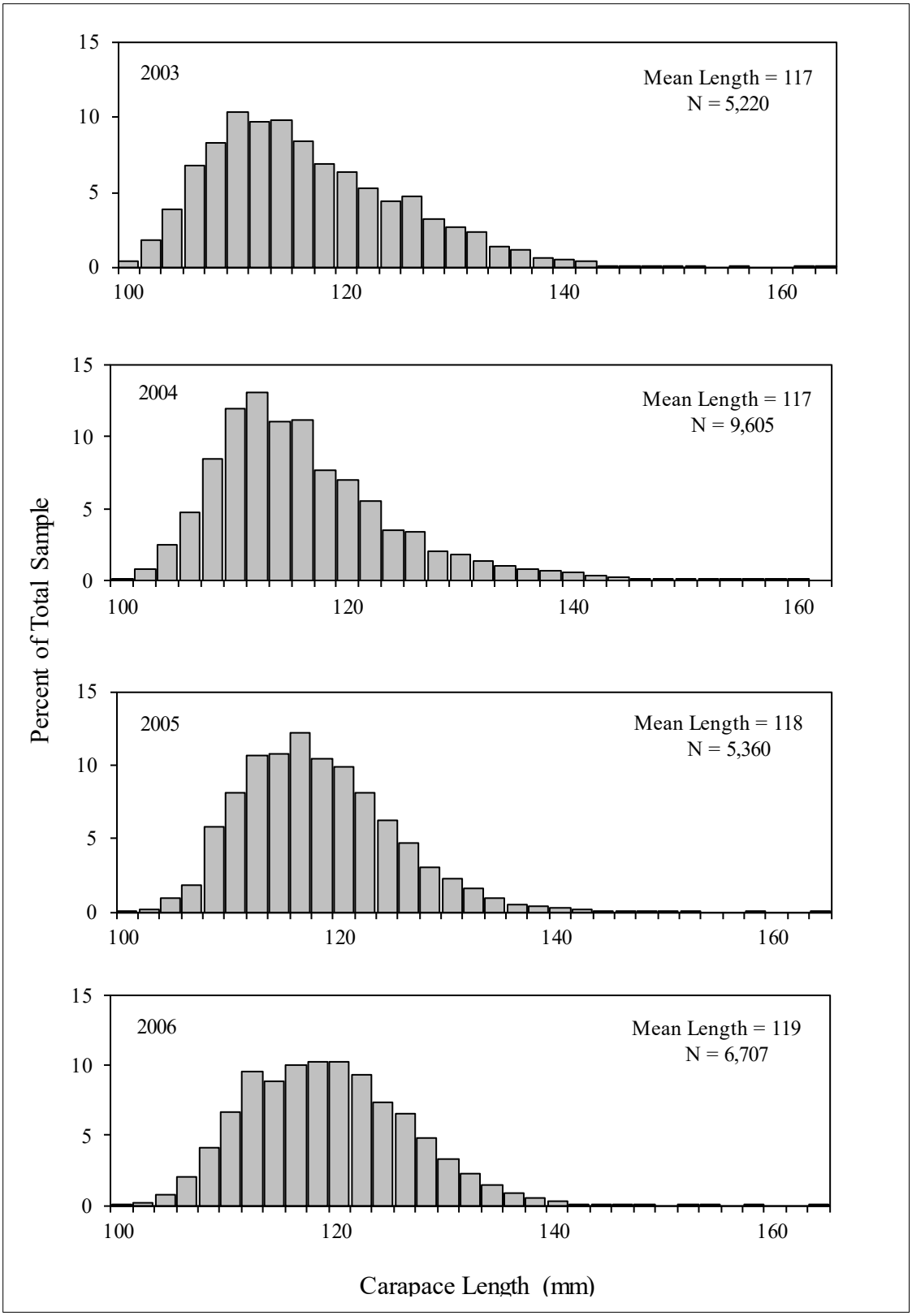
Note: No fishery in 1991.



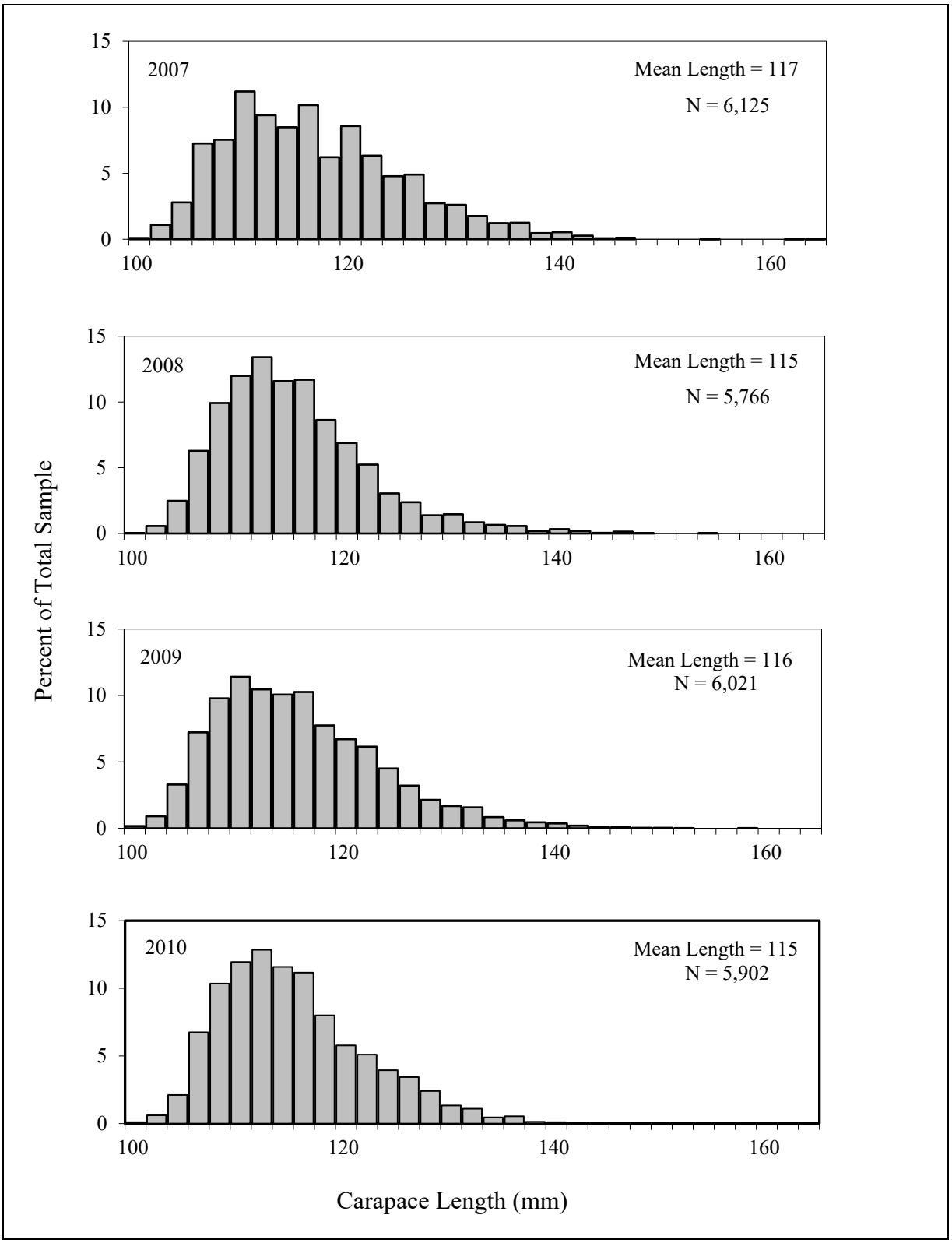
Appendix E17.–Length composition of Norton Sound red king crab summer commercial harvests, 1995–1998.



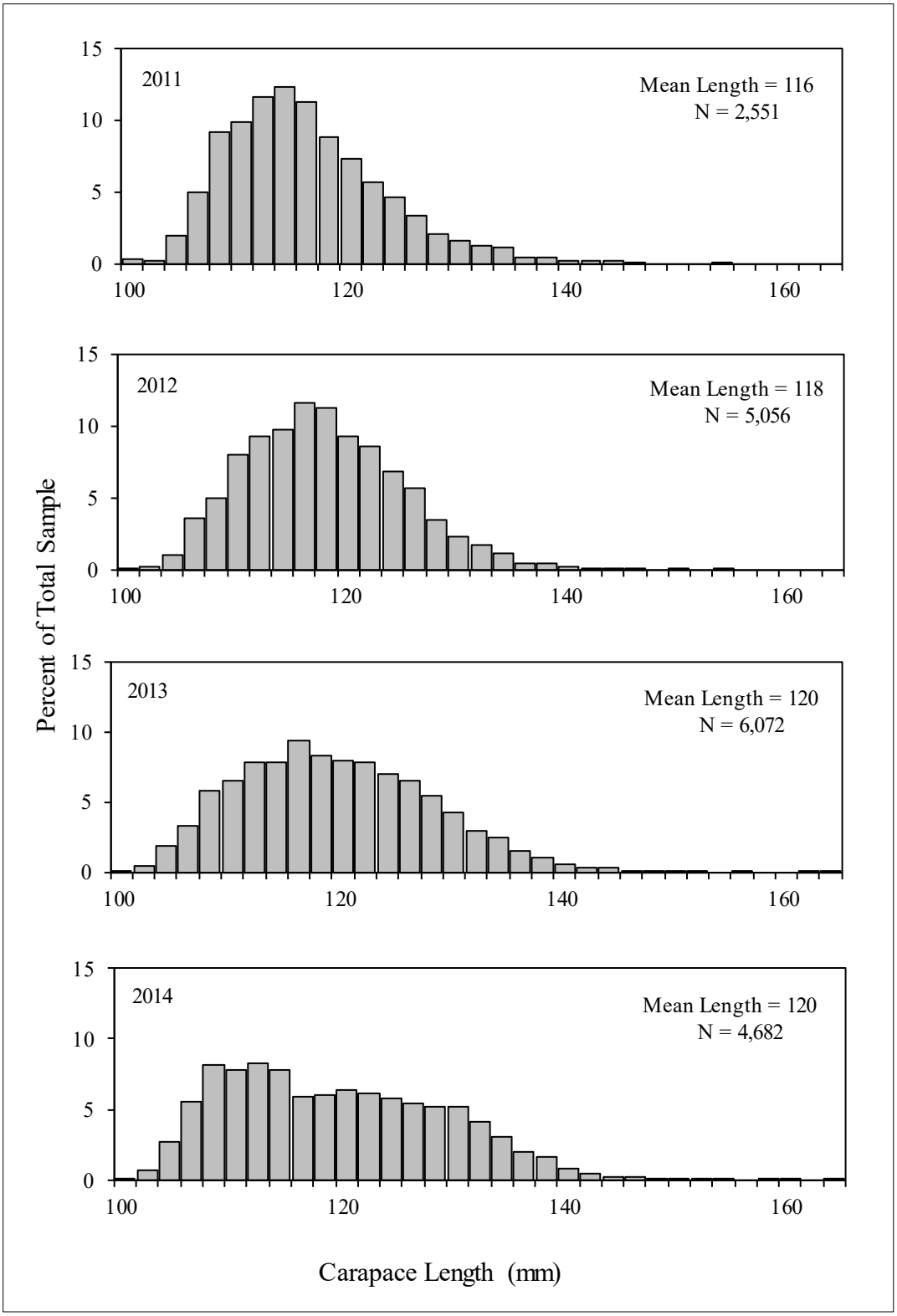
Appendix E18.–Length composition of Norton Sound red king crab summer commercial harvests, 1999–2002.



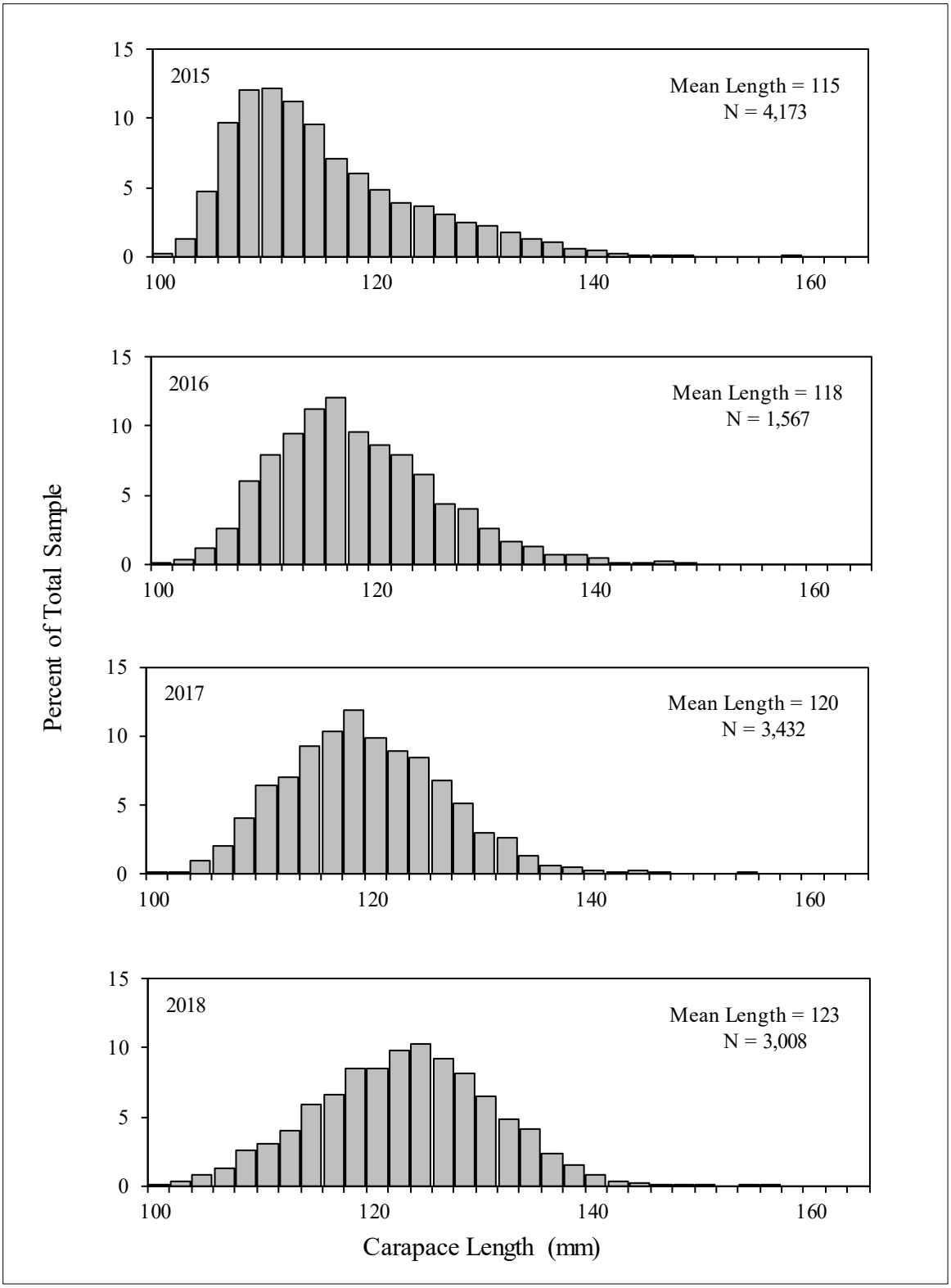
Appendix E19.–Length composition of Norton Sound red king crab summer commercial harvests, 2003–2006.



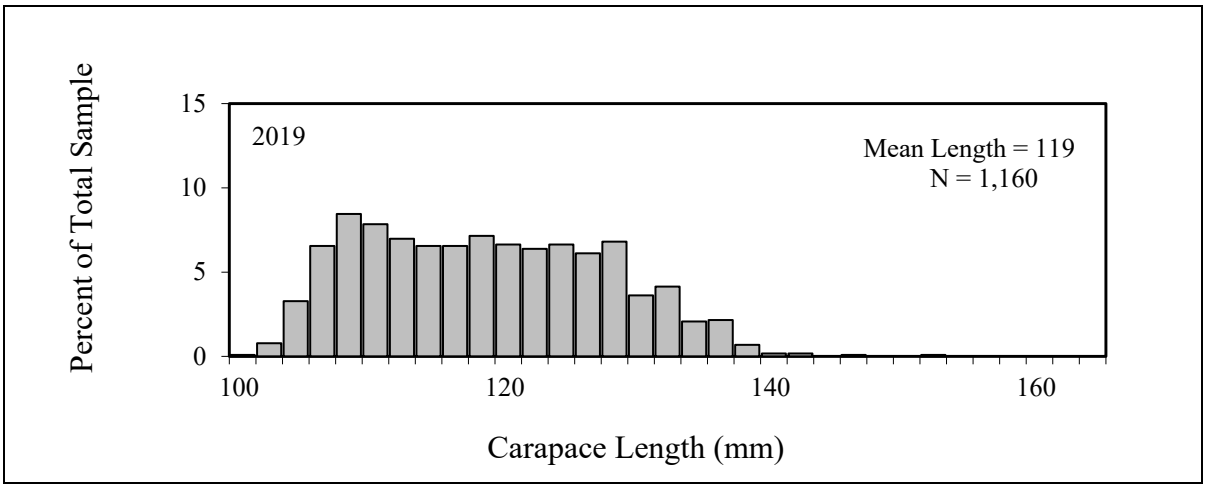
Appendix E20.–Length composition of Norton Sound red king crab summer commercial harvests, 2007–2010.



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

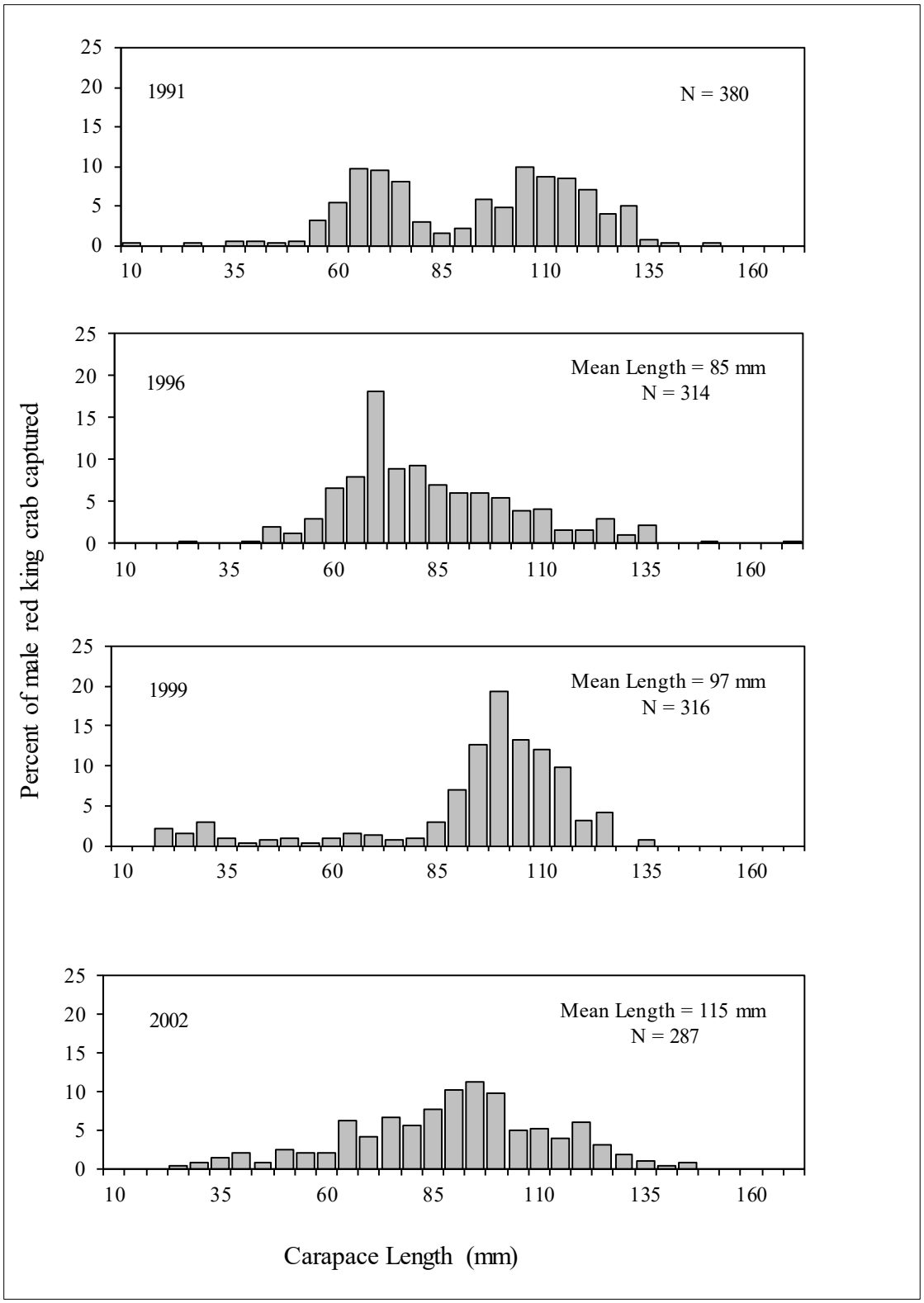


Appendix E22.–Length composition of Norton Sound red king crab summer commercial harvest, 2015–2018.



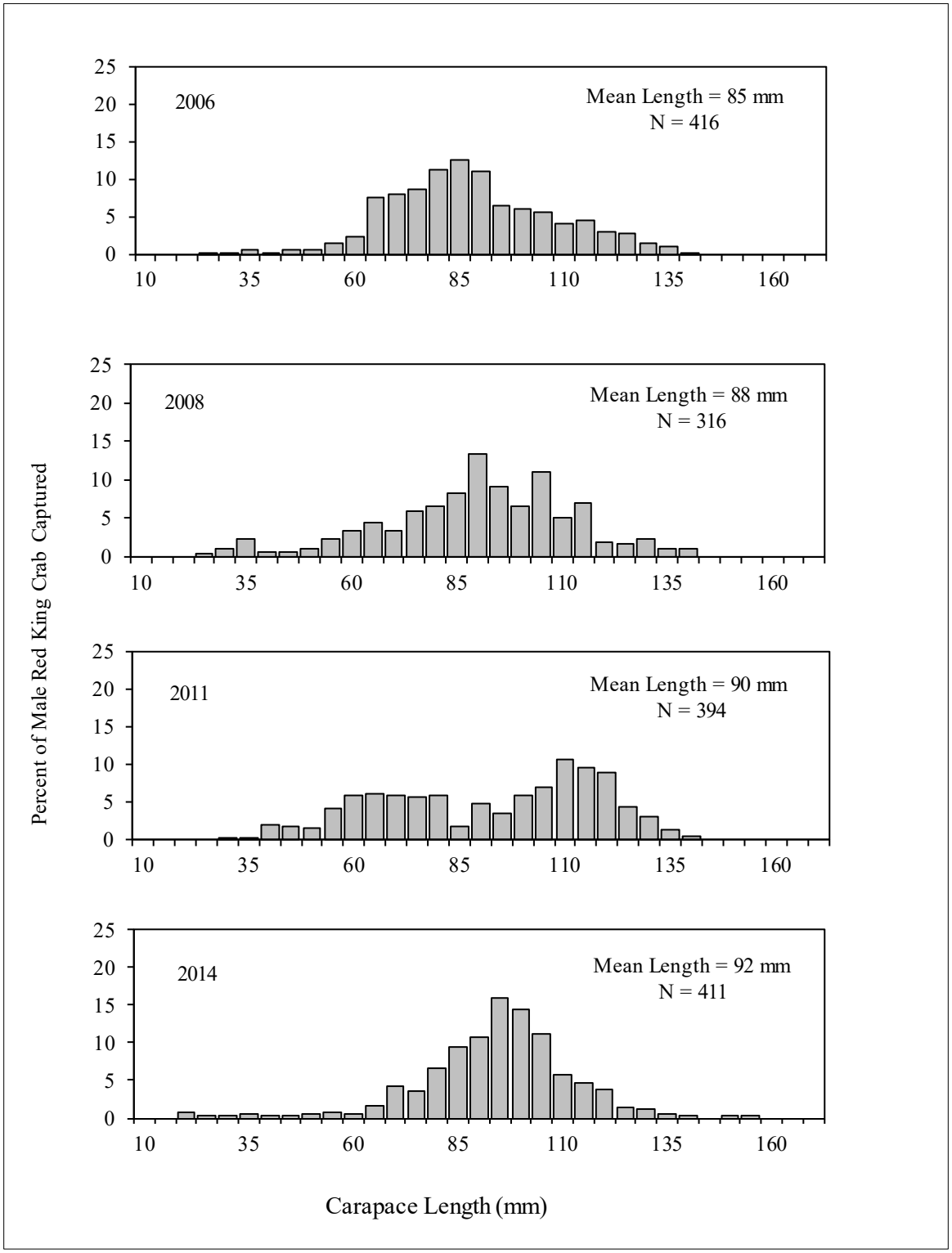
Appendix E23.–Length composition of Norton Sound red king crab summer commercial harvest, 2019.

Note: No fishery in 2020.

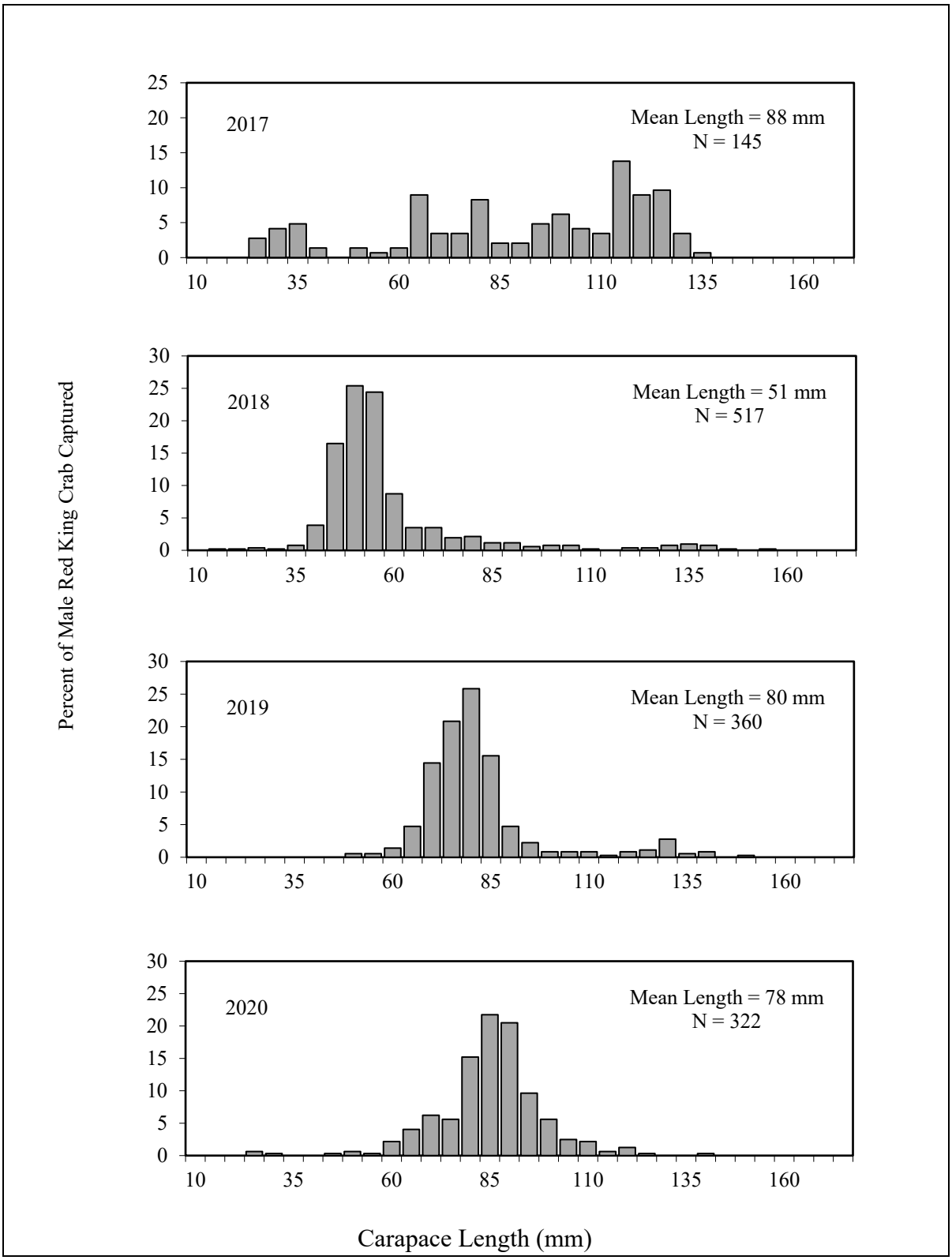


Appendix E24.–Norton Sound male red king crab size distribution from trawl assessment surveys conducted by the National Marine Fisheries Service in 1991, and by ADF&G in 1996, 1999, and 2002.

Note: Mean length information is not available for 1991.



Appendix E25.–Norton Sound male red king crab size distribution from trawl assessment surveys conducted by ADF&G in 2006, 2008, 2011, and 2014.



Appendix E26.–Norton Sound male red king crab size distribution from trawl assessment surveys conducted by ADF&G in 2017, 2018, 2019, and 2020.

APPENDIX F: MISCELLANEOUS FISHERIES

Appendix F1.–Kotzebue District winter commercial sheefish harvest statistics, 1990–2020.

Year [b]	Number of participants	Number of fish	Pounds [a] Total	Pounds [a] Average	Price per pound ($)	Estimated value ($)
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]			No catch[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]			No catch[e]			
1998	1	254	2,400	9.4	0.43	1,032
1999–2000 [e]			No catch[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]			No catch[e]			
2011	1	Confidential Information			2.09	[f]
2012–2014 [e]			No catch[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]
2019–2020 [e]			No catch[e]			

[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 participants; 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, 1990–2020.

	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	1,644	439	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	1,314	366	245	24	46
2018	420	143	629	731	298
2019	411	161	230	139	406
2020	Information not available.				
Average					
2015–2019	915	408	481	411	522
2010–2019	1,204	469	584	433	415

Appendix F4.–Kotzebue District incidentally caught and sold Dolly Varden during the commercial salmon fishery, 1990–2020.

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	688	0	[d]	0.00
2019	0	927	0	[d]	0.00
2020	0	389	0	[d]	0.00

[a] Estimate includes fish caught but not sold based on interviews of participants 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 (blank cells).

[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, 1990–2020.

	Location									
Year	Marine water	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other streams	Total
1990	183	1,078	166	614	348	ND	ND	ND	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	32	72	0	264	0	16	0	0	36	420
2019	0	112	27	152	13	13	0	27	67	411
2020	Information not available.									
Average 2015–2019	6	176	5	526	42	54	5	5	44	863
2010–2019	3	117	4	687	185	42	7	7	127	1,178

Note: Data are not available for all years. ND = no data.

Appendix F7.–Aerial survey counts of overwintering and spawning Dolly Varden in the Kotzebue District, 1990–2020.

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]
2019	[d]	17,308	[d]
2020	[d]	74,406	24,675

[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 are 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, 2006–2020.

Year [a]	Number of participants	Number of whitefish	Total pounds	Price per pound ($)	Estimated value ($)
2006–2007	1	3,209	3,723	0.44	2,635
2007–2008 [b]			[b]		
2008–2009 [b]			[b]		
2009–2010 [b]			[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]			[b]		
2015–2016	3	1,971	2,076	0.50	1,038
2016–2017	1	1,999	1,999	0.50	1,000
2017–2020 [b]			[b]		

Note: Confidentiality was waived by participants.

[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, 1993–2020.

Year [a]	Number of participants	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
2017–2020 [d]		[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 participants.

[d] No reported sales.

Appendix F11.–Norton Sound District capelin sightings, 2013–2020.

Year	Dates
2013	7/19
2014	mid-June
2015	early and late June
2016	6/19
2017	7/2
2018	6/15-6/21
2019 [a]	first 3 weeks of June, 7/4, and 7/10
2020	no reported sightings

Note: Capelin sightings were not tracked or recorded by ADF&G prior to 2013.

[a] The June sightings were along the coastline from a plane.

APPENDIX G: OVERVIEW OF 2020

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*
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, 2020.

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.

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. NSEDC project.

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. NSEDC project.

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. Collect age, sex and length of Chinook and chum salmon in the Kwiniuk River escapement from beach seining. ADF&G project.

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, sex, and length data through escapement sampling from weir trap. ADF&G project.

-continued-

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 project.

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. NSEDC project.

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. NSEDC project.

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. Collect age, sex, and length data from weir trap. NSEDC project.

Solomon River Weir

a) Location: Solomon River, at approximately mile 36 on the Nome-Council road.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapements. ADF&G project.

Ungalik River Tower

a) Location: Ungalik River, approximately 2 miles upstream from the mouth (Norton Bay) and 30 miles southeast of Koyuk.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapements. NSEDC 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. 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.

-continued-

Salmon Lake Limnology Project / Sockeye Salmon Restoration

a) Location: Salmon Lake, throughout.

b) Description: Restore sockeye salmon population to higher historical levels. Hydroacoustic-tow net studies conducted to estimate rearing fry population and gather growth data. Fertilization of Salmon Lake. NSEDC project.

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. Unalakleet was also surveyed by Commercial Fisheries Division. ADF&G project.

CRAB

Norton Sound Red King Crab Trawl Survey (Conducted in 2020)

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, 2020.

Company	Address	Type of processing	District
Norton Sound Seafood Products	Nome, AK 99762 and Unalakleet, AK 99684	Frozen/fresh salmon Herring and miscellaneous finfish bait Frozen/fresh king crab	Norton Sound
Copper River Seafoods	1118 East Fifth Avenue Anchorage, AK 99501	Buy and Fly Frozen/fresh salmon	Kotzebue Sound
E & E Seafoods dba Pacific Star Seafoods	520 Bridge Access Rd. Kenai, AK 99611	Buy and fly Floating processor Frozen/fresh salmon	Kotzebue Sound

Appendix G4.–Subdistrict 6 subsistence salmon harvest survey form, 2020.

NORTON SOUND 2020 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 (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?

RED KING CRAB

Emergency Order: 3-C-Z-01-20 Effective Date: February 29, 2020

EXPLANATION: This emergency order opens the Norton Sound winter through the ice open-access red king crab fishery from 12:00 noon Saturday, February 29 until 11:59 p.m. Thursday, April 30, or when closed by subsequent emergency order when the 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 2020 Norton Sound commercial red king crab fishery is 170,100 pounds with 8% reserved for the winter open access fishery and results in a potential harvest of 13,100 pounds. By regulation those intending to commercial crab must stop subsistence crabbing two weeks before the commercial season begins and therefore must not participate in subsistence crabbing after noon on February 15, 2020.

Emergency Order: 3-C-Z-02-20 Effective Date: June 15, 2020

EXPLANATION: This emergency order opens the commercial open access crab fishery in Norton Sound from 12:00 noon Monday, June 15 until 12:00 noon Thursday, September 3, or when the guideline harvest level is reached.

JUSTIFICATION: By regulation, the summer commercial king crab fishery can open anytime on or after June 15 by emergency order. This season by regulation the area east of 167 degrees W longitude is closed. The open access guideline harvest level is over 140,000 pounds. The major land-based processor-buyer has notified the department that they will not purchase crab this year and therefore reaching the guideline harvest level will be unlikely in 2020.

HERRING

Emergency Order: 3-H-Z-01-20 Effective Date: May 19, 2020

EXPLANATION: This emergency order opens the Norton Sound District to commercial gillnet fishing for bait herring beginning 12:00 noon Tuesday, May 19, 2020 until Wednesday, July 1, 2020, unless superseded by emergency order.

JUSTIFICATION: The buyer, Norton Sound Seafood Products (NSSP), plans to buy up to 75 tons of herring for bait this season. Processing and buying operations will be limited to NSSP processing plant in Unalakleet. The herring quota is over 5,000 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-1S-20 Effective Date: July 8, 2020

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 about 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-01-19 Effective Date: July 8, 2020

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.

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JUSTIFICATION: The main runway at the Kotzebue airport extends nearly to the ocean and concern has arisen about 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-02-20 Effective Date: July 10, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 10 hours from the hours of 8 a.m. until 6 p.m. Friday, July 10.

JUSTIFICATION: Three buyers plan to purchase Kotzebue chum salmon this season. Regulation allows the season to be open from July 10 through August 31. Two buyers have notified the department that they would like to begin purchasing fish on Friday, July 10. Having a 10-hour opening will serve as a test of early run strength and fishing effort.

Emergency Order: 3-S-X-03-2020 Effective Date: July 12, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 10 hours daily from the hours of 8 a.m. until 6 p.m. Sunday, July 12 through Friday, July 17.

JUSTIFICATION: Three buyers plan to purchase Kotzebue chum salmon this season. Regulation allows the season to be open from July 10 through August 31. Two buyers participated in the first commercial fishing period on July 10 and the catch of 443 chums was below average. Fishing effort was about half of recent years. Having 10-hour daily openings will serve as a test of early run strength and fishing effort.

Emergency Order: 3-S-X-04-20 Effective Date: July 19, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 10 hours daily from the hours of 8 a.m. until 6 p.m. Sunday, July 19 through Friday, July 24.

JUSTIFICATION: Two buyers participated in the first full week of commercial fishing. Through 7 fishing periods the commercial catch was 8,125 chums. The daily average number of permit holders fishing was 11 compared to 30 permit holders fishing the same time last year. This year's catch was less than 30% of the catch when compared to last year through the first 7 fishing periods. However, with the reduced fishing effort and fishing 2 hours less daily this year the catch per unit of effort (CPUE) was only slightly below last year. The Kobuk River test fish crew is scheduled to begin fishing later this week. Having 10-hour daily openings should not jeopardize escapement or subsistence fishing.

Emergency Order: 3-S-X-05-20 Effective Date: July 26, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 10 hours daily from the hours of 8 a.m. until 6 p.m. Sunday, July 26 through Friday, July 31.

JUSTIFICATION: Through 13 fishing periods the commercial catch was 28,270 chums. The daily average number of permit holders fishing the second week of the fishery was 24 compared to 41 permit holders fishing the same time last year. This past week's catch was 20,145 chums compared to 35,055 chums during the same week last year. However, with the reduced fishing effort and fishing 2 hours less daily this year the catch per unit of effort (CPUE) was well above last year's CPUE for the past week. The Kobuk River test fish crew has begun fishing. The department will compare Kotzebue commercial catch and the CPUE from the test fish project to determine if additional fishing time is warranted the following week.

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Emergency Order: 3-S-X-06-20 Effective Date: August 3, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from 10 a.m. until 6 p.m. Monday, August 3.

JUSTIFICATION: The July chum salmon catch was half the July catch last year. The daily average number of permit holders fishing the second week of the fishery was 21 compared to 40 permit holders fishing the same time last year. However, even with the reduced fishing effort and fishing 2 hours less daily this year the catch per unit of effort (CPUE) was the same as last year. The Kobuk River test fish chum salmon catches at Kiana have been poor with sheefish catches outnumbering chum catches nearly four to one. The last time sheefish catches exceeded chum salmon catches in July at the Kiana test fish site was in 2006. That year was the last year when commercial fishing was suspended for several days to allow for more chum salmon escapement. The department is reducing commercial fishing time this week to allow more chum salmon to move through the fishing district and into the rivers. The department will compare Kotzebue commercial catch and the test fish CPUE to determine if fishing time can be expanded later.

Emergency Order: 3-S-X-07-20 Effective Date: August 5, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from 12 p.m. until 8 p.m. Wednesday, August 5.

JUSTIFICATION: The July chum salmon catch index at the Kobuk River test fishing project was the lowest in the 28-year project history. The commercial fishing effort this year has been nearly half and fishing time has been at least 2 hours less daily this year. This week the department plans to have openings every other day to enable more fish to pass into the rivers to provide for subsistence needs and escapement. The department will compare Kotzebue commercial catch and the test fish CPUE to determine if commercial fishing time can be expanded later in the week or next week.

Emergency Order: 3-S-X-08-20 Effective Date: August 7, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from 12 p.m. until 8 p.m. Friday, August 7.

JUSTIFICATION: The chum salmon catch index at the Kobuk River test fishing project has been the lowest in the 28-year project history. The commercial fishing effort this year has been nearly half, and fishing time has been at least 2 hours less daily this year. This week the department has been having openings every other day to enable more fish to pass into the rivers to provide for subsistence needs and escapement. The Kobuk River test net chum catches have improved, and the department will compare Kotzebue commercial catch and the test fish CPUE to determine if commercial fishing time can be expanded next week.

Emergency Order: 3-S-X-09-20 Effective Date: August 9, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from 10 a.m. until 6 p.m. Sunday, August 9.

JUSTIFICATION: The chum salmon catch index at the Kobuk River test fishing project has been the lowest in the 28-year project history. The commercial fishing effort this year has been nearly half, and fishing time has been at least 2 hours less daily this year. The past week the department reduced fishing time from 6 days a week to 3 days a week and further reduced fishing time another 2 hours. Yesterday's 8-hour opening had the best catch of the season and the highest CPUE. The department has been having openings every other day to enable more fish to pass into the rivers to provide for subsistence needs and escapement. The Kobuk River test net chum catches have improved, and the department will compare Kotzebue commercial catch and the test fish CPUE to determine if commercial fishing time can be expanded during the coming week.

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Emergency Order: 3-S-X-10-20 Effective Date: August 11, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from 10 a.m. until 6 p.m. Tuesday, August 11.

JUSTIFICATION: The chum salmon catch index at the Kobuk River test fishing project had been the lowest in the 28-year project history but is starting to improve. Yesterday's 8-hour opening had the best catch of the season and the highest CPUE. The department has been having openings every other day to enable more fish to pass into the rivers to provide for subsistence needs and escapement. The department will compare Kotzebue commercial catch and the test fish CPUE to determine if commercial fishing time can be expanded this week.

Emergency Order: 3-S-X-11-20 Effective Date: August 13, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from 10 a.m. until 6 p.m. Thursday, August 13.

JUSTIFICATION: The chum salmon catch index at the Kobuk River test fishing project is the second lowest in the 28-year project history but has been improving. Yesterday's 8-hour opening had the best catch of the season and the highest CPUE. The department has been having openings every other day to enable more fish to pass into the rivers to provide for subsistence needs and escapement. The department will compare Kotzebue commercial catch and the test fish CPUE to determine if commercial fishing time can be expanded this week.

Emergency Order: 3-S-X-12-20 Effective Date: August 16, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from 10 a.m. until 6 p.m. Sunday, August 16.

JUSTIFICATION: The chum salmon catch index at the Kobuk River test fishing project is the second lowest in the 28-year project history but has been improving with the best catches occurring this past week. The department has been having openings every other day to enable more fish to pass into the rivers to provide for subsistence needs and escapement. This opening will be after two days with no commercial fishing. The department will compare Kotzebue commercial catch and the test fish CPUE to determine if commercial fishing time can be expanded this coming week.

Emergency Order: 3-S-X-13-20 Effective Date: August 18, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from 12 p.m. until 8 p.m. Tuesday, August 18.

JUSTIFICATION: The chum salmon catch index at the Kobuk River test fishing project is the second lowest in the 28-year project history but has been improving with the best catches occurring last week. The department has been having openings every other day to enable more fish to pass into the rivers to provide for subsistence needs and escapement. The department will compare Kotzebue commercial catch and the test fish CPUE to determine if commercial fishing time can be expanded this coming week.

Emergency Order: 3-S-X-14-20 Effective Date: August 20, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from 10 a.m. until 6 p.m. Thursday, August 20.

JUSTIFICATION: The chum salmon catch index at the Kobuk River test fishing project is lowest in the 28-year project history but is projected to reach the minimum 600 index points with the current fishing schedule. The department has been having openings every other day to enable more fish to pass into the rivers to provide for subsistence needs and escapement. The department will compare Kotzebue commercial catch and the test fish CPUE to determine if commercial fishing time can be expanded next week.

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Emergency Order: 3-S-X-14-20 Effective Date: August 23, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from 10 a.m. until 6 p.m. on Sunday, August 23 and Monday, August 24.

JUSTIFICATION: The chum salmon catch index at the Kobuk River test fishing project has been steady this week and is projected to reach the minimum 600 index points with the current fishing schedule. In August, the department has been having openings every other day to enable more fish to pass into the rivers to provide for subsistence needs and escapement. The department will compare Kotzebue commercial catch and the test fish CPUE to determine if commercial fishing time can be expanded later in the week.

Emergency Order: 3-S-X-15-20 Effective Date: August 26, 2020

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours daily from 10 a.m. until 6 p.m. beginning on Wednesday, August 26 through Friday, August 28.

JUSTIFICATION: The chum salmon catch index at the Kobuk River test fishing project has been steady this week and has reached the minimum 600 index points. In August until this week the department has been having openings every other day to enable more fish to pass into the rivers to provide for subsistence needs and escapement. Although the commercial season ends in regulation on August 31 the buyers have requested finishing the season by having consecutive fishing periods this week with the last fishing period on August 28. The department agrees that doing so will not jeopardize escapement or subsistence needs.

NORTON SOUND SALMON

Emergency Order: 3-S-Z-01S-20 Effective Date: June 15, 2020

EXPLANATION: This emergency order closes all subsistence fishing in the marine waters of Subdistrict 5 and 6, Shaktoolik and Unalakleet Subdistricts beginning June 15 and reopens them to two 48-hour fishing periods a week from 6 p.m. Monday until 6 p.m. Wednesday and from 6 p.m. Thursday until 6 p.m. Saturday.

JUSTIFICATION: The Board of Fisheries has listed king salmon of Subdistricts 5 and 6 of the Norton Sound District a stock of concern and have restricted subsistence fishing in the marine waters of those subdistricts to two 48-hour fishing periods a week from June 15 through July 15.

Emergency Order: 3-S-Z-02S-20 Effective Date: June 15, 2020

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 15 through July 15, 2020. 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 several years ago of a fisherman using a trout net to capture king salmon just upstream of the Unalakleet River mouth. King salmon have been determined to be a stock of concern by the Alaska Board of Fisheries Salmon in Subdistrict 6 the Unalakleet Subdistrict and a management plan including the Unalakleet River has been put in regulation by the Board. The management plan allows for subsistence salmon fishing for two 36-hour fishing periods from 8 a.m. Monday until 8 p.m. Tuesday and from 8 a.m. Friday until 8 p.m. Saturday in the Unalakleet River from June 15 through July 15. The department had allowed fishing with small mesh gillnets with a mesh size of four inches or less to target Dolly Varden and whitefish. To prevent fishermen using the small mesh exception during times other than the subsistence fishing schedule the department is closing all subsistence fishing in the Unalakleet River downstream of the North River confluence and in the North River. Fishermen can fish upstream of the confluence on the Unalakleet River with small mesh gear 7 days a week.

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Emergency Order: 3-S-Z-03S-20 Effective Date: June 15, 2020

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 2020 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, Solomon, and Pilgrim rivers will also be operated to count salmon escapements.

Emergency Order: 3-S-Z-04S-20 Effective Date: June 15, 2020

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-05S-20 Effective Date: August 20, 2020

EXPLANATION: This emergency order doubles the subsistence catch limit from 25 sockeye salmon to 50 sockeye salmon in Pilgrim River.

JUSTIFICATION: The Pilgrim River weir was pulled on August 14 and the count through August 13 was 13,578 sockeyes, nearly double the low end of the escapement goal range of 6,800 to 36,000 sockeye salmon. The last day of counting on August 13 there were 305 sockeyes counted through the weir. An aerial survey of Salmon Lake and Grand Central River had nearly 6,000 sockeyes enumerated, and the previous aerial survey goal was 4,000 to 8,000 sockeyes. As some sockeyes are still moving upstream this will allow some additional harvest by subsistence permit holders who so desire.

Emergency Order: 3-S-Z-01-20 Effective Date: June 24, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1, 2, 3, 4, 5 and 6 to commercial fishing for 24 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Covid-19 restrictions have delayed adult salmon escapement counting projects from being operational, but projects should be operational later in the week. 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. Subsistence fishers in Shaktoolik and Unalakleet have reported strong catches of king salmon during the last 48-hour opening that ended at 6 p.m. June 20. Catches of chum and pink salmon were also reported. One more subsistence fishing period will occur in Shaktoolik and Unalakleet before commercial fishing begins. Reports from Shaktoolik and Unalakleet are that many residents have filled their subsistence needs for king salmon. This fishing period will be a restricted mesh opening to target chum salmon and the king salmon run was forecast to be like last year when the escapement goal was reached at the historical midpoint of the run. By season's end the king salmon escapement at North River was 25% over the high end of the escapement goal range. The king salmon run has reached the escapement goal in southern Norton Sound the last two years and allowing some incidental catch should not jeopardize escapement. If weak catches occur the department will wait for a longer duration before the next chum salmon fishing period. In northern Norton Sound the commercial chum salmon fishery is starting a week later than last year. This brief opening will allow some utilization of an expected harvest surplus and is not expected to jeopardize escapement needs.

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Emergency Order: 3-S-Z-02-20 Effective Date: June 29, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistrict 2 to commercial fishing for 24 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: The last commercial salmon fishing period that ended Thursday evening was 24 hours in Subdistrict 2, the Golovin Subdistrict. Chum salmon catches were well above average. Stormy weather has delayed additional commercial fishing, and this will be the first opportunity for the fishing fleet to commercial fish again. The counting tower on Fish River, the major river of the Golovin Subdistrict, is now operational and the crew has counted 12 kings, 12 sockeyes, 330 chums and 318 pinks passing the tower through Sunday evening. This brief opening will allow some utilization of an expected harvest surplus and is not expected to jeopardize subsistence or escapement needs.

Emergency Order: 3-S-Z-03-20 Effective Date: July 1, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistrict 2 to commercial fishing for 24 hours with nets restricted to 6 inches or less.

JUSTIFICATION: The last commercial salmon fishing period that ended Tuesday evening was 24 hours in Subdistrict 2, the Golovin Subdistrict. Chum salmon catches were average but dropped from the well above average catches during the first 24-hour fishing period. The counting tower on Fish River, the major river of the Golovin Subdistrict, has not been operational for the last two days because of high water and the crew had counted 12 kings, 12 sockeyes, 330 chums and 318 pinks passing the tower through Sunday evening. The management plan in regulation allows for a harvest of up to 15,000 chums by mid-July before chum salmon escapement assessment. This brief opening will allow some utilization of an expected harvest surplus and is not expected to jeopardize subsistence or escapement needs.

Emergency Order: 3-S-Z-04-20 Effective Date: July 2, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1, 3, 4, 5 and 6 to commercial fishing for 24 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Southern Norton Sound salmon escapement counting projects are not yet operational because of high water but most northern Norton Sound projects are now operational. Although early chum salmon counts have been lower than recent years. Because of this the department have delayed fishing one week since the first 24-hour commercial fishing opening. 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. If weak catches occur the department will wait again before the next chum salmon fishing period unless counting projects show a surge of chum salmon. This brief opening will allow some utilization of an expected harvest surplus and is not expected to jeopardize escapement needs.

Emergency Order: 3-S-Z-05-20 Effective Date: July 9, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 5 and 6 to commercial fishing for 24 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: The Fish River tower crew in Golovin Subdistrict has been unable to count salmon escapement for over a week. Southern Norton Sound salmon escapement counting projects have been operational for most of the season, but the North River tower crew in Unalakleet Subdistrict did start counting again on July 6. Elsewhere, escapement counting projects have had low counts of chum salmon compared to historical averages. Because of this the department has delayed commercial fishing one week since the start of the last 24-hour commercial fishing opening. This opening will allow department staff to compare the catch per unit of effort (CPUE) with historical catches near the same date. If weak catches occur no more commercial fishing is expected until chum escapements improve or there is a pink directed or silver salmon fishery.

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Emergency Order: 3-S-Z-06-20 Effective Date: July 15, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1, 2 and 5 to commercial fishing for 24 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Chum salmon counts have increased at Nome area weirs and Eldorado River weir will surpass the lower end of the escapement goal range of 4,200 to 14,200 chum salmon. The Fish River tower in Golovin is now operational after being out for two weeks because of high water. Based on last week's chum harvest sufficient time has passed to allow for another commercial fishing period. The Shaktoolik River tower is now operational and based on last week's chum harvest sufficient time has passed to allow for another commercial fishing period. If weak catches occur the department will wait again before the next chum salmon fishing period unless counting projects show a surge of chum salmon. This brief opening will allow some utilization of an expected harvest surplus and is not expected to jeopardize escapement needs.

Emergency Order: 3-S-Z-07-20 Effective Date: July 16, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 3, 4 and 6 to commercial fishing for 4 hours with nets restricted to 4 ½ inches or less mesh size.

JUSTIFICATION: Pink salmon escapement is on track for over one million fish at escapement projects in all three subdistricts. The buyer is concerned about capacity and has a requested only a 4-hour opening. This brief opening will allow some utilization of the surplus.

Emergency Order: 3-S-Z-08-20 Effective Date: July 17, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1 and 2 to commercial fishing for 48 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Chum salmon escapement has reached the lower end of the escapement goal range on the Eldorado River in the eastern Nome Subdistrict. In the Golovin Subdistrict the Fish River tower crew was only recently been able to count for a little over 3 complete days before losing staff to continue to count and over 4.000 chums were counted during that time. The chum run is past the average midpoint date and having an opening on the back side of the run should not jeopardize chum salmon escapement.

Emergency Order: 3-S-Z-09-20 Effective Date: July 18, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 3, 4, 5 and 6 to commercial fishing for 6 hours with nets restricted to 4 ½ inches or less mesh size.

JUSTIFICATION: Pink salmon escapement is on track for over one million fish at escapement projects in all four subdistricts. The buyer is concerned about capacity and has a requested only a 6-hour opening. This brief opening will allow some utilization of the surplus.

Emergency Order: 3-S-Z-10-20 Effective Date: July 22, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 3 and 4 to commercial fishing for 12 hours with nets restricted to 4 ½ inches or less mesh size.

JUSTIFICATION: Pink salmon escapement is one million fish in Subdistrict 3 and over 600,000 fish at an escapement counting project in Subdistrict 4. The buyer is concerned about capacity and has a requested only a 12-hour opening. This brief opening will allow some utilization of the surplus.

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Emergency Order: 3-S-Z-11-20 Effective Date: July 24, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1 and 2 to commercial fishing for 48 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Chum salmon escapement has reached the lower end of the escapement goal range on the Eldorado River in the eastern Nome Subdistrict and is projected to reach one of two lower end escapement goal ranges in western Nome Subdistrict. In the Golovin Subdistrict the Fish River tower crew was only recently been able to count for a little over 3 complete days before losing staff to continue to count and over 4.000 chums were counted during that time. The chum run is well past the average midpoint date and having an opening on the back side of the run should not jeopardize chum salmon escapement.

Emergency Order: 3-S-Z-12-20 Effective Date: July 25, 2020

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 mesh size.

JUSTIFICATION: The department salmon management plan shifts to silver salmon management on July 25 and this brief opening allow an early test of silver salmon run strength.

Emergency Order: 3-S-Z-13-20 Effective Date: July 31, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1 and 2 to commercial fishing for 48 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Chum salmon escapement has reached the lower end of the escapement goal range on the Eldorado River in the eastern Nome Subdistrict and is projected to reach one of two lower end escapement goal ranges in western Nome Subdistrict. In the Golovin Subdistrict the Fish River tower crew was only recently been able to count for a little over 4 complete days over 4.000 chums were counted during that time. The 48-hour opening last week had good catches for this late in the chum run that well past the third-quarter point date and having an opening on the back side of the run should not jeopardize chum salmon escapement.

Emergency Order: 3-S-Z-14-20 Effective Date: August 1, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 3, 4, 5 and 6 to commercial fishing for 24 hours, with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: The department management plan has shifted to silver salmon management, and this brief opening will allow an early test of silver salmon run strength.

Emergency Order: 3-S-Z-15-20 Effective Date: August 7, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1, 2, 3 and 4 to commercial fishing for 48 hours, and Norton Sound Subdistricts 5 and 6 for 24 hours, with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: The department management plan has shifted to silver salmon management, and this opening will allow some harvest of silver salmon before the historical midpoint of the run. Northern Norton Sound escapement projects have had much better silver salmon passage than in southern Norton Sound so fishing time will be reduced from the normal 48 hours to 24 hours in Subdistricts 5 and 6.

Emergency Order: 3-S-Z-16-20 Effective Date: August 12, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1, 2, 3 and 4 to commercial fishing for 48 hours with nets restricted to 6 inches or less mesh size.

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JUSTIFICATION: Northern Norton Sound escapement projects salmon passage, although early in the run, has been tracking well enough to reach sufficient escapement. Openings to date have been reduced to once a week of 48 hours duration rather than the normal two 48-hour fishing periods a week. This should allow for sufficient escapement and provide opportunity for subsistence.

Emergency Order: 3-S-Z-17-20 Effective Date: August 15, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 for 24 hours, with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Silver salmon escapement has been below average in Shaktoolik and Unalakleet and the usual two 48-hour commercial fishing periods each week have been reduced to one 24-hour fishing period each week. Historically mid-August has had the peak commercial silver catches in Shaktoolik and Unalakleet and this 24-hour commercial fishing period will help to determine if there is any improvement in the silver run.

Emergency Order: 3-S-Z-18-20 Effective Date: August 18, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1, 2 and 3 to commercial fishing for 48 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Last week's 48-hour fishing period had an above average silver catch in Nome, an average catch in Golovin and a below average catch in Elim. Although the Elim silver catch was below average, and the silver escapement counts at Kwiniuk River are below average the silver counts at Kwiniuk River do project the escapement goal being reached this year. The average historical midpoint of the silver run past the tower is later this week. This season there has been one 48-hour commercial fishing period per week rather than the usual two 48-hour periods per week. This should allow for sufficient escapement and provide for subsistence opportunity.

Emergency Order: 3-S-Z-19-20 Effective Date: August 24, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1, 2 and 3 to commercial fishing for 48 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Silver escapement counts at Kwiniuk River tower near Elim are slightly below average, but the escapement goal range is projected to be easily achieved this season. Nome River weir silver counts are average at the historical first quarter point and Snake River weir silver counts are above average at the historical first quarter point. This season there has been one 48-hour commercial fishing period per week rather than the usual two 48-hour periods per week allowing for sufficient escapement and to provide for subsistence opportunity.

Emergency Order: 3-S-Z-20-20 Effective Date: August 27, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1, 2 and 3 to commercial fishing for 48 hours, and Norton Sound Subdistricts 5 and 6 for 24 hours, with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Norton Sound escapement projects have had much better silver salmon passage than in southern Norton Sound so fishing time will be reduced from the normal 48 hours to 24 hours in Subdistricts 5 and 6. Northern Norton Sound escapement projects are expected to reach escapement goals and southern Norton Sound escapement now appear able to reach the lower end of the escapement goal range.

Emergency Order: 3-S-Z-21-20 Effective Date: September 1, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1, 2 and 3 to commercial fishing for 48 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Silver escapement counts at Kwiniuk River tower near Elim are slightly below average, but the

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escapement goal range is projected to be easily achieved this season. Nome River weir silver counts and Snake River weir silver counts are one-third below average at the historical midpoint. The last commercial period had a below average catch in Elim, an average catch in Golovin and an above average catch in Nome. Having two 48-hour periods per week should allow for sufficient escapement and to provide for subsistence opportunity.

Emergency Order: 3-S-Z-22-20 Effective Date: September 4, 2020

EXPLANATION: This emergency order opens Norton Sound Subdistricts 1, 2 and 3 to commercial fishing for 24 hours with nets restricted to 6 inches or less mesh size.

JUSTIFICATION: Silver escapement counts at Kwiniuk River tower near Elim are slightly below average, but the escapement goal range is projected to be easily achieved this season. Nome River weir silver counts and Snake River weir silver counts are one-third below average just past the midpoint. The last commercial period was affected by winds with high seas but there was an average catch in Elim and an above average catch in Nome. No one fished in Golovin. The commercial salmon season closes by regulation after September 7 and having one 24-hour period should still allow for sufficient escapement and to provide for subsistence opportunity.

NORTON SOUND SALMON – SPORT FISH

There were no sport fish emergency orders specific to Norton Sound in 2020.

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

[a] Reported on daily catch form returned to ADF&G. Catch reports were returned to the department 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.