Fishery Management Report No. 17-41

2016 Annual Management Report Norton Sound, Port Clarence, and Arctic, Kotzebue Areas

by

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and

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November 2017

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

FISHERY MANAGEMENT REPORT NO. 17-41

2016 ANNUAL MANAGEMENT REPORT NORTON SOUND, PORT CLARENCE, AND ARCTIC, KOTZEBUE AREAS

by
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ABSTRACT

This report provides information about the 2016 commercial and subsistence fisheries of Norton Sound, Port Clarence, and Arctic, Kotzebue management areas of the Arctic-Yukon-Kuskokwim Region of the Alaska Department of Fish and Game, Division of Commercial Fisheries. The management areas consist of all waters from Point Romanof north of the Yukon River and west of 141 degrees W longitude and those waters draining into the Bering Sea north of Yukon River; the Chukchi Sea, Beaufort Sea and Arctic Ocean. Commercial and subsistence fisheries target 5 species of salmon (Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, chum *O. keta*, coho *O. kisutch*, and pink *O. gorbuscha* salmon), Pacific herring *Clupea pallasii*, red king crab *Paralithodes camtschaticus*, and miscellaneous species such as inconnu (sheefish) *Stenodus leucichthys*, whitefish *Coregonus laurettae*, Dolly Varden *Salvelinus malma*, and saffron cod *Eleginus gracilis.*

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

INTRODUCTION

This report summarizes the 2016 season and historical information concerning management of the commercial and subsistence fisheries of Norton Sound–Port Clarence, Arctic–Kotzebue management areas of the Arctic, Yukon, and Kuskokwim (AYK) Region. Data from select management and research projects are included in this report. A more complete documentation of project results is presented in separate reports. Most of the historical harvest and escapement information in this report goes back to 1990. For information prior to 1990 see Menard et al. 2013.

Data presented in this report supersede information found in previous management reports (e.g., Menard et al. 2017). An attempt has been made to correct errors present in earlier reports and previously unreported data were included. Current-year catch data presented were derived from seasonal field data.

This report is organized into the following major sections:

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

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

SECTION 1: MANAGEMENT AREA OVERVIEWS

BOUNDARIES

Norton Sound–Port Clarence Area and Arctic–Kotzebue Area include all waters from Point Romanof in southern Norton Sound and St. Lawrence Island and west of 141 degrees W longitude, to the U.S.–Canada border (Figure 1). This area encompasses over 100,000 mi² and has a coastline exceeding that of California, Oregon, and Washington combined. For crab management the southern boundary is Cape Romanzof.

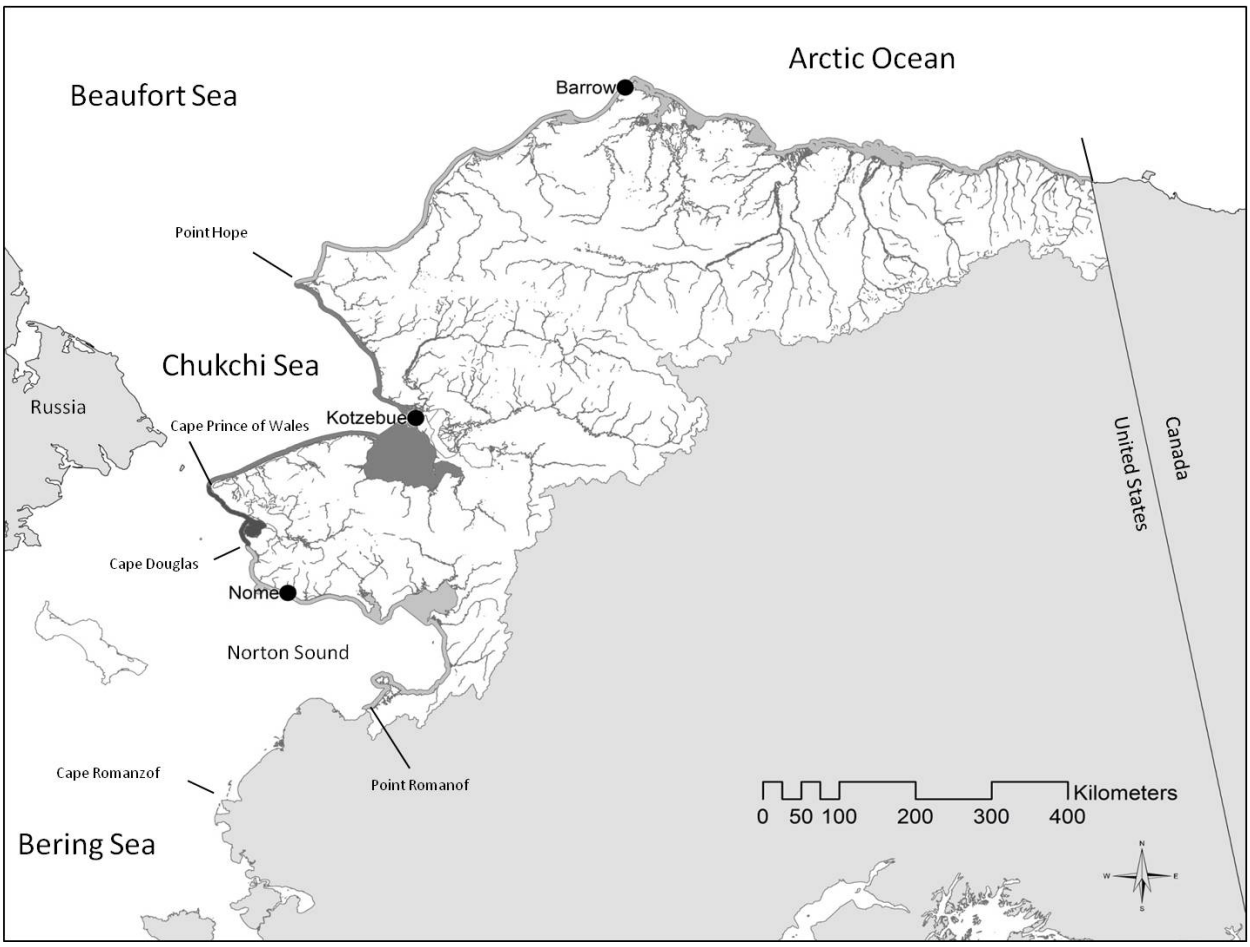

Figure 1.–Norton Sound, Port Clarence, Kotzebue Sound, and Arctic management districts.

SALMON OVERVIEW

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

COMMERCIAL SALMON FISHERY

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

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

There is no commercial salmon fishery in the Arctic District.

SUBSISTENCE SALMON FISHERY

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

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

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

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

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

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

In 2008, a cooperative project (among ADF&G Divisions of Commercial Fisheries, Habitat, and Subsistence; and North Slope Borough Department of Wildlife Management and Planning) was initiated and is ongoing to assess Pacific salmon resources in the Arctic District. Components of the project include 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 throughout all areas of Norton Sound (Appendices A14–A17). However, in northern Norton Sound from Bald Head near Elim to southern Kotzebue Sound at Cape Espenberg, a fishing pole is legal subsistence gear, and catches are often reported as subsistence harvests. More detailed description of sport fish harvest is reported in the fishery management report for sport fisheries in the Northwest/North Slope management area (Scanlon 2015).

SALMON MANAGEMENT

The Division of Commercial Fisheries of ADF&G is responsible for management of commercial and subsistence fisheries in this vast area. Permanent full-time staff assigned to this area during 2016 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. Biologists from regional staff provided additional assistance. In 2016, interns funded by Norton Sound Economic Development Corporation (NSEDC) were utilized as fisheries technicians at some projects. There are 5 cooperative projects staffed by NSEDC and 2 projects jointly operated by NSEDC and ADF&G in Norton Sound that supplemented salmon escapement monitoring activities of area staff.

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

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

The cornerstone regulation that governs commercial salmon harvest in all districts is the scheduled weekly fishing period. Commercial salmon fishing regulations allow for variable fishing periods per week during the open season depending on area and season differences. ADF&G attempts to distribute fishing effort throughout the entire return to avoid harvesting only particular segments of the run. Occasionally, fishing time is increased or decreased by emergency order. Emergency orders issued in 2016 are listed in Appendix G9. 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 fishery news articles are published in the *Nome Nugget* and *Arctic Sounder*.

NORTON SOUND SALMON OVERVIEW

DISTRICT BOUNDARIES

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

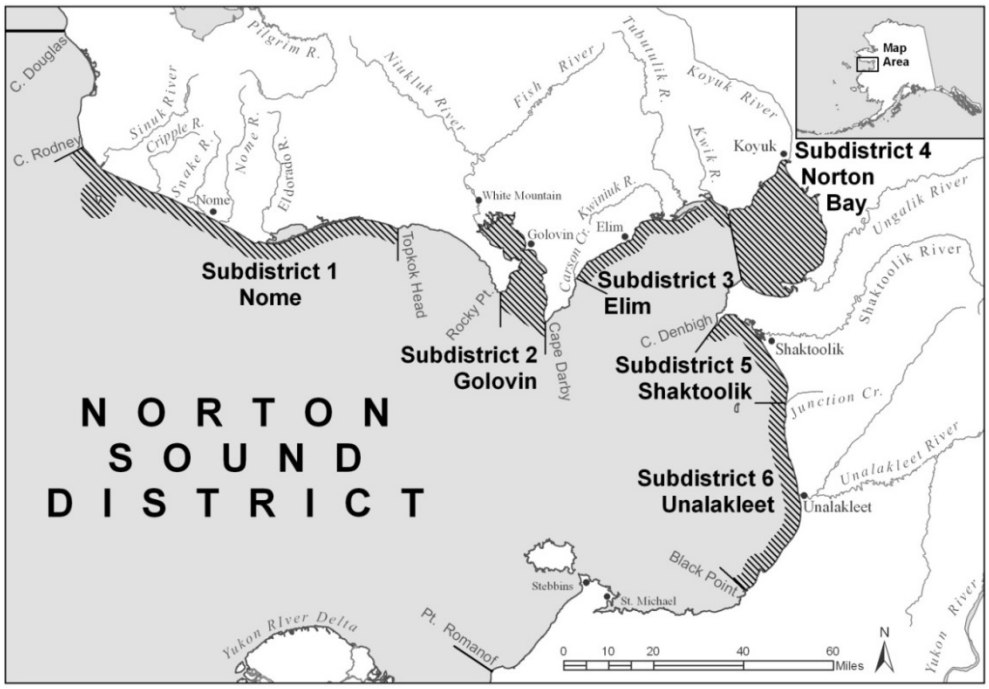

Figure 2.–Norton Sound commercial salmon fishing subdistricts.

All commercial salmon fishing in the district is by set gillnets in marine waters; however, fishing effort is usually concentrated near river mouths. Commercial fishing typically begins in June and targets Chinook salmon if 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 much more abundant in even-numbered year returns. A pink salmon directed fishery may coincide with or may be scheduled to alternate periods with the historical chum salmon directed fishery.

Salmon management had changed significantly beginning in the mid-1990s because of limited market conditions and marginal returns of several salmon stocks within the district; however, rebounding salmon returns in the mid-2000s resulted in renewed buyer interest. There had been no commercial interest in pink salmon from 2000 to 2006, but beginning in 2007 there was some commercial fishing to harvest a small portion of the pink salmon run. Also, since 2007 there has been renewed buyer interest in Golovin and Elim Subdistricts and since 2008 in Norton Bay Subdistrict. Commercial fishery managers use estimates of run strength from escapement counting projects, test fishing, aerial surveys, and commercial fishing catch per unit of effort (CPUE). Nome Subdistrict is managed intensively for subsistence use: Tier II chum salmon subsistence permits, registration permits, closed waters, fishing-period length restrictions, gear limits, and harvest limits are all tools that can be employed throughout the season to provide for escapement needs and to maximize subsistence opportunity.

HISTORICAL FISHERY USE

Archeological evidence dating back 2,000 years indicates fishing has been a part of life for Norton Sound residents for many centuries (Bockstoce 1979). The largest precontact settlements on the Bering Strait Islands and the western Seward Peninsula were located where marine mammals were the primary subsistence resource. The rest of the region's population lived in

small groups scattered along the coast, often moving seasonally to access fish and wildlife resources (Thomas 1982). During summer months, residents would usually disperse in groups composed of 1 or 2 families and set up camps near the mouths of streams. Harvest levels of fish on any 1 stream were relatively small because of low concentrations of people who caught only what their families and 1 or 2 dogs needed through the winter (Thomas 1982).

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

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

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

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

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

of summer cash and snow machines were replacing the need for dog teams. The use of dry fish to feed dogs decreased and cash became more available for exchange at stores.

COMMERCIAL FISHERY OVERVIEW

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

Since then, markets have been sporadic and some subdistricts have often been unable to attract buyers for entire seasons. A joint venture between KEG (Koyuk–Elim–Golovin) Fisheries and NPL Alaska, Inc. operated from 1984 until midseason in 1988. Two Japanese freezer ships were permitted to buy directly from domestic fishermen limited to salmon caught in the internal waters of Golovnin and Norton Bays. The most consistent markets are at Shaktoolik and Unalakleet, and onshore processing occurs at Unalakleet. Appendix G3 provides a list of commercial processors and buyers that operated in Norton Sound and Kotzebue Sound in 2016.

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

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

COMMERCIAL FISHERY MANAGEMENT

Norton Sound District is managed on comparative commercial catch data, escapements, and weather conditions. A combination of factors are 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 taken into account when making interannual aerial survey comparisons. Counting towers and weirs are a more consistent and accurate method of obtaining escapement information and have been utilized on several river systems in Norton Sound. In 2016, there were 4 counting towers and 6 weirs in operation. One sonar project was operated on the Shaktoolik River in combination with a counting tower, but the project was still in development and was not used for inseason management.

Early management emphasis is on Chinook salmon switching to chum salmon around July 1, and then gradually shifting to coho salmon during the fourth week in July. Pink salmon are abundant during even-numbered years, but often no buyer is available for this species except as incidentally caught fish when there are other salmon directed fisheries. Coho salmon catches have remained fairly stable in recent years and although they had dropped from the record levels seen in Norton Sound in the mid-2000s, the 2016 catch was the seventh time in history that the catch exceeded 100,000 fish. Chum salmon catches have been rebounding in recent years to the best catches since the 1980s, but were less than half the expected harvest in 2016. Management actions have consisted of a series of emergency orders that open and close fishing seasons and periods and establish gillnet mesh size specifications.

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

Little or no commercial salmon harvest had occurred in Nome and Norton Bay Subdistricts since the early 1980s. Nome Subdistrict had very depressed chum salmon stocks that, until the mid-2000s, required closure or severe restrictions of the subsistence fishery. However, salmon runs have improved greatly with record runs of pink and coho salmon in the mid-2000s and the best chum salmon runs in recent years since the 1980s. Nome Subdistrict had been unable to attract a buyer for pink and coho salmon until recently and was closed to commercial chum salmon fishing by regulation until 2013. The Norton Bay Subdistrict often has healthy stocks, but it had been unable to attract markets willing to operate in this remote area until recently. Since 2008, improving market conditions resulted in NSSP bringing more tenders to the subdistrict, and commercial salmon fishing has resumed in Norton Bay.

SUBSISTENCE FISHERY OVERVIEW

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

Subdistricts 1–6 (2006–2015), the average subsistence harvest was 62,824 salmon, and the majority was pink salmon (Appendix A14). However, from 2004 to 2007, the village of Koyuk was not surveyed, and therefore no harvest data from Norton Bay Subdistrict are included for those years.

Two goals of the postseason household subsistence survey are to collect harvest data to estimate subsistence salmon catch by species and community, and to compile information on gear types, participation rates, sharing, use of salmon for dog food, and household size. A copy of the Norton Sound subsistence salmon harvest survey form is shown by village in Appendices G4–G8.

In 2004, ADF&G's subsistence salmon harvest assessment program changed substantially when household surveys were discontinued in most communities because the household subsistence permit system was expanded from Nome Subdistrict to include Port Clarence District (affecting the communities of Teller and Brevig Mission) and Norton Sound Subdistricts 2 and 3 (affecting the communities of Council, White Mountain, Golovin, and Elim). Thereafter, subsistence salmon harvest for those communities are reported totals from subsistence permits, and household surveys have not been necessary. Permits issued at the Nome office, and by ADF&G personnel in the field, identify gear restrictions, bag limits, subsistence zones (for Subdistrict 1, Salmon Lake and Pilgrim River only), location and access descriptions, and subsistence regulations for each location or body of water. In addition, the permit contains a catch calendar for household members to record gear type used, area fished, and catch in numbers by species for each day fished. If subsistence fishermen reach their harvest limit in 1 river, they can fish in other rivers until they reach the limit in those rivers. Subsistence permits are important to management because they identify users, fishing effort, harvests, and catch limits.

In Subdistrict 1 (Nome), low salmon stock levels combined with a large concentration of users has required subsistence fishing permits since 1975. By regulation, permits with catch calendars are issued to each requesting household listing all Nome Subdistrict fishing locations, catch limits, and gear restrictions. After the fishing season, households are required to return the completed permit to ADF&G, whether or not they actually fished. Due to the subsistence permit program, all subsistence salmon catches from Norton Sound Subdistrict 1 have been determined from returned permits since 1975. However, not all fishermen obtained or returned permits from 1975 to 2003, and the data were not expanded for unreturned permits because the assumption was that those permit holders did not fish. Beginning in 2004, stricter enforcement of regulations including fines for failure to return a permit resulted in nearly 99% of all permits issued being returned, and the last 5 years all subsistence salmon permits issued have been returned or households have reported catches in person, by telephone, or by email.

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

Beginning in 2007, regulations allowed for cash sales of up to $200 worth of subsistence-taken finfish per household, per year, in the Norton Sound–Port Clarence Area, and starting in 2013 the amount allowed was raised to $500. From 2007 to 2012, 5 or fewer customary trade finfish permits were issued per year, but more recently (2013–2016), due to ADF&G's increased efforts to remind residents about the permit requirement when selling subsistence-caught finfish, an average of 16 customary trade permits were issued per year in Norton Sound District. Total annual sales have never exceeded $2,000 (Appendix A34).

HISTORICAL REGULATORY ACTIONS IN NORTON SOUND SUBDISTRICTS

Nome Subdistrict (Subdistrict 1) has been the focus of most regulatory actions within the Norton Sound District since the 1970s. Although pink salmon are usually the most abundant species of salmon in Nome Subdistrict streams, the commercial fishery primarily targeted chum salmon during the 1970s. Relatively large chum salmon catches in this subdistrict in conjunction with weak local abundance implied that the fishery may have harvested 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 Golovin (Subdistrict 2) to Kotzebue. In an attempt to provide for spawning requirements and to provide for an important subsistence fishery that targets local stocks, a commercial harvest guideline of 5,000–15,000 chum salmon was adopted as a regulation.

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

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

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

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

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

were adopted by BOF in 1987 restricting gillnet length and mesh size in the subsistence fishery. Beach seine use in specific waters in the subsistence fishery was also eliminated.

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

In 1999, the BOF concluded that the previous management plan did not provide adequate opportunity for all subsistence salmon users to supply their annual needs for chum salmon. Therefore, Nome Subdistrict was designated a Tier II subsistence chum salmon permit fishery during a special BOF meeting held in Nome, March 1999. Under Tier II, permits are dispensed to individuals prioritized by fishing history and dependence and are based on projected harvestable surplus. As a result, ADF&G allowed 20 individuals who scored highest on the Tier II application process in 1999 to subsistence fish. The intent was to allow Tier II permit holders first 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 obtain a Tier I permit and individual harvests would be restricted to prescribed bag limits. In addition, BOF established "closed waters" areas where no subsistence salmon fishing would be allowed at any time, to protect chum salmon on the spawning grounds, and placed existing chum salmon aerial survey escapement goals for 6 Nome Subdistrict streams into regulation. In 1999, due to poor chum salmon returns, ADF&G closed even the Tier II fishery, and in 2000, only 10 Tier II permits were issued.

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

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

Nome Subdistrict (Subdistrict 1)

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

Elim Subdistrict (Subdistrict 3)

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

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

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

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

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

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

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

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.

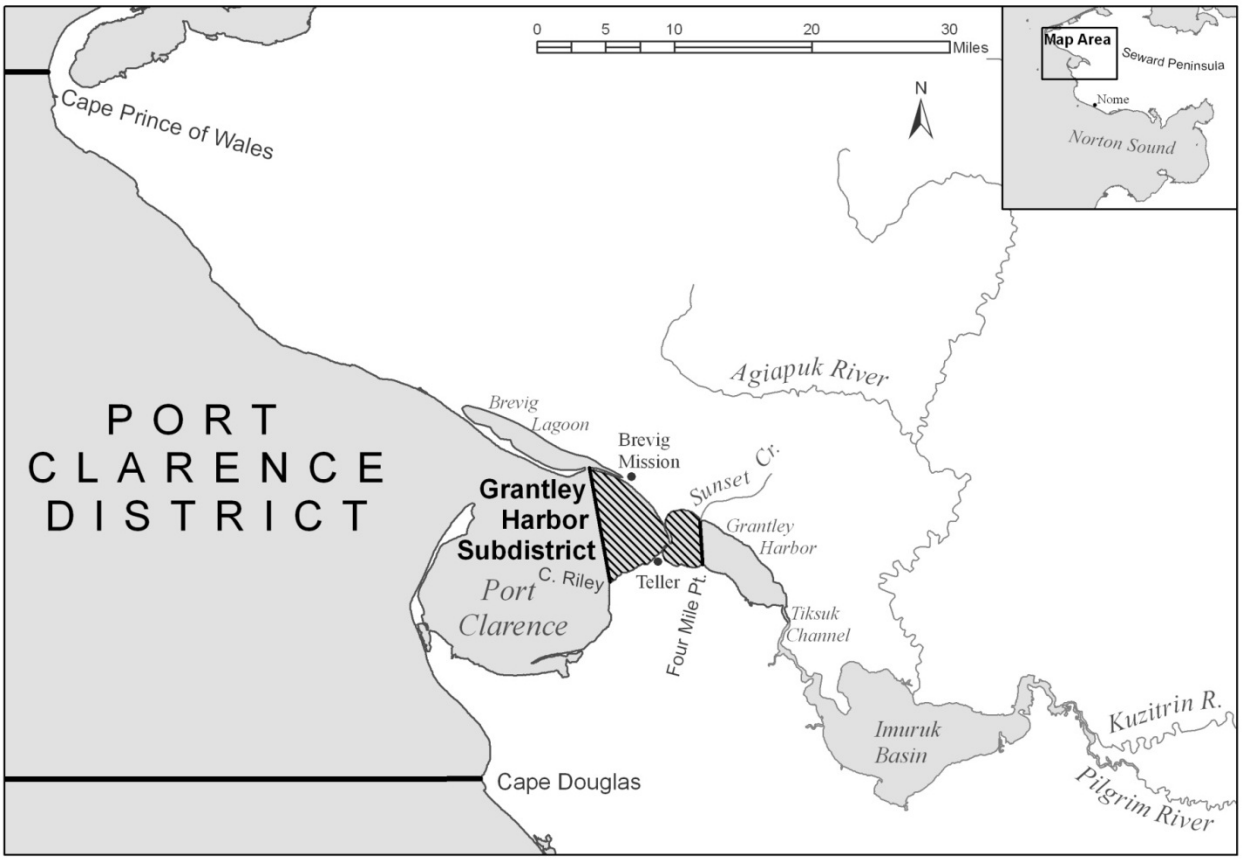

Figure 3.–Port Clarence District.

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

COMMERCIAL FISHERY OVERVIEW

In contrast to Norton Sound District, commercial fishing has been limited in Port Clarence District. In 1966, a commercial salmon fishery was established in the Grantley Harbor/Tuksuk Channel area of the Port Clarence District, but the fishery that year yielded less than 2,300 combined chum, pink, and sockeye salmon (Menard et al. 2013). It was closed later that same season, due to small salmon runs and concerns from local residents about impacts to area subsistence salmon fisheries, and had remained closed until relatively recently. In the mid-2000s, there were large increases in sockeye salmon runs as well as positive results from an ADF&G test fishery in 2006. Consequently, in 2007, the BOF reestablished by regulation a Port Clarence District commercial salmon fishery. The BOF also established an inriver run goal of at least 30,000 sockeye salmon as a trigger point to allow a commercial fishery. The 2007 fishery harvest was 1,152 sockeye salmon, and 3,183 chum salmon, whereas the 2008 fishery harvest was 89 sockeye salmon, 256 chum salmon, and 910 pink salmon (Menard et al. 2010). The 2008 commercial fishery was closed when the inriver goal of 30,000 sockeye salmon for Pilgrim River was projected to fall short. The commercial fishery has remained closed since 2009 because the inriver run goal of 30,000 sockeye salmon had not been achieved through 2014. In 2015 a surge of sockeye during the second half of July resulted in an escapement of just over 36,000 fish past the Pilgrim River weir and the possibility of commercial fishery, but there was no buyer interest. Although there was the possibility of commercial fishing in 2016 there was no buyer interest.

SUBSISTENCE FISHERY OVERVIEW

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

Beginning in 2007, regulations allowed for cash sales of up to $200 worth of subsistence-taken finfish per household, per year, in the Norton Sound–Port Clarence Area, and starting in 2013 the amount allowed was raised to $500. From 2007 to 2012, one or zero customary trade finfish permits were issued in Port Clarence District, but more recently, due to ADF&G's increased efforts to remind residents about the permit requirement when selling subsistence-caught finfish, an average of 8 customary trade permits were issued. Total annual sales have never exceeded $2,000 (Appendix A34).

Village subsistence surveys were conducted annually by the Division of Commercial Fisheries until 1983 (Menard et al. 2013). The Division of Subsistence conducted a partial survey of Brevig Mission in 1989 and conducted full-scale household surveys of both villages from 1994 to 2003. Since expansion of the subsistence salmon permit program in 2004, subsistence salmon

harvests for residents of Teller and Brevig Mission 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 increased fishing restrictions in Nome Subdistrict beginning in the 1990s, and more so in the mid-2000s when there were record runs of sockeye salmon to Salmon Lake. Since then, even though numerous fishing restrictions have been eliminated in Nome Subdistrict and subsistence fishing closures have occurred on Pilgrim River in 5 of the last 8 years, there continues to be record fishing effort at Pilgrim River.

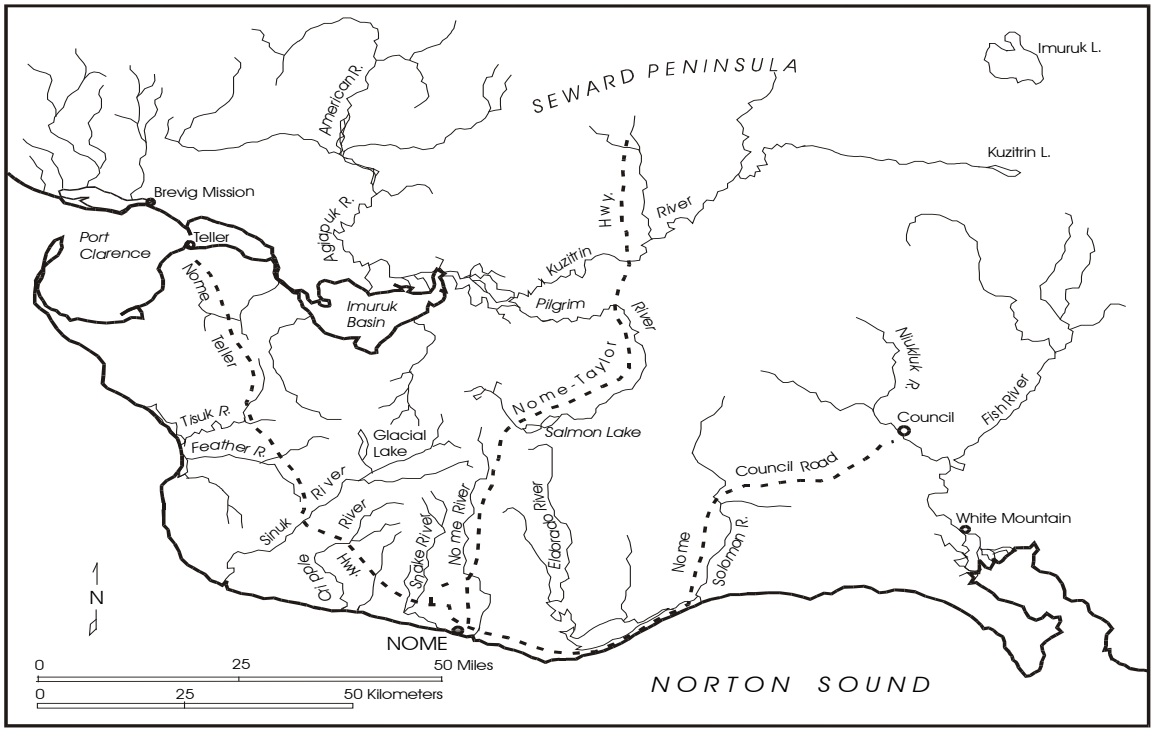

Figure 4.–Seward Peninsula with road-accessible waters.

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.

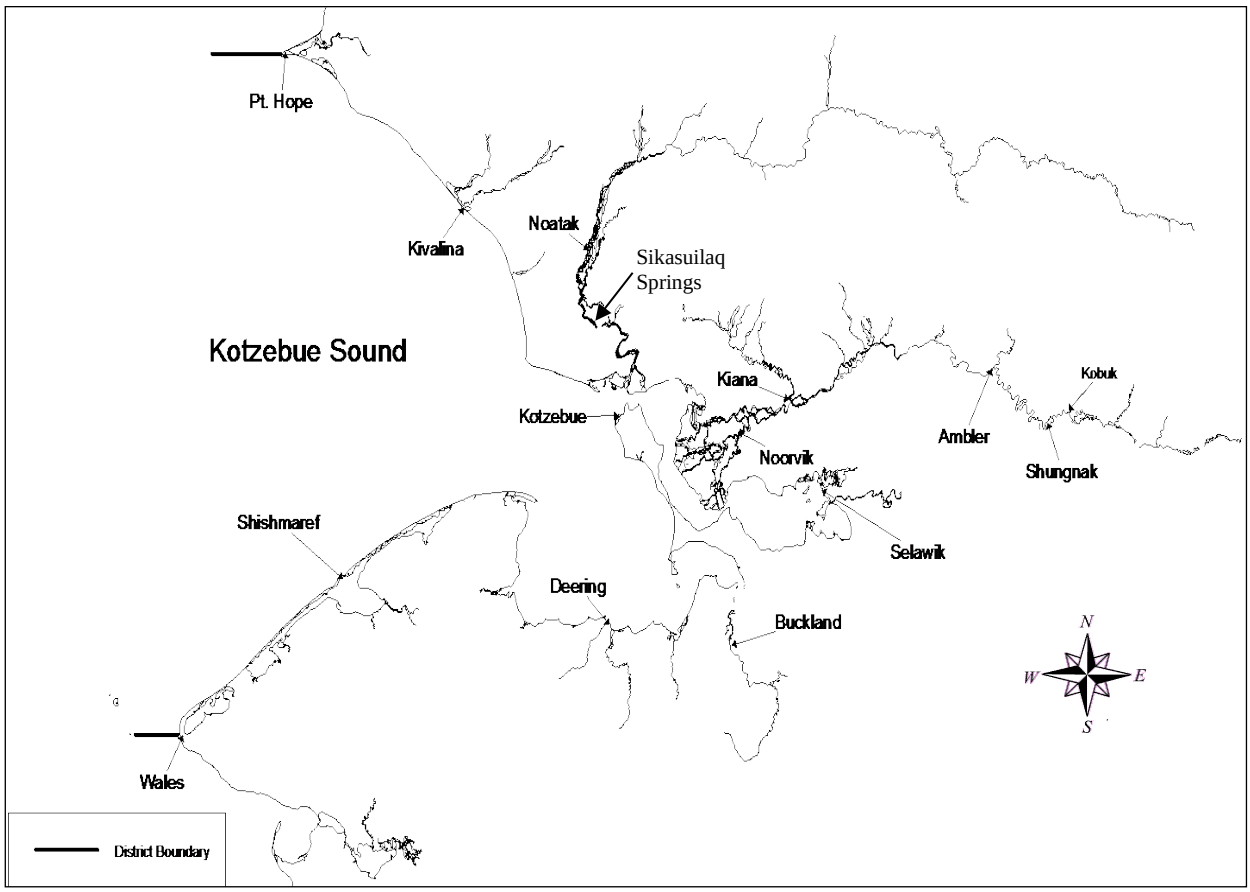

Figure 5.–Kotzebue District, villages and subsistence fishing area.

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

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

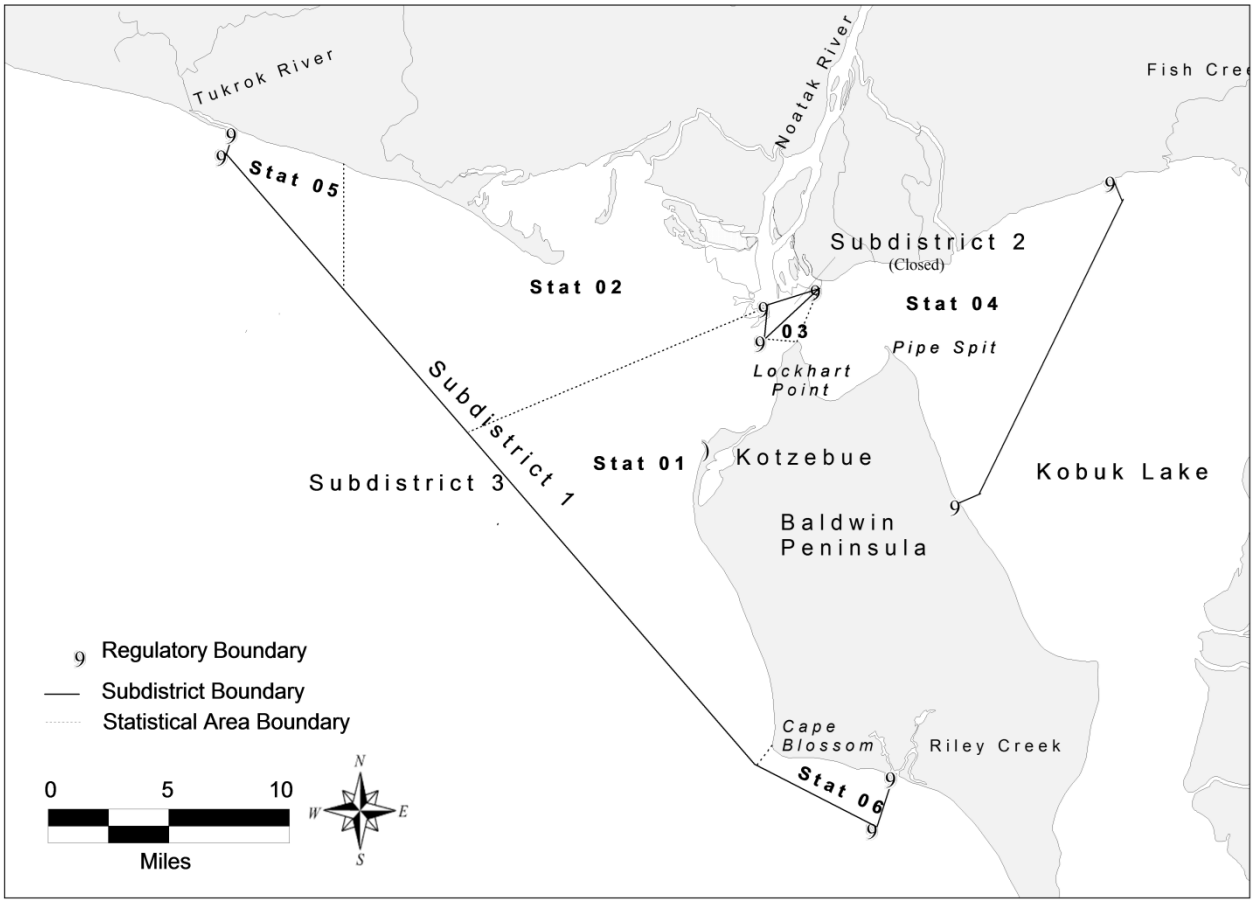

Figure 6.–Kotzebue Sound commercial salmon fishing subdistricts and statistical areas.

The earliest documented sales of salmon in Kotzebue District were in 1909 when Lockhart's store purchased 21,906 pounds of salmon from local residents and resold it at $0.05 per pound. Of those sales, 21,366 pounds were sold to gold miners on the Kobuk River drainage and 540 pounds were sold to a company in Seattle. A commercial fishery occurred from 1914 to 1918. Salmon were canned and the bulk of the harvest is assumed to have been sold to miners who worked in the upper Kobuk River drainage. The next organized commercial fishery began under state management in 1962 and continues to the present. The current fishery became fully developed in the mid-1970s. In 1987, the fisheries managers' new program emphasized attaining escapement goals. Before 1987, harvests were proportional to total return. Since 1995, poor market conditions and limited buyer capacity have caused harvests to fall short of their potential. The fishery bottomed out in 2002 and 2003 when no major buyer came to Kotzebue and began to slowly rebound in 2004 when 1 major buyer returned and slowly increased their capacity over a decade. This buyer remained the only major buyer for 10 years, but in 2014, 2 additional major buyers purchased fish (Menard et al. 2015b). However, only 1 major buyer, Copper River Seafoods, returned in 2015 and 2016 (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 estimated contribution to the commercial fishery was unknown.

SUBSISTENCE FISHERY OVERVIEW

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

Historical subsistence surveys for the Kotzebue area have been less complete than for Norton Sound and Port Clarence Districts. However, expanded documented surveys from 1995 to 2001 resulted in an estimated total subsistence salmon harvest for the Kotzebue Sound area to be 74,000 annually (Appendix C4). During these years, ADF&G Division of Subsistence (DOS) conducted annual household subsistence salmon surveys in select Kotzebue District communities, including surveying the town of Kotzebue using mail-in postcards. Due to budget constraints these surveys were discontinued in 2005 but were restarted in 2012–2014, when comprehensive subsistence fish harvest data were again collected from Kotzebue area villages by DOS. The town of Kotzebue, which had not been surveyed since 2001, was last surveyed from June 2014 to May 2015.

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 fishermen along the Arctic coast; pink salmon are the most numerous followed by chum salmon. Salmon are caught in gillnets as an incidental species when subsistence fishermen are targeting other non-salmon finfish. In October 2012, a fisherman caught 2 sockeye salmon in Ikroavik Lake, approximately 5 miles south of Barrow, subsistence fishing with gillnets under the ice targeting least cisco *Coregonus sardinella* (Geoff Carroll, Alaska Department of Fish and Game, Barrow; personal communication). There are no reliable reports of coho salmon being caught.

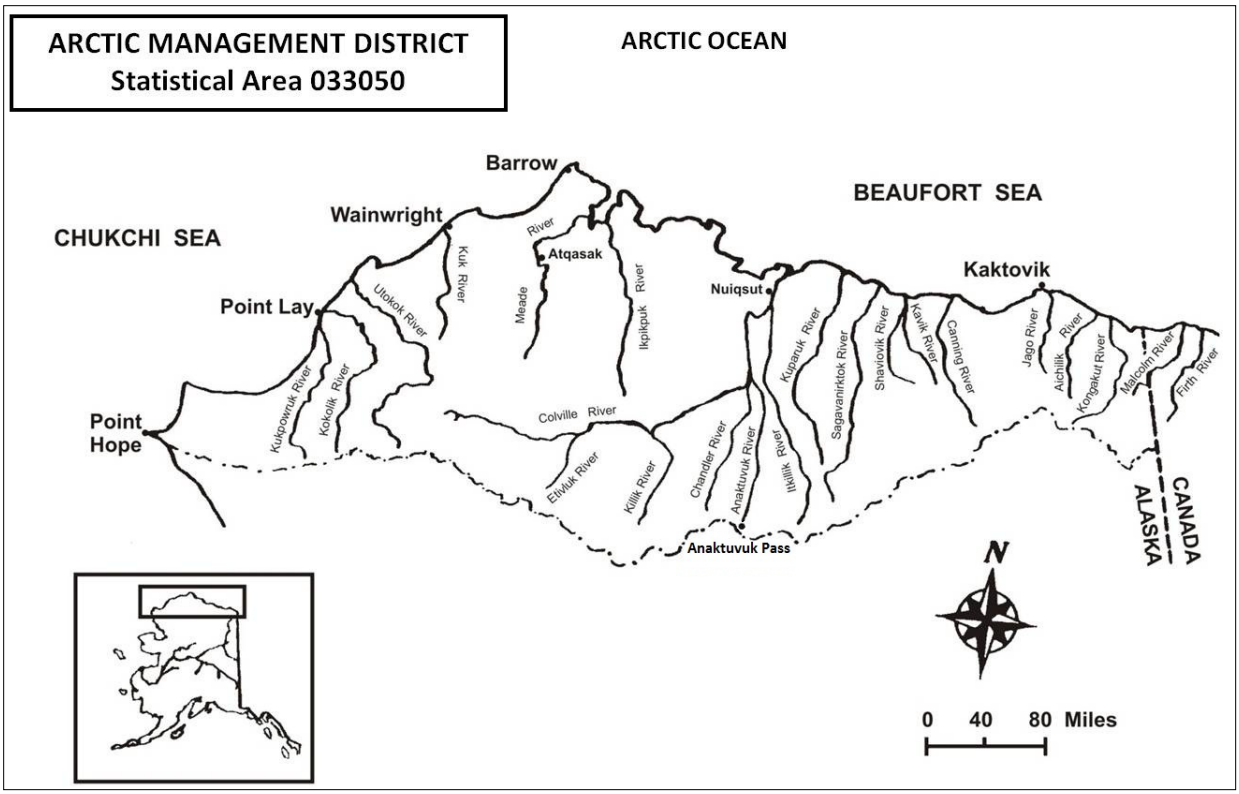

Figure 7.–Arctic management district.

PACIFIC HERRING OVERVIEW

DISTRICT BOUNDARIES

Pacific herring *Clupea pallasii* are present in Norton Sound, Port Clarence, Kotzebue Sound, and Arctic Districts. Norton Sound Herring District consists of all state waters between the latitude of the westernmost tip of Cape Douglas and the latitude of Point Romanof (Figure 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. When sea ice has remained in this area into June, spawning has been more extensive along Cape Denbigh and locations along the northern shore of Norton Sound between Bald Head and Bluff. Additional northerly spawning

areas have been more difficult to identify because of small herring stock sizes and limited investigations. Likely spawning areas include Imuruk Basin in Port Clarence District, and Shishmaref Inlet, Deering–Kiwalik coast, and Hotham Inlet in Kotzebue District. Although subsistence herring catches have been reported in the Arctic District near Barrow, there is no information available on spawning areas.

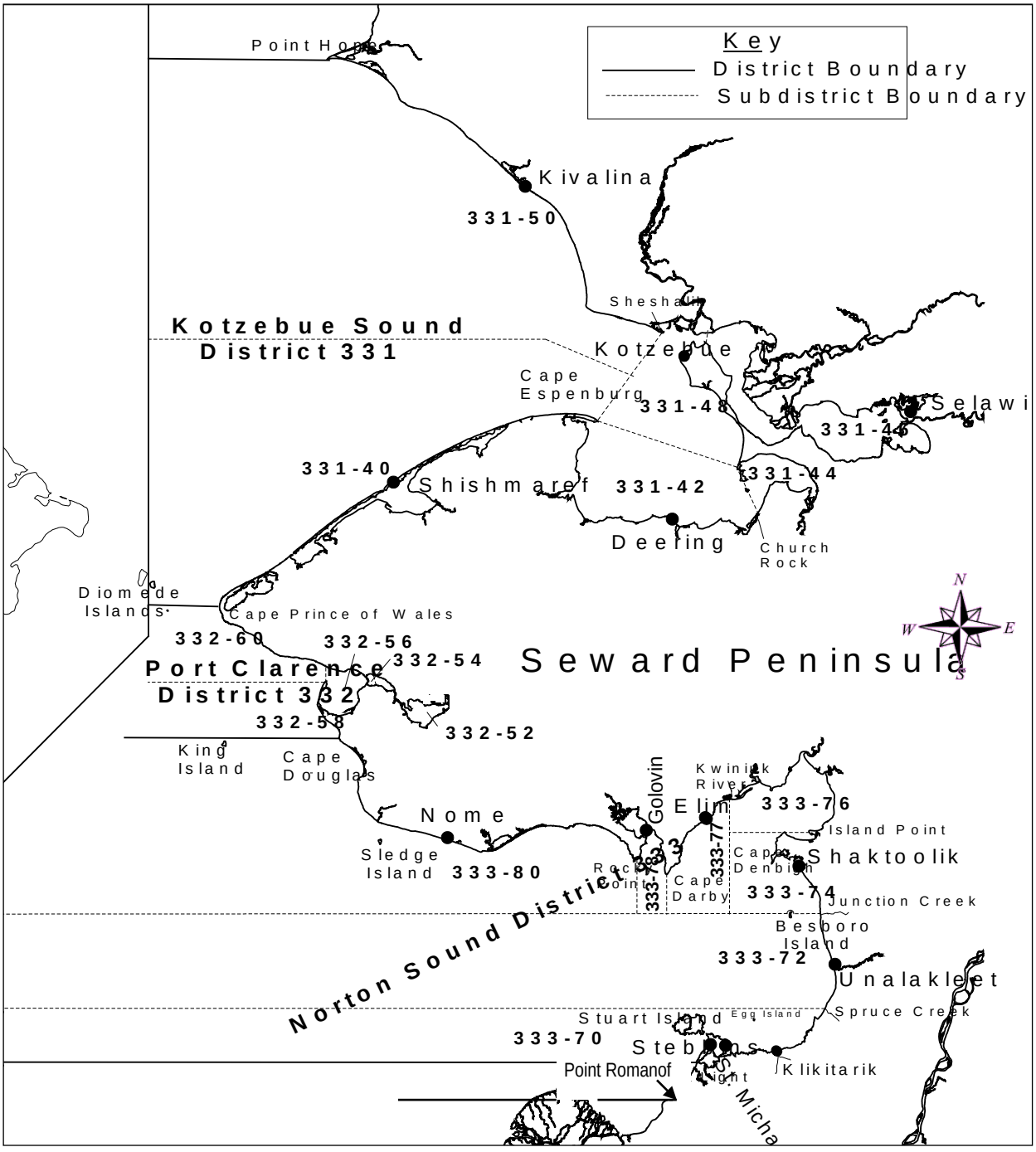

Figure 8.–Commercial herring districts and statistical areas of Norton Sound, Port Clarence, and Kotzebue Sound.

NORTON SOUND PACIFIC HERRING OVERVIEW

COMMERCIAL FISHERY OVERVIEW

Sac Roe

The earliest American commercial effort on Bering Sea herring apparently took place in the early part of the 1900s near Golovin in Norton Sound (Menard et al. 2013). Domestic commercial fishing resumed for "spring herring" in Norton Sound in 1964 near Unalakleet and continued sporadically until 1979. Between 1964 and 1978, the fishery averaged about 10 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 tons of herring were taken by 63 fishermen (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 local fishermen to participate in this developing fishery.

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

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

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

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

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

Since 1997, poor market conditions have been the primary influence on the level of commercial harvest. There has been no harvest by beach seine since 2000. Number of fishermen has decreased from 122 in 1999 to an average of 19 for the past 5 years. From 1999 to present, the number of buyers has steadily declined, from 4 to 1, and no buyers were present in 2004 and 2007–2009. Even when there was a buyer, sometimes only bait was purchased, as happened in 4 out of the last 5 years. In 2012 and 2014–2016, there was no sac roe fishery either due to ocean ice blocking tenders or preventing deliveries, or lack of market interest. One bright spot was the high recovery of over 13% roe in 2010 and 2011, but the last year that a sac roe fishery occurred, in 2013, less than 500 short tons of sac roe herring was harvested (Appendix D).

Spawn-on-Kelp

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

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

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

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

Food and Bait Fishery

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

Since 1977, there has not been a consistent domestic commercial food and bait herring fishery in Norton Sound. The majority of reported food and bait herring harvest estimates were initially harvested as sac roe but bought and processed as food and bait, so they were considered food and

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

COMMERCIAL FISHERY MANAGEMENT

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

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

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

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

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

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

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

SUBSISTENCE FISHERY USE

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

PORT CLARENCE AND KOTZEBUE PACIFIC HERRING OVERVIEW

COMMERCIAL FISHERY OVERVIEW

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

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

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

HISTORICAL RESOURCE INVESTIGATIONS

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

Seward Peninsula Populations	Southern Norton Sound to Southern Bering Sea Pelagic Populations
Smaller herring at age with lower vertebral counts.	Larger herring with probable higher vertebral counts.
Lower abundance.	Higher abundance.
Subtidal spawning (3 m) in shallow bays, inlets, and lagoons.	Intertidal and shallow subtidal spawning along exposed rocky headlands.
Zosteria sp. primary spawning substrate.	*Fucus* sp. primary spawning substrate.

More euryhaline.	Less euryhaline.
Overwinter in shallow bays; water is warmed by river discharge under ice cover.	Over winter in deep ocean layers near the Pribilof Islands.
Fall (non-spawning) runs documented.	No fall runs documented.
Larval development in brackish water.	Larval development probable in more saline water.

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

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

KING CRAB OVERVIEW

NORTON SOUND KING CRAB OVERVIEW

District Boundaries

Norton Sound Section (Q3) consists of all waters in Registration Area Q north of the latitude of Cape Romanzof (61 degrees 49 minutes N latitude), east of the International Dateline, and south of 66 degrees N latitude (Figure 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 has been 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 and Appendix E9). Results from the latest trawl survey, which occurred in 2014, showed that male red king crab abundances were the highest since 1976 (Soong and Hamazaki 2015). Abundance of prerecruits was 3 to 7 times higher than those for 2011 survey. However, the increases were mainly due to high catches at 1 station which also resulted in high biomass estimates and uncertainties. Nevertheless, abundance is still

believed to have increased from 2011 to 2014 because the catches were higher at other stations as well.

Since 1998 a length-based population model has been used to predict biomass for the red king crab population in Norton Sound (Zheng et al. 1998). Incorporating data from trawl surveys (Appendices E9 and E23–E24), historical winter and summer pot studies, and winter and summer fisheries (Appendices E16–E22), the model is used to project abundance estimates of legal male crab even in years when no trawl survey occurs, allowing abundance-based management of the summer commercial crab fishery. Every time new data are incorporated into the population model, it estimates current abundance as well as revises prior years' abundances. Trawl survey estimates prior to 1996 were revised and standardized in 2013 (NPFMC 2013).

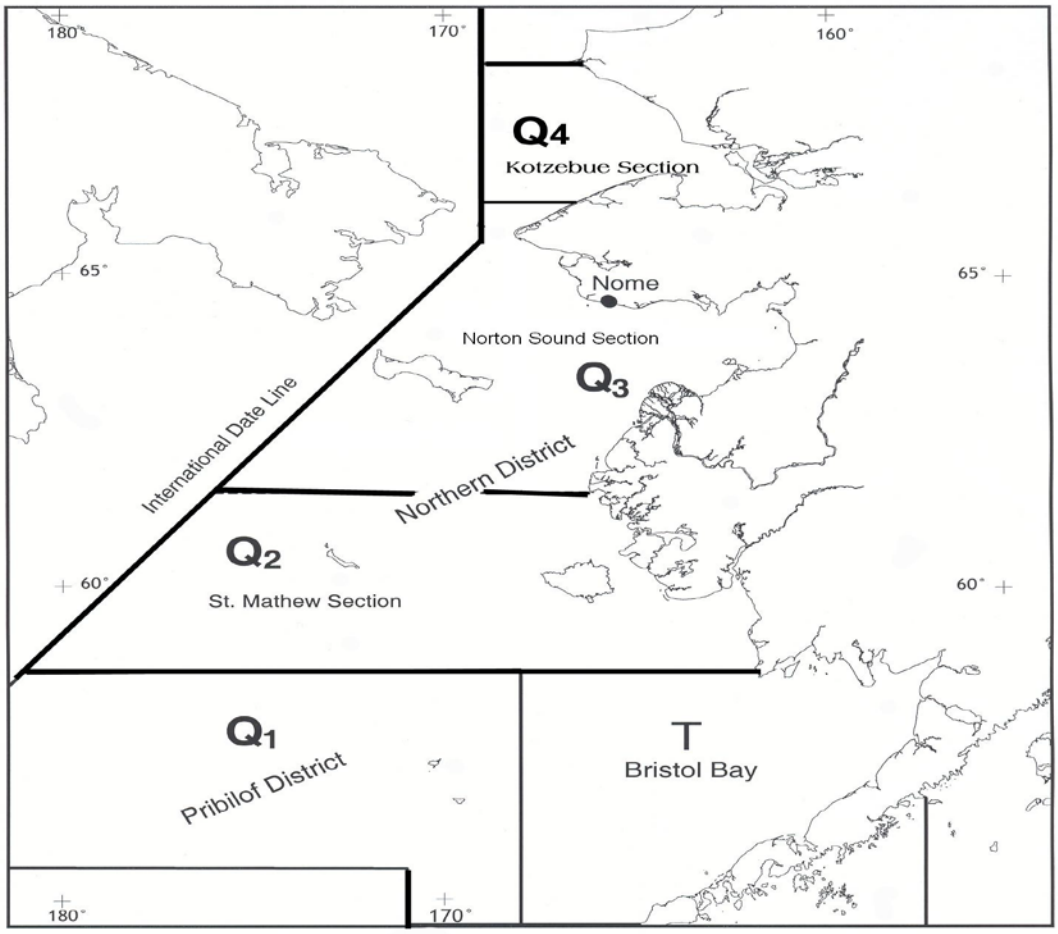

Figure 9.–King crab fishing districts and sections of Statistical Area Q.

The following estimates are based on the model's results from spring of 2016 including the latest data from the 2014 trawl survey, the 2015 summer fishery, and the 2011–2012 winter study. In 2011, legal biomass estimate for the summer crab fishery was 4.56 million pounds, a slight increase from the 4.51 million pounds estimated for 2010. The legal population estimate then decreased 9%, to 4.14 million pounds in 2012, and again decreased the following 2 years: to 3.67 million pounds in 2013 and 3.64 million pounds in 2014. From 2014 to 2015, the estimate increased by 23% to 4.48 million pounds, but decreased by 4% from 2015 to 2016, to 4.31 million pounds (NPFMC 2016).

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

COMMERCIAL FISHERY OVERVIEW

The last year that a large-vessel summer commercial crab fishery existed in Norton Sound Section was in 1990. No summer commercial fishery occurred in 1991 because of ADF&G staff constraints. In 1992, the summer commercial fishery resumed. Appendix E13 shows historical summer commercial harvest by year and statistical area for Norton Sound crab fishery since 1990. Historical information before 1990 can be found in *2012 Annual management report Norton Sound, Port Clarence, and Kotzebue* (Menard et al. 2013). Regulation changes adopted during the March 1993 BOF meeting changed participation in the fishery to that of small boats. A superexclusive designation went into effect for the Norton Sound commercial crab fishery June 27, 1994. This designation stated a vessel registered for the Norton Sound crab fishery may not be used to take king crab in any other registration area during that registration year. Later, a vessel moratorium put into place before the 1996 season was intended to precede a license limitation program. Community Development Quota (CDQ) groups were allocated a portion of the summer harvest beginning in 1998, but no CDQ harvest occurred until the 2000 season. The North Pacific License Limitation Program (LLP) went into effect for the Norton Sound crab fishery January 1, 2000. The program states a vessel which exceeds 32 feet in length overall must hold a valid crab license issued under LLP by National Marine Fisheries Service. Regulation changes and location of buyers resulted in harvest distribution moving eastward in Norton Sound in the mid-1990s (Appendix E14).

During the March 1999 BOF meeting a new management strategy was enacted for the Norton Sound summer red king crab fishery. A threshold level of abundance of legal male red king crab biomass was set at 1.5 million pounds. A summer commercial season may only open if the legal crab biomass is estimated to be at least 1.5 million pounds, and if the legal biomass falls in the range of 1.5 to 2.5 million pounds the harvest rate will be no more than 5% so the stock may rebuild. If legal biomass is 2.5 million pounds or more, the harvest rate will be no more than 10%. In March of 2012, this regulation was modified by the BOF so that the new threshold level of abundance of legal male red king crab biomass was set at 1.25 million pounds. If the estimated legal crab biomass falls within the range of 1.25 to 2.0 million pounds, the harvest rate will be no more than 7% of legal male abundance. From 2.0 to 3.0 million pounds, the harvest rate will be no more than 13%. If the estimated legal biomass is more than 3.0 million pounds, the harvest rate will be no more than 15%. Improved abundance estimates and the current management strategy will greatly reduce the risks of over fishing the stock.

Since 1981, in order 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 mortality of sublegal and smaller female crab, BOF at its March 2008 meeting put a new regulation into effect: a minimum of 4 escapement rings are required per pot with each ring having a minimum inside diameter of 4.5 inches located within 1 mesh size from the bottom of

the pot, or at least one-half of the vertical surface of a square pot or sloping side-wall surface of a conical or pyramid pot must be composed of no less than 6.5 inch stretched mesh. Also starting with the 2008 season, even though the minimum legal size of red king crab is 4.75 inch in carapace width (CW), the local seafood plant did not always buy crab less than 5.0 inch CW. The Anchorage buyer, however, has continued to buy crab as long as they are of legal size.

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

CDQ Fishery

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

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

In 2016, for the first time, NSEDC chose to harvest their CDQ allocation during the winter fishing season.

Commercial Catch Sampling

The Norton Sound red king crab commercial fishery had the benefit of an onboard observer during the 2000 and 2001 seasons because there was a floating processor on the fishing grounds in those years. In years with no onboard observer, a smaller percentage of crab from the commercial harvest is sampled because fishermen deliver at all times of the day and night. The new seafood processing plant, Norton Sound Seafood Products (NSSP), began operating in Nome in summer 2002, greatly improving the ability of Nome ADF&G staff to sample crab brought to the Nome dock. Crab where either sampled at NSSP or at the small boat harbor where non-resident fishermen or catcher-processors not selling to NSSP offload their catch for delivery to Anchorage. ADF&G will continue to make a concerted effort to coordinate catch sampling with fishermen and buyers to ensure optimal commercial harvest data collection.

COMMERCIAL FISHERY OVERVIEW – WINTER

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

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

Beginning in 2016, harvest allocation for the winter commercial fishery is 8% of the total open-access GHL. Another regulation adopted during the March 2015 BOF meeting, which set pot limits and requiring pot tags, will not be implemented until the 2017 season. In 2017, commercial permit holders will be limited to 20 pots each and each pot must have a current-year pot tag attached.

All 3 proposals were adopted by the BOF in response to the dramatic increases in winter fishing effort that has occurred in recent years due to much higher exvessel prices. During the years 1978–2011, an average of 9 permit holders fished commercially in winter. Since 2012, winter fishery participation tripled, to an average of 27 permit holders. From 1978 to 2011, the average harvest was roughly 7,000 pounds, but from 2012 to 2014, the average harvest increased more than 5-fold, to over 40,000 pounds. Average exvessel price for winter red king crab from 2012 to 2014 was $6.71 per pound, more than twice the average price of $3.25 per pound during the previous 5 year period (Appendix E4). Part of the reason for the increase in prices was due to expansion of live king crab markets overseas, particularly in South Korea; from 2012 to 2015, crab were sold live to Korea by 2 catcher-processors based in Nome.

Prior to 2010, all of the crabbers were based out of Nome. Starting with the 2009–2010 winter season, crabbers in other Norton Sound villages started participating in the winter commercial crab fishery. In 2012, both Shaktoolik and Unalakleet crabbers sold roughly a third each of the total harvest, whereas Nome crabbers only accounted for a quarter of the harvest sold. Since then, ice conditions in eastern Norton Sound have not been conducive to winter crab fishing; consequently, Nome crabbers harvested over 90% of the total commercial winter harvest the last 3 years. All crab harvested by crabbers based outside of Nome is shipped live and sold to NSSP in Nome.

SUBSISTENCE FISHERY OVERVIEW

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

Catch information for king crab before 1990 can be found in *2012 Annual management report Norton Sound, Port Clarence, and Kotzebue* (Menard et al. 2013). Since 1990, the winter subsistence crab fishery harvest has ranged from a low of 256 crab during the 2000–2001 season to a high of 12,152 crab during the 1989–1990 season (Appendix E7). Lack of success in the winter crab fishery during some years has been attributed to a declining crab population caused by removal of crab in the summer commercial fishery together with low recruitment, low effort caused by poor ice conditions, and changes in nearshore winter distribution of crab. All these factors in varying degrees affect success of the winter fishery, as well as increased use of more efficient gear (pots instead of hand lines). Unstable ice conditions and record snowfalls adversely affected 1992–1993, 1996–1997, 2000–2001, 2003–2004, and 2005–2006 catches. During years of stable ice conditions, approximately 85 fishermen averaged 80 crab each.

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 in the vicinity of King Island, Wales, and Port Clarence. The survey was only partially successful due to strong currents that made pot retrieval difficult when set deeper than 10 fathoms. Shallow pot placement resulted in a catch primarily of egg-bearing female blue king crab, and indicated that using standard Norton Sound crab gear would only access a nursery site for gravid female blue king crab. When more suitable gear becomes available, further surveys will be necessary to determine the feasibility of a summer fishery. At the March 2008 BOF meeting, legal size requirement for blue king crab was changed from 5.5- to 5.0-inch. Preliminary data indicate that blue king crab size at maturity is very similar to Norton Sound red king crab.

In summer of 2006, 2008, and 2011, trawl surveys in the northern Bering Sea were conducted by NSEDC in cooperation with ADF&G to assess crab resources in the St Lawrence Island and Bering Strait areas of Norton Sound District. The primary focus was to collect information on blue king crab size, distribution, and abundance. The area surveyed lies west and northwest of the standard ADF&G triennial Norton Sound red king crab trawl survey locations. In 2006, trawls were conducted from near the southwest corner of St Lawrence Island to the Bering Strait area southwest of Cape Prince of Wales. Size information and general distribution of blue king crab was collected. In 2008 prior to the trawl survey, a camera sled was towed a few meters above the seabed to observe crab and other species in the St. Lawrence Island area that had been trawled in 2006. The 2008 and 2011 trawl work was 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.

Commercial Fishery Overview

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

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

INCONNU (SHEEFISH)

Spawning Areas and Timing

Sheefish are distributed throughout nearshore estuarine areas of Kotzebue Sound, with the largest spawning stocks and harvests in the Kobuk–Selawik River drainages and Hotham Inlet. However, there is a small population in the Sheshalik and Krusenstern areas of northern Kotzebue Sound and in the Koyuk River of Norton Bay in Norton Sound (Figure 10).

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

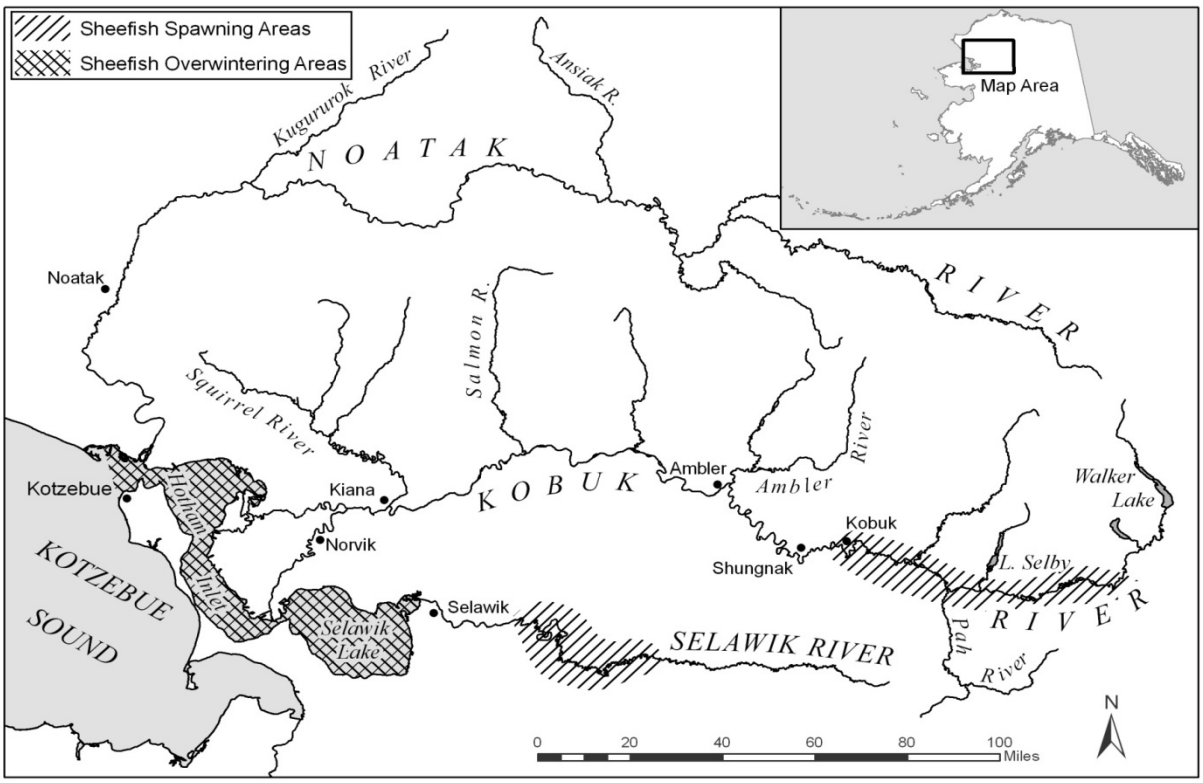

Figure 10.–Kotzebue and Kobuk River Valley villages and their spatial relationship with sheefish spawning and overwintering areas.

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

After ice breakup in Kotzebue Sound area, adult sheefish migrate upriver to spawning areas on the Kobuk and Selawik rivers. On the Kobuk River, spawning occurs upstream from the village of Kobuk, and the greatest concentration is observed between the Mauneluk and Beaver rivers. Then, when spawning is complete in late September and early October, sheefish disperse downstream to overwintering areas within Hotham Inlet/Selawik Lake.

Historical Fishery Use

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

Subsistence Fishery

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

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

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

Commercial Fishery

Most commercial fishing effort occurs through the ice in Hotham Inlet, near Kotzebue, using gillnets from 5.5-inch to 7.0-inch stretched mesh. Recorded commercial catches are relatively small, but undocumented catches may be significant. Therefore, harvest totals should be considered minimum estimates. Lack of markets outside northwestern Alaska greatly limits commercial activity; however, most individuals participating in the winter commercial fishery also fish for subsistence purposes. Sheefish incidentally caught in the commercial salmon fisheries are sold in years when there is a market, but only in small amounts. Reported harvest and effort in the commercial fishery have declined in the last 15 years. Since 1998, harvest has not exceeded 1,250 pounds, compared to the highest harvest of 8,224 pounds in the last 25 years (Appendix F1). Since 2005, there have been no reported commercial sheefish catches except in 2011, 2015, and 2016. In all those seasons, there were fewer than 3 permit holders fishing, making their 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. In spite of 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 local 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 now available to fishermen on 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 2015). Sheefish sport harvests in the last 10 years have averaged under 600 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 local residents were concerned that the sheefish stocks were declining.

Because of these concerns, a cooperative tagging project on sheefish in Kotzebue District occurred from 1994 to 1997. This study was conducted by Division of Sport Fish, U.S. Fish & 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 32,273 in 1995, 43,036 in 1996, and 26,800 in 1997. Sheefish spawn upstream of the village of Kobuk; the greatest observed concentrations were between Maneluk and Beaver rivers. After spawning is complete in late September, fish disperse to downstream overwintering areas. In Selawik River, the spawning population estimate was 5,200 and 5,300 for 1995 and 1996, respectively. Tag recoveries showed that these stocks mixed in Hotham Inlet winter habitats but maintained fidelity to their spawning areas (DeCicco 2001).

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

DOLLY VARDEN

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

Spawning Areas and Timing

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

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

Subsistence Fishery

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

In Kotzebue District, fall seine fishing is a group effort with several households making up a fishing group. Catch is stored and allowed to freeze in willow cribs located near the seining site. These fish are used throughout the winter by the fishing group. Most Dolly Varden harvests take place before or just after freeze-up. Fishermen from Noatak usually fish before freeze-up, but residents of Kobuk River villages of Shungnak and Noorvik fish for Dolly Varden throughout the winter. Since 1991, subsistence catch of Dolly Varden in Noatak has ranged from almost 3,000 to over 11,000 fish (Appendix F5). However, these harvests should be considered minimal figures because of survey timing. Except for 2007, no Dolly Varden harvest surveys have been conducted of Kivalina residents during the last 25 years. From 2012 to 2014, a comprehensive survey of fish and wildlife harvests was done in 6–9 Kotzebue area villages by the 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 but typically begin migration along the northern shore of Kotzebue Sound during the third week of August. Reported Dolly Varden sales are dependent upon available markets. The typical season catch, when buyers are purchasing Dolly Varden

throughout August, is approximately 1,000 to 3,000 fish (Appendix F4). However, limited markets in the 2000s have resulted in less than 200 Dolly Varden reported sold each year in Kotzebue Sound, and none sold since 2005 because the buyer no longer purchases Dolly Varden. Regardless of sales, Dolly Varden catches are still required to be reported on fish tickets. During the 2011–2012 season, 3 fishermen caught and sold 1,057 pounds of Dolly Varden to the fish plant in Nome as bait[3]. This was the first recorded sale of Dolly Varden in Norton Sound in recent history.

Sport Fishery

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

Sport fishing effort has been consistently low, which is probably due to the remote location and difficult access of fishing sites (Scanlon 2015). Dolly Varden sport fish harvests in the last 10 years in Norton Sound averaged over 2,000 fish annually but just over 1,100 fish in the Kotzebue/Chukchi Sea areas (Appendix F3).

Historical Escapement

Since 1990, aerial survey counts of overwintering Dolly Varden on the Wulik River has ranged from 144,138 fish in 1993 to 1,500 fish in 2003 (Appendix F7). Weather and water conditions have precluded flying aerial surveys during many years. Weather permitting, Division of Sport Fish conducts aerial surveys of Noatak River spawning grounds in summer, and Kivalina and Wulik rivers overwintering areas in fall. Since 2000, however, only Wulik River has been surveyed.

WHITEFISH

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

Spawning Areas and Timing

Whitefish occur throughout most bodies of fresh water in Norton Sound, Port Clarence, Kotzebue, and Arctic districts and can also be found at various times of year in inshore marine

[3] Fish ticket database [Internet]. 1985-present. Juneau, AK: Alaska Department of Fish and Game, Division of Commercial Fisheries. [URL not available as some information is confidential].

waters. Several whitefish species spawn in freshwater in late August to October when lakes and streams are close to freezing.

Subsistence Fishery

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

Subsistence catch enumeration is difficult because fishermen do not count fish individually, but by "tubs," "bags," "strings," or other estimators of gross abundance. Additionally, many fish are dried and consumed or stored in caches before the survey period. Reported subsistence harvests were generally the result of a limited and sporadic survey effort and should be regarded as minimum values and not comparable from year to year. In 1997, subsistence harvests of whitefish were included for the first time in 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 the state (Georgette and Shiedt 2005). Average subsistence harvests of whitefish estimated for the village of Noatak and the 5 Kobuk River villages combined from 2012 to 2014, the last 3 years for which information is available, was 74,000 fish (Appendix F8). Harvest numbers are considered minimal and are not comparable year to year.

Commercial Fishery

Limited commercial whitefish harvests have been allowed since statehood, normally under auspices of a permit that delineates harvest levels, open areas, legal gear, etc. Commercial whitefish fisheries were generally limited to large open-water areas (e.g., Grantley Harbor in Port Clarence District) or ocean waters. Beach seines were stipulated as legal gear in some instances in order to reduce the number of incidental species taken. Little comparative commercial catch and effort data were recorded, but harvest levels were historically low. Most commercial catches were made in Golovnin Bay in Norton Sound District, in Kuzitrin River in Port Clarence District, and in Hotham Inlet and Selawik River in Kotzebue District. Fish were sold to local markets for human consumption, dog food, or, more recently crab bait. During the 2006–2007 season 1 local Nome fisherman, who waived confidentiality, sold 3,723 pounds of whitefish. No further whitefish harvests occurred until the 2010–2011 season, and since then as much as 4,726 pounds of whitefish have been commercially harvested in 1 season (Appendix F9).

In the Arctic District, a commercial fishery for freshwater finfish has existed in the Colville River delta (located approximately 60 miles west of Prudhoe Bay) since 1964 (Menard et al. 2013). Historically, commercial fishing generally took place during late June and July for broad and humpback whitefish and October through early December for Arctic and least cisco. However, since 1990 commercial fishing effort has predominantly occurred in October and November for Arctic and least cisco. Set gillnets are used as capture gear, and fishing during fall months occurs under the ice. All fish were harvested with the intent to sell commercially and are reported daily on a catch form. However, not all fish reported on permits for this area were sold. Those fish not commercially sold were retained and used for subsistence purposes. No commercial harvest has been reported since 2007 from the Coville River (Appendix H1).

Sport Fishery

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

Historical Escapement

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

SAFFRON COD

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

No extensive commercial fishery on tomcod in Norton Sound–Port Clarence and Arctic–Kotzebue areas has ever occurred, but during the 1980s, a limited commercial fishery occurred in Norton Sound (Menard et al. 2013). According to local fishermen, these fish were used for dog food, crab bait, and human consumption. In the mid-1990s, NSEDC established markets for several fish species not commercially utilized in the past. The need for crab bait was the primary factor in initiating the saffron cod fishery near Unalakleet. A total of 1,402 pounds of saffron cod were sold during the 1993–1994 season. The NSEDC market was not available the following winter and was probably a factor in the reduced harvest of 52 pounds (Appendix F10).

No commercial harvest was reported from 1995 through 2008. Since the fall of 2009, total annual tomcod harvest has ranged from 1,700 pounds to almost 34,000 pounds (Appendix F10), all sold to Norton Sound Seafood Products (NSSP) in Nome for use as crab bait. NSSP would only buy tomcod that were caught through the ice by jigging gear.

Miscellaneous Finfish Species

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

Subsistence Fishery

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

Commercial Fishery

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

Sport Fishery

Sport fisheries for Arctic grayling exist in Norton Sound–Port Clarence and Arctic–Kotzebue areas, but they are relatively small. Average annual sport fish harvests for Arctic grayling in the

last 5 years were roughly 500 fish in both Norton Sound and Kotzebue Districts. In Norton Sound, average Arctic grayling sport fish harvests for the last 10 years are roughly a fourth of that of Dolly Varden, but in Kotzebue District, average Arctic grayling sport fish harvests for the last 10 years is almost half that of Dolly Varden (Appendix F3).

CAPELIN

Commercial Fishery

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

Subsistence

Because no subsistence permit for capelin is required, accurate harvests of capelin are not reported or documented. Sightings of capelin nearshore of Nome are incidentally reported to ADF&G by Nome residents or observed by ADF&G employees. In 2013, one of the latest capelin spawning events observed on Nome beaches occurred on July 19, compared to mid-June in most years when capelin are observed spawning on Nome beaches. In 2014, capelin were observed spawning in mid-June, and in 2015, in early June as well as late June. Many residents harvest capelin with various gear types, such as nets, buckets, plastic bags, and shovels.

SECTION 2: SALMON FISHERIES

2016 NORTON SOUND SALMON FISHERY

2016 Norton Sound Fisheries Outlook

The 2016 outlook was for a commercial harvest level of 130,000 to 170,000 chum salmon, 250,000 to 750,000 pink salmon, and 120,000 to 160,000 coho salmon. Salmon outlooks and harvest projections for the 2016 season were based on qualitative assessments of parent-year escapements and age composition, subjective determinations of freshwater overwintering and ocean survival conditions, and, in the case of the commercial fishery, anticipated market interest and processing capacity. Commercial salmon harvest for Norton Sound in 2016 by subdistrict is listed in Table 1.

For the fourth year in a row commercial fishing for chum salmon was expected to occur in Nome Subdistrict after being closed for over 2 decades. Commercial periods for chum salmon were not expected to exceed 24 hours in length.

As in previous years, the bulk of commercial salmon harvests were expected to come from southern Norton Sound (Subdistricts 4–6). The relatively large southern Norton Sound watersheds (e.g., Inglutalik, Ungalik, Shaktoolik, and Unalakleet rivers) generally support larger runs of salmon. This fact, coupled with stable, healthy salmon runs (except Chinook salmon) and more liberal fisheries management plans, allows for more commercial harvest opportunity in the southern Norton Sound subdistricts. In contrast, salmon runs, particularly chum salmon runs, have been more unstable in the smaller drainages to the north in Subdistricts 2 (Golovin) and 3 (Elim) since the early 2000s. Subdistricts 2 and 3 chum salmon runs have either been very strong, providing large surpluses available for commercial use (e.g., in 2006, 2007, 2010, 2011, 2014, and 2015); or very weak, with runs often below levels needed to achieve escapement goals, such as in 2004, 2005, 2008, 2009, 2012 and 2013. The extent and frequency of commercial chum and pink salmon periods in Subdistricts 2 and 3 is also largely predicated on the Subdistricts 2 and 3 management plan, which directs ADF&G to ensure that chum salmon escapement goals and subsistence needs are achieved.

Commercial Fishery Season Summary

Poor Chinook salmon runs occurred throughout Norton Sound in 2016 and required inseason restrictions to southern Norton Sound subsistence fisheries. The pink salmon run was near record levels, the chum salmon run was below average, and the coho salmon run was above average. Although there was no directed sockeye salmon commercial fishing, the Pilgrim River sockeye salmon run was similar to last year (one of the best since the mid-2000s), and a commercial fishery could have occurred had there been buyer interest.

The 2016 Norton Sound District commercial salmon fishery fell short of the forecast range for chum, pink and coho salmon. Norton Sound commercial salmon harvest was 183 Chinook; 208,739 pink; 51,167 chum; 102,722 coho; and 2,635 sockeye salmon (Table 1), and did not

include 141 Chinook, 222 pink, 9 chum, 168 coho, and 253 sockeye salmon kept for personal use. The buyer was not able to buy Chinook salmon in Subdistricts 5 and 6, per emergency order.

The combined commercial harvest of all species ranked third highest in the last 10 seasons in Norton Sound. There were 141 commercial permits fished in 2016, the highest total since 1993 (Appendix A2). The 2016 fishery value to the permit holders of $1,237,229 ranked fourth highest in the last 10 years and was the sixth year in the last 7 years that the value exceeded 1 million dollars (Appendix A3). Prior to 2010 the last time the value of the fishery exceeded 1 million dollars was in the 1980s.

Subdistrict 6 (Unalakleet) accounted for over half of the coho salmon harvest (Table 1). Subdistrict 3 (Elim) had its second highest coho salmon harvest on record (Appendix A8) with a harvest including personal use of 14,197 fish and only trailed the 2014 harvest of 15,938 fish.

The pink salmon catch was the majority of the harvest in 2016 (Table 2) although the catch was an incidental harvest during the larger mesh openings targeting chum and coho salmon. Overall there was less interest by fishermen for participating in chum salmon fishery because of the large catch of pink salmon and the low price.

The coho salmon catch was 23% above the 5-year average and was the 7th time the harvest exceeded 100,000 fish in the 56 year history of the fishery. However, the chum salmon catch was less than half the recent 5-year average.

Dock prices per pound for Norton Sound salmon in 2016 were $2.45, $0.10, $0.48, $0.90, and $1.39 for Chinook, pink, chum, sockeye, and coho salmon, respectively (Appendix A4). Average commercial weights by species were 11.6 pounds for Chinook salmon, 3.6 pounds for pink salmon, 6.8 pounds for chum salmon, 6.1 pounds for sockeye salmon and 6.8 pounds for coho salmon (Appendix A5).

Only 1 salmon buyer operated in Norton Sound during the 2016 season. The Unalakleet fish plant operated by Norton Sound Seafood Products 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.

Subsistence Fishery Season Summary

Subsistence salmon fishermen in Port Clarence District, Cape Woolley Subdistrict, and Subdistricts 1–3 were required to possess a subsistence salmon fishing permit for each household that fished in these locations. Households may obtain and fish permits for multiple areas. Return rates for these permits have been close to 100% in most years, and in 2016 the return rate was 99% snapping 5 consecutive years of a 100% return rate (Table 2). Well above average catches of pink and sockeye salmon resulted in the highest subsistence salmon catch in northern Norton Sound since 2008.

In southern Norton Sound, in 2016, postseason household surveys were conducted in Koyuk, Shaktoolik, Stebbins, St. Michael, and Unalakleet, and attempts were made to contact 100% of the households. Catch information for all these villages are in Appendices A9–A13. The southern Norton Sound subsistence catch was similar to the recent 5-year and 10-year averages.

In Norton Sound District, there are limits on subsistence salmon harvests only in Subdistrict 1 (Nome), where salmon limits have been in place since 1985. Also, hook and line subsistence fishermen must follow sport fish bag limits except in the Subdistrict 1 subsistence zones, where

they can catch the subsistence limit. In 2016, an above average chum salmon run was forecasted for Subdistrict 1 and the subdistrict was not closed to salmon fishing in mid-June for the eleventh year in a row. From 1991 through 2005, Subdistrict 1 was closed to subsistence salmon fishing in mid-June in order for ADF&G to determine the run strength of chum salmon before allowing fishing. Furthermore, Tier II regulations were not in effect in 2016 because the chum salmon run was projected to exceed the amount necessary for subsistence (ANS).

In Port Clarence District, subsistence permits are required and a separate permit is required for Pilgrim River and for Salmon Lake. There are no salmon harvest limits in Port Clarence District, except for Pilgrim River, and Salmon Lake.

Regulations allow for cash sales of up to $200 worth of subsistence-taken finfish per household, per year, and starting in 2013 the amount allowed was raised to $500. In 2016 there were 6 customary trade permits issued in Norton Sound District and 6 permits issued in Port Clarence District. Cash sales of $575 were recorded in 2016 for both Norton Sound and Port Clarence Districts combined (Appendix A34).

Season Summary by Subdistrict

Nome–Norton Sound Subdistrict 1

In Subdistrict 1, 2016 chum salmon run abundance was projected to achieve the subdistrictwide biological escapement goal (BEG) range of 23,000–35,000 chum salmon and amounts necessary for subsistence (ANS) range of 3,430–5,716 chum salmon. As such, a Tier II fishery was not implemented in 2016. There has not been a Tier II fishery implemented since 2005, and Tier II subsistence fishing restrictions were rescinded early during the 2004 and 2005 seasons.

Regulation changes starting in 2013 allowed for subsistence gillnet fishing 7 days a week in marine waters in the eastern half of Subdistrict 1, and beach seining was allowed in all subsistence locations during the chum salmon run when gillnet fishing was open. Regulation changes in 2016 increased subsistence gillnet fishing in the marine waters in the western half of Subdistrict 1 from 3 days to 5 days a week and fresh water subsistence gillnet fishing throughout Subdistrict 1 was increased from 4 days to 5 days a week. Excellent subsistence catches of pink salmon were reported in late June and early July and by mid-July counts at Nome River weir were at record levels. Aerial surveys were conducted in mid-July of the eastern Nome Subdistrict drainages (Flambeau and Bonanza rivers) and Sinuk River in the western Nome Subdistrict. One of best runs of pink salmon on record obscured chum salmon on these surveys, however, the Eldorado River, Nome River, and Snake River weir counts exceeded the chum salmon escapement goal ranges in 2016. Consequently, chum salmon subsistence gillnet fishing proceeded on the standard freshwater schedule and the marine schedule for Subdistrict 1.

The Subdistrict 1 BEG of 23,000–35,000 chum salmon has been exceeded for the last 7 years. However, achievement of the goal is often a result of better and more productive chum salmon runs east of Cape Nome disproportionately contributing to the BEG. The chum salmon escapement goal range for the Eldorado River, which is east of Cape Nome, is double the combined escapement goal range of the Nome and Snake rivers, both of which are west of Cape Nome, highlighting the disparity in river productivity within the subdistrict. In the last 6 years, the Eldorado River has exceeded the chum salmon escapement goal range every year, and the Nome and Snake rivers have exceeded their escapement goal ranges in 4 of the last 5 years (Appendices A22–A23 and A26). Although chum salmon runs are greater east of Cape Nome

(Appendix A32), for pink salmon the run strength is much greater west of Cape Nome (Appendix A33). Both the Nome and Sinuk rivers have much larger runs of pink salmon, particularly in even-numbered years, compared to rivers east of Cape Nome. Nome River has the only pink salmon escapement goal in Subdistrict 1, and the even-numbered-year goal of 13,000 pink salmon was easily exceeded in 2016 (Appendix A26).

No coho salmon escapement goals have been established in Subdistrict 1, but the escapement in Nome and Snake rivers was in midrange compared to previous years in the 2000s of sufficient escapement estimates with no large-scale flooding events.

In 2016 there were a record 591 subsistence salmon permits issued for the Nome Subdistrict, surpassing the previous record of 531 permits issued last season. Of the 591 permits issued, 588 were returned (Table 2).

Reported subsistence harvest was 26 Chinook, 3,260 chum, 10,101 pink, 2,274 coho, and 601 sockeye salmon (Appendix A6). The chum salmon harvest was the second highest since 1990. The pink salmon harvest was the second highest odd-numbered year harvest in over 30 years. The coho salmon harvest was average, but the sockeye salmon harvest was a record.

Commercial chum salmon fishing occurred for the fourth year in a row after being closed for over 2 decades and this was the first year of commercial fishing targeting coho salmon since then also. Five permit holders participated in the commercial fishery and that is the most fishing since fishing resumed in 2013, but the effort is half of any other subdistrict. Permit holders only fished during 4 of 7 fishing periods and expressed discouragement with the low price of pink salmon as one of the reasons for lack of effort. The commercial harvest including personal use was 662 chum; 1,456 pink; 118 coho; and 10 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 in an attempt 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 had been used to evaluate escapement in the Golovin Subdistrict from 1995 to 2012, but the project was discontinued in 2013. The Niukluk River is a tributary of Fish River, a major salmon-producing river in the Golovin Subdistrict. Telemetry studies in the early 2000s showed an average of 33% of the chum salmon in the Fish River drainage pass the Niukluk River tower (Todd et al. 2005).

There was no commercial chum salmon fishing in Golovin Subdistrict from 2002 to 2007, largely because escapements, in most of those years, had fallen short of the lower bound SEG of greater than 30,000 fish for the Niukluk River (Appendix A25). Consequently, ADF&G has implemented a conservative approach with respect to determining when commercial fishing may occur. In 2014 a new counting tower project was initiated by NSEDC on the Fish River. High water in 2014 resulted in salmon passage being undercounted, but in 2015 low water enabled the tower crew to more accurately count salmon passage and in 2016 operations were suspended for the season on July 30 because of high water. Additionally, ADF&G has previously used observations of the chum salmon run in the adjacent Subdistrict 3 counting tower at Kwiniuk River. During the 18 year period when the counting tower at both the Niukluk and Kwiniuk rivers were operational, ADF&G observed that in 16 of those years, when the Kwiniuk River counting tower reached or

did not reach its chum salmon escapement goal, then Niukluk River counting tower was in agreement in reaching or not reaching its goal.

This season there was a change in the usual fishing schedule with the buyer requesting daily 16 hour fishing periods 6 days a week during the majority of the chum salmon season instead of the usual two 48-hour fishing periods a week. The buyer requested this change to improve fish quality. After the third week of July, when coho salmon started to appear in the catch, the buyer requested a return to two 48-hour fishing periods a week.

The commercial catch in Golovin Subdistrict for 2016 including personal use was 17 Chinook; 157 sockeye; 880 coho; 15,346 pink; and 5,331 chum salmon caught by 10 permit holders (Appendix A7). The chum salmon harvest was only one-quarter of last year's harvest, but was still the third highest harvest since commercial fishing resumed in 2008 in Golovin. The pink salmon harvest of 15,346 fish was the second highest harvest since 2008. Coho salmon catches were well below average and commercial fishing was suspended 10 days before the usual end of August fishing closure. The coho salmon harvest of 880 fish was only one-quarter of last year's harvest and was the fourth lowest harvest since 2008.

This was the twelfth year that subsistence salmon permits were required. 166 permits were issued for Golovin Subdistrict in 2016 and 164 were returned. Subsistence fishing was allowed to continue 7 days a week with no catch limits throughout the season. Reported harvest was 35 Chinook, 29 sockeye, 844 coho, 6,747 pink, and 1,006 chum salmon (Appendix A7). The number of salmon reported harvested (8,661) ranked sixth lowest in the 2000s mainly because of the lower harvests of chum, coho, and pink salmon.

Elim–Norton Sound Subdistrict 3

The Subdistrict 3 management plan directs ADF&G to project that chum salmon escapement goals will be reached and ensure that harvestable surpluses will be in excess of subsistence needs before directed chum or pink salmon commercial fishing is allowed. Further, in times of low chum salmon abundance, directed pink salmon commercial fishing may not occur before July 7 in the subdistrict. By this date, historical data indicate that the bulk of the chum salmon run is in river, and commercial pink salmon fishing would be expected to have little impact on chum salmon escapement or subsistence needs.

The Elim Subdistrict commercial fishing schedule was the same as the Golovin Subdistrict with daily 16 hour fishing periods 6 days a week until the third week of July when the two 48-hour fishing periods a week resumed. The only difference in the 16 hour daily fishing schedule was the buyer had Golovin closed to fishing on Tuesdays and Elim on Thursdays.

The 2016 pink salmon run was one of the greatest on record, but there were no directed pink salmon fishing periods. Nearly 39,000 pink salmon were harvested incidentally and this was the second highest harvest since commercial fishing resumed in 2007 in Elim. The chum salmon run was below average and the catch of 6,736 fish was only one-sixth of last year's harvest.

The commercial catch in Elim Subdistrict including personal use was 69 Chinook; 728 sockeye; 14,197 coho; 39,028 pink; and 6,736 chum salmon caught by 25 permit holders. The 2016 coho salmon harvest was the second highest on record only trailing the 2014 catch of 15,938 coho salmon (Table 6, Appendix A8).

There were 55 subsistence salmon permits issued for Elim Subdistrict in 2016 and all were returned. The number of salmon reported harvested (8,934) was above the recent 5-year and

10-year averages due to the higher catch of pink salmon. Estimated subsistence harvests by species were 163 Chinook; 60 sockeye; 1,164 coho salmon; 6,717 pink salmon; and 830 chum salmon (Appendix A8).

Norton Bay–Norton Sound Subdistrict 4

Historically, Norton Bay Subdistrict has had difficulty attracting a buyer due to its remoteness and its reputation for watermarked fish. Until recently, Norton Bay Subdistrict has typically been managed based on Shaktoolik and Unalakleet Subdistricts' salmon run assessments due to a lack of ground-based escapement projects in Norton Bay. However, in 2011, an enumeration tower project was initiated by NSEDC on the Inglutalik River to provide an index of salmon escapement to Norton Bay. Currently, the Inglutalik River escapement counts are considered ancillary to comparative catch statistics for inseason management until a longer time series of escapement data becomes established.

In 2008, a small-scale commercial salmon fishery occurred in Norton Bay Subdistrict for the first time since 1997, and 4 permit holders participated. ADF&G again opened the commercial salmon fishery in 2009 and 7 permits holders participated. In 2010, there were 5 permit holders participating in the fishery, which was limited due to a combination of inadequate tendering capacity in early July, mechanical breakdowns on tender vessels in August, and reduced fishery participation probably due to concurrent fisheries prosecuted in the Elim and Shaktoolik Subdistricts (permit data on file with ADF&G, Division of Commercial Fisheries, Nome).

In 2011 effort nearly doubled to 12 permit holders, and in 2012 there were 18 permit holders fishing in Norton Bay Subdistrict and a record 49,970 pink salmon were harvested. In 2013 there was a record catch of 36,021 chum salmon by 18 permit holders. In 2014 there were 20 permit holders and a record catch (9,562) of coho salmon (Appendix A9). The last 2 years there have been 18 permit holders participating in the commercial fishery.

In 2016 to protect Chinook salmon ADF&G restricted subsistence fishing in Subdistrict 4 to two 48 hour fishing periods a week during the month of June. The first fishing period each week had a restriction of 6.0 inches or smaller mesh size and the second period had no mesh size restrictions.

Like Golovin and Elim Subdistricts, the commercial fishing schedule was 16 hour daily fishing periods, but fishing was closed on Wednesdays. After the third week of July, fishing periods were two 48-hour fishing periods a week.

Cumulative commercial catch by species for Subdistrict 4 including personal use was 111 Chinook; 174 sockeye; 6,656 coho; 38,357 pink; and 14,069 chum salmon (Appendix A9).

This was the ninth consecutive year that household subsistence salmon surveys were conducted in the village of Koyuk. Surveys were conducted from 1994 to 2003, but funding limitations precluded surveys of Koyuk during the 2004–2007 seasons. There were 63 households that were successfully contacted out of a possible 73 in 2016. Results from these households were expanded to estimate harvests by species, gear type, and location (e.g., Inglutalik River, Ungalik River, Koyuk River, Mukluktulik River, and marine waters) for those households not surveyed. An estimated 241 Chinook, 235 sockeye, 929 coho, 1,978 pink, and 2,724 chum salmon were reported as subsistence harvest in Norton Bay Subdistrict in 2016 (Appendix A9).

Shaktoolik and Unalakleet–Norton Sound Subdistricts 5 and 6

Both Subdistricts 5 and 6, which share a common boundary, consistently attract commercial markets due to larger volumes of fish and better transportation services. Management actions typically encompass both subdistricts because salmon tend to intermingle, and harvest in 1 subdistrict affects the movement of fish in the adjacent subdistrict. Results from ADF&G's test net in Unalakleet River (Kent 2010), North River tower counts, and subsistence fishermen interviews in Unalakleet had been used to set early fishing periods in both subdistricts. However, the test net project was discontinued in 2013. Commercial fishing is typically allowed after Chinook salmon have been observed in increasing numbers in subsistence fishing nets and ADF&G is confident the midpoint of the Chinook salmon escapement goal range of 1,200–2,600 fish will be reached at the North River counting tower. If ADF&G does not project that the midpoint of escapement goal range will be reached then no commercial gillnet fishing periods are allowed for any species until after June 30. Radiotelemetry projects in the Unalakleet River drainage have shown that a large percentage of the Chinook salmon run spawns in the North River compared to chum and coho salmon (Estensen et al. 2005; Estensen and Hamazaki 2007; Joy et al. 2005; Joy and Reed 2006, 2007; Wuttig 1998 and 1999). Aerial surveys are only useful for late-season escapement assessment because of the long travel time between the fishing and spawning grounds.

In Subdistricts 5 and 6, directed commercial Chinook salmon fishing has only occurred in 2 of the previous 16 years, and in only 1 year since 2001. Restrictive action was taken in the subsistence and sport fisheries from 2003 to 2004 and from 2006 to 2015. As forecasted, a weak run of Chinook salmon to Shaktoolik and Unalakleet Subdistricts in 2016 precluded commercial fisheries directed on Chinook salmon but also led to a significant amount of foregone chum salmon harvest surplus. As a consequence of the poor Chinook salmon run, directed chum salmon fishing was delayed until after June 30 based upon the Shaktoolik and Unalakleet Subdistricts management plan.

Estimated 2013 Chinook salmon escapements from the Unalakleet River mainstem and its major tributary, North River, were 767 and 564 fish, respectively, and were the lowest ever recorded (Menard et al. 2015a). Subsistence Chinook salmon harvests in Subdistricts 5 and 6 were the lowest recorded since survey methods were standardized in 1994, with 136 and 468 fish, respectively (Menard et al. 2015a). In 2016 both the Unalakleet River weir and North River counting tower were inoperable after the third week of July because of high water and the Chinook salmon escapement may have been lower than in 2013 if the entire run could have been counted.

Starting in 2014 the subsistence fishing seasons began with unprecedented closures to subsistence salmon fishing to ensure that the Chinook salmon run would meet escapement goals. Severe restrictions on fishing time had the intended consequence that the 2014 Chinook salmon escapement dramatically improved and reaching the North River counting tower escapement goal range (1,200–2,600) with 2,328 Chinook salmon counted. Likewise, in 2015, subsistence fishing was closed early in the season (June 8) and 1,950 Chinook salmon were counted at North River tower. Again in 2016, ADF&G had fishermen's meetings in Shaktoolik and Unalakleet prior to the fishing season to inform residents of the upcoming subsistence closure to all subsistence salmon fishing from north of Wood Point near St. Michael, to Bald Head near Elim, including the Golsovia, Shaktoolik, Unalakleet, Egavik, Ungalik and Inglutalik rivers. However, even with the subsistence restrictions in place in 2016, from mid-June onward the Chinook salmon run was very weak.

The Subdistrict 5 catch of 251 Chinook was above the recent 5-year average (182) and near the 10-year average (297) (Appendix A10). However, in Subdistrict 6, the 687 Chinook salmon harvested in the subsistence fishery ranked just above the recent 5-year average (657), but well below the recent 10-year average (1,204) (Appendix A11).

Commercial fishing began on July 1 with one 24-hour chum salmon fishing period. The buyer had capacity issues with the number of pink salmon caught and limited fishing periods to 12 hours or less through July 20. The usual two 48-hour fishing periods a week did not begin until late July when pink salmon catches began to slow and coho salmon catches were increasing.

Commercial catches for chum salmon were nearly equal in both subdistricts with 12,149 fish caught in Shaktoolik and 12,229 fish caught in Unalakleet. Pink salmon catches in Unalakleet were over three times the catch in Shaktoolik with 86,466 fish caught in Unalakleet and 28,308 fish caught in Shaktoolik. Coho salmon catches were over twice as high in Unalakleet with 25,849 fish caught in Shaktoolik and 5,173 fish caught in Unalakleet (Appendices 10 and 11).

The chum salmon catch for Shaktoolik was the lowest since 2009 and for Unalakleet was the lowest since 2007. The pink salmon catch was the third highest in the 2000s in Shaktoolik and was the highest since 1998 in Unalakleet. The coho salmon catch was similar to last year in Shaktoolik, but was a little more than half of last year's record catch in Unalakleet (Appendices 10 and 11).

Escapement

Table 3 and Appendix A18 summarize escapement assessments for the major index river systems of Norton Sound and Port Clarence Districts in 2016. Appendices A22–A31 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, Fish, and Kwiniuk rivers; sonar/tower on Shaktoolik River; and weirs on Unalakleet, Snake, Nome, Solomon, Eldorado, and Pilgrim rivers.

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

Aerial survey assessment conditions were fair to good during July and August of 2016, but high water in southern Norton Sound prevented any surveys there.

Chinook Salmon

Chinook salmon escapement was much weaker compared to 2014 and 2015. The Kwiniuk River tower count did not reach the lower end of the SEG range of 300–550 fish with 135 Chinook salmon counted (Appendix A24). Flooding prevented an accurate assessment of the Chinook salmon run at North River counting tower, but the escapement goal range of 1,200–2,600 fish was probably not reached. Counting operations were suspended for 1 month beginning on July 19 when the cumulative Chinook salmon escapement count was 510 fish. The 5-year average passage of Chinook salmon by the tower on July 19 is 61% and the 10-year average is 73%. In

only 1 year in the 2000s was the passage lower than 50% by July 19. Previous to this year the last time the lower end of the Chinook salmon goal was not reached was in 2013. Likewise, the Chinook salmon escapement goal of Kwiniuk River counting tower was not reached for the first time since 2013. The Unalakleet River weir was inoperable because of high water after July 20 and count 505 Chinook salmon (Appendix A31) was less than half the recent 5-year average for that date.

Chum Salmon

Chum salmon escapement goal ranges were exceeded in all rivers, but the escapement goal range was not reached at the Kwiniuk River counting tower in the Elim Subdistrict.

Subdistrict 1 chum salmon escapement was less than two-thirds of the last several years, but those years were some of the largest escapements in over 20 years. Estimated subdistrictwide escapement of chum salmon was 60,749, which was 74% above the upper bound of the subdistrictwide biological escapement goal (BEG) range of 23,000–35,000 chum salmon (Table 3; Appendix A21). Subdistrict 1 escapements of chum salmon have exceeded the upper bound of the escapement goal range in 11 of the last 15 years of the established goal. As in previous years, more than half (67%) of the chum salmon escapement occurred in rivers east of Cape Nome, and Eldorado River had the largest estimated escapement for an individual river system, contributing 18,938 chum salmon or 31% of the subdistrictwide escapement (Appendix A32).

Escapement at Kwiniuk River tower was 8,526 chum salmon (Appendix A24) and was the third lowest in over 30 years and well below the Kwiniuk River escapement goal range of 11,500–23,000 fish. ADF&G did not fly the Tubutulik River, OEG range of 9,200–18,400 fish, in Elim Subdistrict to determine if the chum salmon escapement goal range was reached there. An overwhelming number of pink salmon in the adjacent Kwiniuk River was probably an indication of huge numbers of pink salmon at Tubutulik River and effectively counting chum salmon by aerial survey would have been near impossible.

In southern Norton Sound the Inglutalik River tower like other southern Norton Sound counting projects was knocked out the third week of July because of high water. The cumulative count of 43,226 chum salmon through July 17 was the second highest in the 7 year project history (Appendix A29), and the North River tower count of 15,993 chum salmon through July 18 was a record, but high water prevented counting for a month and the final count of 16,014 chum salmon was not interpolated for missed counts (Appendix A30).

In Port Clarence District, chum salmon runs were below average in 2016. Escapement of chum salmon to the Pilgrim River was 21,379 fish, which ranked fourth lowest out of 14 years at the Pilgrim River floating weir project (Appendix B2).

Coho Salmon

Coho salmon are found in nearly all of the chum salmon producing streams throughout Norton Sound, with the primary commercial contributors being the Unalakleet and Shaktoolik rivers. Escapement data are not available over a long time series for several streams because few projects counted coho salmon prior to the early 2000s due to funding limitations. More recently Norton Sound escapement assessment projects have been funded to monitor coho salmon as well as chum salmon and are becoming increasingly important to fisheries management.

There are only 2 coho salmon escapement goals in Norton Sound, and both are aerial survey goals. The North River goal of 550–1,100 was probably achieved although an aerial survey was

not flown, but the tower count during 18 days (probably less than 50% counted because of high water) was 2,241 fish (Table 3). The Kwiniuk River goal of 650–1,300 was easily exceeded with an aerial survey count of 1,987 fish, and the final tower count was 9,210 fish (Table 3).

The aerial survey goal for Niukluk River and Ophir Creek is 750–1,600 coho salmon, and this year's aerial survey count was 976 coho salmon (Table 3).

Both the Snake (1,115) and Nome (2,331) rivers' weir projects had counts slightly below the median for coho salmon (Appendices A23 and A26).

Pink Salmon

For over 25 years, pink salmon runs to Norton Sound have followed an odd- and even-numbered year cycle, with even-numbered year runs typically much higher in abundance than odd-numbered years. Pink salmon escapement estimates were successfully obtained from most ground-based escapement projects in 2016. There are 3 pink salmon escapement goals in Norton Sound: Nome River (13,000), Kwiniuk River (8,400), and North River (25,000). In almost all years the goals were reached, and in 2016 there were near record to record runs (Table 3). The Kwiniuk River counting tower passage of 1,909,949 pink salmon was the third highest count in the 52 year project history (Appendix A24) and the Nome River weir count of 1,175,723 pink salmon was less than 11,000 fish from the record count in 2008 (Appendix A26). The Solomon River weir has only been operational for 4 years and the 128,046 pink salmon counted was a record (Appendix A27).

In Port Clarence District, pink salmon runs were below average in 2016. Escapement of pink salmon to the Pilgrim River was 2,986 fish, which ranked lowest for any even-numbered year in the 14 year project history and continued the trend starting in 2013 of pink salmon runs being less than 4,200 fish each year (Appendix B2).

Sockeye Salmon

River spawning sockeye salmon are typically found in small numbers throughout Norton Sound District. Glacial Lake (Nome Subdistrict) and Salmon Lake (Port Clarence District) support populations of lake-spawning sockeye salmon and constitute the northernmost populations of any significance of sockeye salmon in North America. Salmon Lake spawning populations seldom exceeded 10,000 fish in years previous to 2003, whereas from 2003 to 2007 there were record breaking runs of sockeye salmon. Likewise, Glacial Lake saw an upswing in sockeye salmon returns beginning in 2004, and a record count of 11,135 sockeye salmon occurred in 2005 (Appendix A28).

In 2008, sockeye salmon escapement dropped off at both Glacial Lake and Salmon Lake, and in 2009 sockeye salmon counts were record lows at both Glacial Lake weir and Pilgrim River weir. The Glacial Lake weir was operated at Glacial Creek near the outlet of the lake and about 1 mile upstream from the confluence with the Sinuk River, and 826 sockeye salmon were counted in 2009, the lowest count since the weir project started in 2000 (Appendix A28). The 2009 Salmon Lake sockeye salmon run was also the lowest since Pilgrim River weir began operations in 2003, with 953 sockeye salmon counted through the weir (Appendix B2).

Sockeye salmon escapements in these 2 systems increased in 2010, although not by much. Sockeye salmon escapement in 2010 at Glacial Lake was 1,047 fish, tying 2002 for the third lowest count since the project began in 2000 (Appendix A28). Pilgrim River weir sockeye

salmon escapement in 2010 was 1,654 fish, which was the second lowest on record (Appendix B2).

Improving sockeye salmon runs started occurring at both Glacial and Salmon Lakes in 2011 and by 2013 an estimated 2,544 sockeye salmon were enumerated at Glacial Lake weir, and 12,428 sockeye salmon were enumerated at the Pilgrim River weir (Appendices A28 and B2). The 2015 sockeye run was the best run since the record runs of the mid-2000s with 9,257 sockeye salmon counted at Glacial Lake weir and 36,052 sockeye salmon counted at Pilgrim River weir. Because of decreasing budgets ADF&G did not operate Glacial Lake weir in 2016, but an aerial survey count of 1,582 sockeye salmon was within the aerial survey escapement goal range of 800–1,600 fish. At Pilgrim River weir the sockeye salmon count was 15,066 fish in 2016 and the aerial survey count of 8,558 sockeye salmon in Salmon Lake and Grand Central River exceeded the aerial survey goal of 4,000–8,000 fish (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 2016. In addition, Nome ADF&G Division of Commercial Fisheries has 7 deputized staff with the ability to issue citations.

2017 NORTON SOUND SALMON OUTLOOK

Salmon outlooks and harvest projections for the 2017 salmon season are based on qualitative assessments of parent-year escapements, subjective determinations of freshwater overwintering and ocean survival, and, in the case of the commercial fishery, the projections of local market conditions. The Chinook salmon run was expected to show improvement in 2016, but was much poorer than expected. The 2017 run is expected to be poor and once again no commercial fishing targeting Chinook salmon is expected. Additional preemptive subsistence restrictions are also likely for southern Norton Sound to conserve Chinook salmon in order to reach escapement goals. These restrictions include preemptive closures or reductions in fishing time in marine waters, inriver closures to gillnets or mesh size restrictions, and mesh size restrictions in fresh waters. Beach seining subsistence opportunity will be provided to allow the take of other, more plentiful species like pink and chum salmon while requiring the immediate release of Chinook salmon unharmed to the water.

Chum salmon runs are expected to be below average in southern Norton Sound Subdistricts (Norton Bay, Shaktoolik, and Unalakleet). Directed chum salmon fishing is anticipated to commence as early as the fourth week of June in Norton Bay Subdistrict but no earlier than July 1 in Shaktoolik and Unalakleet Subdistricts because of Chinook salmon conservation concerns. In 2017, northern Norton Sound chum salmon runs are expected to be below average to average. Chum salmon abundance is anticipated to be sufficient to reach escapement goals and provide for a chum salmon commercial harvest in Subdistricts 2 (Golovin) and 3 (Elim). A commercial fishery for chum salmon is expected in Nome Subdistrict dependent on a sufficient chum salmon run to obtain escapement goals throughout the subdistrict. Overall projected commercial harvest of chum salmon in Norton Sound is expected to range between 50,000 and 80,000 fish and no subsistence fishing restrictions are expected.

ADF&G expects the pink salmon run to be above average for an odd-numbered year, and dependent on buyer interest the harvest could be 25,000–75,000 fish. No subsistence fishing restrictions for pink salmon are expected.

The coho salmon run in 2017 is expected to be average to above average based on recent 5 year trends in abundance and ocean conditions, as well as parent-year escapements and freshwater rearing conditions for the 2013 brood year. Considering these factors collectively, the commercial harvest is expected to range from 90,000 to 120,000 coho salmon. Coho salmon subsistence fishing restrictions are not expected.

2016 PORT CLARENCE SALMON FISHERY

Commercial Fishery Season Summary

No commercial salmon fishing occurred in 2016. Although the run was thought to have reached the inriver goal of 30,000 sockeye salmon that is necessary for a commercial fishery to occur. However, there was no buyer interest in having commercial fishing and end of season subsistence catch reports combined with Pilgrim River weir counts showed that the run did not reach the 30,000 sockeye salmon threshold for a commercial fishery.

Subsistence Fishery Season Summary

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. In 2016 a record 509 periods were issued that surpassed last year's record of 377 permits issued. Pilgrim River estimated subsistence harvests by species were 9 Chinook salmon, 33 coho salmon, 91 chum salmon, 9,454 sockeye salmon, and 43 pink salmon (Table 2). The sockeye salmon harvest was the second highest on record and only trailed slightly the 10,708 sockeye salmon harvested in 2015. Previous to 2015, the record was 5,556 sockeye salmon harvested in 2006.

The size of the Pilgrim River sockeye salmon run greatly affects the number of issued subsistence permits. The first year of the good sockeye salmon runs (2003), there were 100 permits issued. In 2004, there were 223 permits issued and in 2014, there were 260 permits issued (permit data on file with ADF&G, Division of Commercial Fisheries, Nome). For comparison, in 2002 only 25 permits were issued, and a counting tower in operation that year at the same location as the present day weir estimated less than 4,000 sockeye salmon passing (Appendix B2).

Although permits have been required in the Pilgrim River drainage for over 50 years, 2016 was the 13th 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 158 permits, less than the 171 permits issued in 2015 (Menard et al. 2017).

In 2016 there were 6 customary trade permits issued in Port Clarence District. Cash sales of $575 were recorded in 2016 for both Norton Sound and Port Clarence Districts combined (Appendix A34).

Escapement

Aerial surveys are not typically flown in Port Clarence District except for Salmon Lake because higher priority is assigned to Nome Subdistrict and surrounding areas where commercial fishing

occurs. Aerial surveys had shown an increasing trend of sockeye salmon returns to Salmon Lake since 1990 (Appendix B1). However, the sockeye salmon run crashed beginning in 2009, and ADF&G has had to have subsistence fishing restrictions on Pilgrim River in every year except 2013 and 2015–2016. An aerial survey in 2016 of Salmon Lake and Grand Central River estimated 6,155 sockeye salmon in Salmon Lake and 2,403 sockeye salmon in Grand Central River, a tributary to Salmon Lake. The combined aerial survey escapement goal for Salmon Lake and Grand Central River is 4,000–8,000 sockeye salmon (Table 3).

Salmon Lake had an average sockeye salmon spawning escapement of roughly 12,500 fish in the 5 years previous to 2003. But from 2003 to 2007, sockeye salmon escapements greatly increased, and average weir count for the 5 year period was almost 56,000 sockeye salmon (Appendix B2). Salmon Lake aerial survey escapement goal has been reached the last 6 years, however in 3 of those years, subsistence closures were required in Pilgrim River.

Enforcement

In 2016, 1 AWT officer patrolled Pilgrim River in Port Clarence District.

2017 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. Based on last year's run and parent-year escapement, the inriver goal of 30,000 sockeye salmon for Pilgrim River may be met. However, no commercial fishing is expected in 2017 because of a lack of a buyer.

2016 KOTZEBUE SOUND SALMON FISHERY

Commercial Fishery Season Summary

The commercial salmon fishery opened on July 10 and closed after August 31. However, the major buyer last purchased salmon on August 26 and a smaller buyer purchased fish during the 4 additional 12 hour fishing periods from August 27 to August 31 when the majority of the permit holders gilled and gutted their catch.

The 2016 harvest was the second highest in over 30 years and was only the seventh time the harvest exceeded 400,000 chum salmon. No fish processing occurred in Kotzebue and fish were flown out in the round, except for when Maniilaq purchased gilled and gutted salmon the second half of August.

The commercial salmon season opened on July 10 and closed by regulation after August 31. Copper River Seafoods (CRS) requested 8 hour fishing periods from 10:00 AM to 6:00 PM daily. Commercial fishing was allowed 6 days a week with no fishing on Saturday. CRS initiated daily catch limits beginning on August 9 that ranged from 225 salmon to 450 salmon per permit holder and limits were suspended after the August 18 fishing period. Beginning on August 16, CRS requested an additional 2 hours of fishing time until 8:00 PM. Maniilaq first purchased salmon on August 15 and required the fishermen to gill and gut their catch. Maniilaq did not purchase salmon again until August 21 and through August 26 purchased salmon from 2 to 6 permit holders that gilled and gutted their catch. From August 28 to August 31, Maniilaq requested 12 hour fishing periods from 9:00 AM to 9:00 PM daily. Maniilaq purchased fish both in the round and gilled and gutted beginning on August 28 through the last fishing period on

August 31. During the August 28 and August 29 fishing periods Maniilaq also purchased salmon as a licensed agent for Pacific Star Seafoods.

CRS required permit holders to sign up if they intended to fish the following fishing period and dependent on effort CRS would notify ADF&G if they intended to put the permit holders on catch limits.

There were 86 permit holders that sold chum salmon in 2016. This year's participation by permit holders was 82% of last year's participation when 105 permit holders sold fish, but was the fourth highest permit holder participation in 20 years. (Appendix C1). The highest fishing effort occurred on August 9 when 55 permit holders fished.

The commercial harvest figure of 400,417 chum salmon was the seventh highest in the 55 year history of the fishery. There were 18 chum salmon kept for personal use that were not included in the commercial harvest total. Additionally, 75 Chinook salmon, 8 sockeye salmon, 1,460 pink salmon, 5 coho salmon, 710 Dolly Varden, 51 sheefish, and 1 whitefish were reported in the catch, but kept for personal use. Additional fish kept for personal use were probably not reported on fish tickets.

A total of 3,284,097 pounds of chum salmon (average weight 8.4 pounds) was sold at an average of $0.33 per pound (Appendix C2). A total of 82,782 pounds of chum salmon was purchased that was gilled and gutted at prices ranging from $0.45 to $0.50 per pound. This year's average price of $0.33 per pound was the same as last year, but was a drop of nearly 40% from the 2014 price of $0.54 per pound. The total exvessel value was $1,123,248 and was 36% more than last year, but was only 39% of the 2014 exvessel value. However, this year's exvessel value was only the second time since 1988 that the value was over 1 million dollars. The 20-year average exvessel value of the fishery was $462,599 without adjusting for inflation (Appendix C3).

ASL composition was taken from commercial catch samples, but was not used to manage the fishery. The majority of the chum salmon each year are usually 4- and 5-year-old fish. In 2016, commercial catch samples were 1% age-0.2 fish, 37% age-0.3 fish, 53% age-0.4 fish and 9% age-0.5 fish. The age composition was similar to previous years (http://www.adfg.alaska.gov/CommFishR3/WebSite/AYKDBMSWebsite/Default.aspx).

Subsistence Fishery Season Summary

Subsistence household salmon surveys were regularly conducted in Kotzebue District from 1990 to 2004 by the Division of Subsistence (DOS), and again from 2012 to 2014, when comprehensive subsistence fish and wildlife harvest data were collected from 6 to 9 Kotzebue area villages by DOS. From 2012 to 2014, total subsistence chum salmon reported caught ranged from 27,000 to 42,000 fish, more than in 2003 and 2004, the last 2 years that the same 6 villages were surveyed (Appendices C4 and C5). Subsistence chum salmon harvest per household averaged 66 to 85 salmon for Kobuk River villages during the years 2012–2014 (Appendix C6).

Escapement

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

This year's test fishery chum salmon CPUE cumulative index at the ADF&G test fishery project on Kobuk River near Kiana was 1,484 and was the ninth highest in the 24 year project history.

Kobuk River test fishery catch samples in 2016 were 1% age-0.2 fish, 53% age-0.3 fish, 39% age-0.4 fish and 7% age-0.5 fish. The age composition was similar to previous years.

No aerial surveys were conducted in 2016.

Enforcement

One AWT officer patrolled the Kotzebue Sound District 2016 commercial salmon fishery.

2017 Kotzebue Salmon Outlook

The outlook for the 2017 season is based on the parent-year returns and returning age classes observed in the commercial catch samples and in the test fishing catch samples from the Kobuk River in 2016. During the 2017 season, the 4-year-old component of the run is expected to be above average based on the 3-year-old return. The 5-year-old component of the run is expected to be average based on the 4-year-old return this past season. The 3-year-old and 6-year-old age classes are much smaller components of the run and are expected to be average (age data on file with ADF&G, Division of Commercial Fisheries, Nome). The commercial harvest is expected to fall within the range of 250,000 to 450,000 chum salmon.

SECTION 3: PACIFIC HERRING FISHERIES

2016 NORTON SOUND PACIFIC HERRING FISHERY

Sac Roe

A commercial fishery directed on sac roe did not occur for the third consecutive season in 2016. Similar to the 2015 season, the lack of a sac roe fishery in 2016 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

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 2016. The Norton Sound commercial bait herring fishery was opened by emergency order on May 16 and Norton Sound Seafood Products purchased 29 short tons of herring from May 16 to May 22 with 6 permit holders making deliveries (Appendix D2).

Commercial Fishery Management

In 2016, due to budget limitations, ADF&G did not fly aerial surveys to estimate biomass nor conduct ASL sampling. With the decline in market demand, there was no expectation that commercial harvest would exceed 20% of actual biomass.

Budget reductions have resulted in no ADF&G field crew deployed for Cape Denbigh during the 2016 season and no test fishing operations being conducted from Unalakleet. No commercial samples were taken.

Catch Reporting and Enforcement

No AWT officers were on Norton Sound herring grounds during the 2016 fishery because there was no sac roe fishery.

Biomass Determination

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

SECTION 4: KING CRAB FISHERIES

NORTON SOUND CRAB FISHERY

Abundance

The ADF&G length-based population model estimated harvestable legal (over 4.75 inch carapace width) male crab biomass for the 2016 commercial crab fishery at 4.3 million pounds. This estimate was based on the model's results from spring of 2016 that included the latest data from the 2015 summer fishery and the 2014 trawl survey, which had associated high uncertainty (Appendix E9) leading to correspondingly high biomass estimate uncertainty. By BOF regulation, a harvest rate of up to 15% is allowed when the legal male biomass exceeds 3.0 million pounds. Additionally, the North Pacific Fishery Management Council had set an allowable biological catch (ABC) of 568,000 pounds for 2016, which is to include the winter and summer commercial harvests, estimated winter and summer subsistence harvests, and estimated incidental mortality of non-target crab discards. Starting in 2016, under the new king crab management plan, both winter and summer commercial fisheries are now combined under 1 red king crab harvest strategy. Based on the recommended ABC, ADF&G applied a harvest rate of 12% to the legal male population, yielding a total guideline harvest level (GHL) of 517,200 pounds for the commercial red king crab fisheries. By regulation 8% of the GHL is allocated to the winter commercial fishery resulting in a potential 41,376 pound allocation. The Community Development Quota (CDQ) fishery is allocated 7.5% by regulation resulting in a potential 38,790 pound allocation. Any commercial harvest allocation not taken during the winter commercial fishery will be added to the summer commercial fishery allocation.

Winter Open Access Commercial Fishery

The winter commercial season opened February 15, 2016, and 30 fishermen registered. One land-based processor (NSSP in Nome) and 1 catcher-processor registered to buy crab, and 7 fishermen applied for a catcher-seller permit to sell crab dockside (but only 1 made sales). Based on fish tickets submitted, the first landing was made February 16 and last landing was made on March 24 (Table 12). From beginning to end of the season, the harvest rate was consistently high, with landings every day (Appendix E5). For comparison to past years, information below includes winter CDQ catch. A total of 471 landings were made, with an overall CPUE of 5 crab per pot, and average weight of 2.7 pounds of crab (Appendix E4). Price of crab averaged $7.22 per pound, the highest ever for the Norton Sound king crab fishery, and total exvessel value was $559,803, the second highest for the winter fishery. A total of 79,986 pounds (29,794 crab) was harvested, with roughly half harvested in March, a third in April, and the remainder in February. Total amount of crab harvested was 81% compared to last year, and number of landings was 71% in comparison. Because the season started later this year, when the ice was more stable, number of pots reported lost was much less compared to last year: 38 pots lost out of 494 pots fishing this year (8%), compared to 104 out of 606 pots last year (17%) (Appendix E11). Nome crabbers reported fishing from 24 miles west to 12 miles east of Nome, excluding the area closed to commercial fishing. Similar to last year, the majority of fishermen (19) and harvest (93%) came from the Nome area, with the remaining fishermen and harvest coming from Elim,

Golovin, Stebbins, and White Mountain areas. Similar to the last 2 years, the ice was unstable in most of eastern & southern Norton Sound, and harvest from each of these areas accounted for 3% or less of the total harvest in 2016.

In 2016, NSSP purchased almost 80% of the total winter harvest, fish ticket data reported the lone catcher-processor and the lone catcher-seller accounting for the rest of the harvest.

CDQ Fishery

In 2016, as in the previous 9 years, YDFDA transferred their quota to NSEDC. Similar to the past 11 years except for 2013, NSEDC fishermen harvested all, or nearly all, of the entire allocation. In 2016, for the first time, the CDQ fishery was prosecuted during the winter season, opening on March 23, the day before the winter open-access fishery closed, to allow registered CDQ permit-holders to continue fishing. From then until the last (winter) landing was made on April 21, the 22 crabbers that fished (out of 26 that registered) harvested 35,207 pounds, or 91% of the CDQ quota (Table 13). The remaining 9% (3,583 pounds) was harvested during the summer fishery.

In 2016, combining results from winter and summer, there was a total of 189 CDQ landings and 2,258 pots lifts. Average price paid to fishermen was $7.50 per pound in winter and $6.50 per pound in summer, for a combined exvessel value of $278,976 for the CDQ fishery. This was the fifteenth year a CDQ harvest occurred since the CDQ fishery was implemented in 1998.

Summer Open Access Commercial Fishery

The 2016 summer open access commercial crab fishery was opened by emergency order at 12:00 noon, June 27 in the Norton Sound Section, with a GHL of 440,137 pounds of crab. Two companies, NSSP and Aquatech, were registered to buy crab (though Aquatech ended up not purchasing any crab), and 3 fishermen registered to sell crab dockside as catcher-sellers (but only 2 made sales). NSSP operated a seafood processing plant in Nome and 2 tenders in eastern Norton Sound. Crab was sold to NSSP and to local residents.

The first open access deliveries were made on June 29 and final deliveries were made July 21, the day the fishery was closed by emergency order at 6:00 AM, for a season length of 25 days, 1 day less than in 2015 (Appendix E1). This year as in past years, the season start was based on when the crab processors were ready to purchase crab. Once the open access season was under way, NSSP purchased crab continuously with no reports of poor crab meat fill.

For the 2016 season, as in 2015, the harvest rate was excellent from the start and, with only 1 major storm at the end, continued to be superb throughout the 4 week season (Appendix E3), making it the shortest season since the Norton Sound registration area became superexclusive in 1994, which effectively made it a small boat fishery. The daily CPUE never dropped below 10 crab per pot and went as high as 26 crab per pot (Table 14). By the third week of July, the projected trend line showed that the open access quota would be reached in a few days. Even though the weather forecast turned negative and no fishing occurred for 2 days, there was no expected drop in harvest rate once fishing resumed. With an upcoming weather window of fishing opportunity, a closure was announced for July 20 at 6:00 AM, which gave the fishermen 36 hours' notice. The original deliver-by time was extended from 12 hours to 18 hours due to rough surf conditions in parts of Norton Sound. On the morning of July 20, with half the fleet unable to get to their pots due to adverse marine conditions, the closure was extended for 24 hours, to July 21 at 6:00 AM. Crabbers were allowed 12 hours beyond the closure time to deliver, or at least be waiting to deliver at the Nome

plant or at a tender. Because of safety concerns, the usual requirement to have all pot doors open and bait containers removed by the closure date and time was waived. Fishermen could get to their pots once they felt safe to do so, but all crab retrieved after the closure date and time had to be returned to the water.

The open access harvest from fish ticket reports was 137,774 red king crab or 416,576 pounds (95% of the open-access quota; Table 14). Of this total, 1,357 pounds were reported as deadloss, and 1,388 pounds reported as personal use. Out of the 38 vessels and 42 permit holders that registered to fish, 36 vessels and 37 permit holders made 227 landings (Appendix E1). The average weight for commercially caught crab was 3.0 pounds, slightly heavier than last year. Number of pots registered was 1,520, and there were 7,957 pot pulls. CPUE was 17 crab per pot, same as in 2015. In 2016, the total harvest rate tracked similarly to 2015 (Appendix E3). The average price paid (including CDQ catch) was $6.50 per pound, the highest amount ever paid for the summer fishery (Appendix E1). The exvessel value of the fishery (including $0.023 million from summer CDQ) was $2.713 million, the highest fishery value ever for Norton Sound without adjusting for inflation.

Harvest Areas and Commercial Catch Sampling

Fish ticket reports document 8 statistical areas were fished in the summer open access and CDQ fisheries (Table 15). The top harvest (37%) and most effort (33%) came from statistical area 636401, south of Golovnin Bay in eastern Norton Sound, followed by statistical areas 646401 and 656401, south of Nome, which yielded 30% and 23%, respectively, of the total harvest. These 3 statistical areas are all directly south of the closed boundary line (Appendix E12), and, similar to last year, effort was concentrated in this main area. The remaining 5 statistical areas all had 5% or less of the total harvest (Appendix E13). The catch from statistical areas east of 164°W longitude made up 44% of the harvest (Appendix E14).

Carapace length (CL) measurements and shell age were collected from 1,567 commercially-caught crab during the summer open access and CDQ fisheries (Appendix E22). Since the summer of 2002, NSEDC has operated a seafood processing plant in Nome. In 2016, 100% of sampling data was collected from this plant, either as crabbers offloaded their catch or from holding tanks. Carapace age was classified as new (2–12 months old) or old (over 13 months old). Male new-shell crab made up 92% of the total legal crab sampled, and old-shell crab made up 8%, similar to last year. Recruit crab are new-shell legal crab <116 mm CL. Postrecruit crab are legal new-shell male crab $\geq$116 mm CL and all legal old-shell males. Recruit crab made up 36% of the legal crab sampled and postrecruit crab made up 64%, similar to the 3 years prior to last year (Appendix E2). Overall mean carapace length of legal male crab was 118 mm. For comparison of historical length composition of Norton Sound red king crab summer commercial harvests from 1990 to 2016, see Appendices E16–E22.

Enforcement

No AWT trooper made dockside checks during the 2016 summer crab fishery; however, an ADF&G staff member who worked the king crab fishery was deputized to cite violations if necessary. No violations were cited in 2016.

Subsistence Fishery

Both a summer and a winter subsistence red king crab fishery occur in Norton Sound, though the majority of the effort and harvest is from the winter fishery (Appendices E6 and E7). For the 2015–2016 winter crab season, all 139 permits issued were returned, and the 92 permit holders

that actually fished reported retaining 5,408 crab. The number caught, which included crab thrown back to the ocean, was 6,584 crab, about 57% of the average catch from the previous 10 years. Residents of Brevig Mission, Diomede, Savoonga, and White Mountain signed up to fish and caught little or no crab, but residents of Elim, St. Michael, Stebbins, and Unalakleet had a combined harvest of 1,998 crab, over a third of the total harvest. Out of at least 191 pots reported fishing, 9 (5%) were reportedly lost during the season due to moving ice. Percentages of subsistence crab harvested each month are as follows: February 16%, March 47%, April 28%, and May 8% (1% was unknown). Similar to 2015, almost 100% of the crab were caught with pots in 2016 (permit data on file with ADF&G, Division of Commercial Fisheries, Nome).

During the 2016 Norton Sound summer subsistence crab season, all 29 issued permits were returned, and the 16 fishermen that actually fished reported harvesting a total of 1,930 crab. 84% of the harvest came from the Nome area, 12% from the Unalakleet area, and the remaining 4% from St Michael area. Crab kept per fisherman averaged 121 crab for summer 2016 (Appendix E6). Eleven pots were reported lost.

Sport Fishery

Sport fishermen can fish for crab, and a harvest log issued by the Nome office similar to a subsistence permit is required. Sport fishermen are only allowed to keep 6 male crab daily, and they must be of legal size (4.75 inch or greater). The only recent harvest by sport fishermen was in 2005. That year, 9 harvest logs were issued and 8 were returned, showing that 6 nonresident sport fishermen caught 918 crab and kept 106, for an average harvest of 18 crab per fisherman (permit data on file with ADF&G, Division of Commercial Fisheries, Nome).

Future Resource Investigations

Red king crab biomass estimates from the triennial Norton Sound trawl surveys are an integral part of the data used in the length-based population model to project the summer king crab legal biomass and appropriate GHL for the summer commercial king crab fishery. The next trawl survey is scheduled to take place in 2017.

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

ST. LAWRENCE ISLAND CRAB FISHERY

Commercial Fishery

In 2006, the BOF split the St. Lawrence Island section between north and south of 66° N latitude. In the northern section, now known as the Kotzebue section, the commercial season was from noon June 15 through August 1. The southern section was merged with Norton Sound section. This change was initiated by Norton Sound area fishermen to expand fishing opportunity to an area with little commercial utilization since 1995. No harvest was reported from this new area in 2016. No permit holders fished in the Kotzebue section in 2016.

SECTION 5: MISCELLANEOUS SPECIES

INCONNU (SHEEFISH)

Commercial Fishery

In Kotzebue Sound District, for the winter of 2015–2016, 2 fishermen reported selling inconnu, commonly known as sheefish (Appendix F1). However, catch information is confidential because there were less than 3 fishermen. Sheefish are not commonly found in either Norton Sound or Port Clarence Districts.

Subsistence and Sport Fishery

From 2012 to 2014, there were comprehensive subsistence surveys for fish and wildlife harvests of 6–9 Kotzebue area villages conducted by the Division of Subsistence. In 2013, surveyed households in 5 Kobuk River villages, 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 2015 indicated a harvest of 1,191 sheefish, almost 5 times that of 2014 (Appendix F3). Sheefish sport harvests in the last 10 years have averaged less than 600 fish annually. Information for 2016 is not yet available.

Escapement

No aerial surveys are flown to determine sheefish escapement. An ADF&G test fishing project on the Kobuk River helps to give an index of abundance, but the test fishery is operated to determine the index of chum salmon abundance and begins operation well after sheefish have begun to pass the site. In 2016, test fishing on Kobuk River resulted in 137 sheefish caught in 189 drifts, for a cumulative CPUE of 189, the third lowest CPUE out of the 19 years sheefish catches were recorded (data on file with ADF&G, Division of Commercial Fisheries, Nome).

DOLLY VARDEN

Commercial Fishery

Dolly Varden *Salvelinus malma* are occasionally incidentally caught in commercial salmon fisheries in Norton Sound and Kotzebue Districts. During the 2016 commercial salmon fishery, Kotzebue District reported 710 Dolly Varden caught but not sold, which is the highest amount since 2010 when 1,323 were caught and not sold (Appendix F4).

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 to 2014. During those years, surveyed

Noatak households reported harvesting from 6,200 to 9,300 Dolly Varden annually (Appendix F5). No surveys were conducted after 2014.

Sport fish harvest was 412 Dolly Varden in Norton Sound and 221 Dolly Varden in Kotzebue/Chukchi Sea areas in 2015 (Appendix F3). Information is not yet available for 2016. Overall, Dolly Varden sport fish harvests in the last 10 years in Norton Sound averaged just over 2,000 annually, with most fish harvested out of the Unalakleet River (Appendix F6).

Escapement

Dolly Varden escapement is determined from aerial surveys conducted by ADF&G Sport Fish Division in the Kotzebue area, and weir or tower counts in Norton Sound. In 2016, a survey on the Wulik River counted a total of 70,969 Dolly Varden (Appendix F7).

WHITEFISH

Commercial Fishery

There were 3 permit holders that reported selling 2,076 pounds of whitefish during the 2015–2016 season in Norton Sound District (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 to 2014. In 2013 and 2014, survey data showed that 101,000 and 82,000 whitefish, respectively, were harvested for 8 villages in Kotzebue District (Appendix F8). Due to varying survey effort, harvest numbers are considered minimal and are not comparable year to year. No surveys were conducted after 2014.

SAFFRON COD

Commercial Fishery

During the 2015–2016 season, 6 permit holders harvested 3,921 pounds of saffron cod *Eleginus gracilis*, commonly known as tomcod, in Norton Sound and sold them to a commercial buyer at $0.50 per pound for use as bait (Appendix F10). The harvest was well below the 12,973 pounds of saffron cod harvested the previous year by 16 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 2016, Norton Sound household subsistence surveys were conducted; however, subsistence harvest information of tomcod was not collected.

CAPELIN

Subsistence

In 2016, spawning capelin was observed by Nome residents on June 19. No other information on capelin harvest is available.

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TABLES

Table 1.–Norton Sound commercial salmon harvest summary by subdistrict, 2016.

		Subdistricts						
		1	2	3	4	5	6	Total
Number of fishermen [a]		5	10	25	18	28	68	141
Chinook	Number	0	18	58	107	0	0	183
	Weight (lb)	0	158	703	1,262	0	0	2,123
Sockeye	Number	5	138	641	171	466	1,214	2,635
	Weight (lb)	38	906	4,023	1,135	2,847	7,108	16,057
Coho	Number	117	880	14,141	6,652	25,849	55,083	102,722
	Weight (lb)	827	5,996	96,906	44,345	177,252	376,272	701,598
Pink	Number	1,448	15,346	38,901	38,335	28,307	86,402	208,739
	Weight (lb)	4,961	57,196	136,656	135,634	104,287	308,919	747,653
Chum	Number	661	5,331	6,733	14,069	12,145	12,228	51,167
	Weight (lb)	3,997	37,554	45,071	95,265	81,537	81,773	345,197
Total	Number	2,231	21,713	60,474	59,334	66,767	154,927	365,446
	Weight (lb)	9,823	101,810	283,359	277,641	365,923	774,072	1,812,628

Notes: The above harvests do not include personal use. Average commercial weights by species were 11.6 lb for Chinook, 6.1 lb for sockeye salmon, 6.8 lb for coho salmon, 3.6 lb for pink salmon, and 6.8 lb for chum salmon.

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

Table 2.–Subsistence salmon harvest for northern Norton Sound, 2016.

	Permits fished [a]	Number of salmon harvested					
		Chinook	Sockeye	Coho	Pink	Chum	Total
Marine Waters	39	9	182	634	1,207	1,149	3,181
Bonanza River	16	0	1	105	606	112	824
Cripple Creek	9	0	0	90	104	0	194
Eldorado River- above weir	0						0
Eldorado River- below weir	9	0	29	280	171	212	692
Flambeau River	3	0	18	24	26	53	121
Safety Sound	3	13	105	0	380	1,000	1,498
Nome River- above weir	16	0	0	16	294	8	318
Nome River- below weir	202	2	95	539	5,866	403	6,905
Nome River- unknown	15	0	0	2	54	2	58
Penny River	14	0	0	70	64	2	136
Sinuk River	32	1	158	107	260	102	628
Snake River - above weir	5	0	0	3	17	15	35
Snake River - below weir	82	0	3	322	623	113	1,061
Snake River - unknown	2	0	0	0	4	0	4
Solomon River - above weir	6	0	0	16	0	0	16
Solomon River - below weir	28	1	8	64	424	89	586
Other Rivers & Creeks	3	0	2	2	1	0	5
Nome Subdistrict Total [b]	370	26	601	2,274	10,101	3,260	16,262
Cape Woolley [c]	2	0	0	0	30	3	33
Marine Waters	12	20	19	35	542	115	731
Kachavik River	9	0	0	93	1,102	243	1,438
McKinley River	8	0	0	101	30	0	131
Chinik Creek	4	0	0	36	636	0	672
Fish River - above tower	12	0	1	98	1,943	101	2,143
Fish River - below tower	28	14	9	347	2,158	400	2,928
Niukluk River	13	1	0	134	336	147	618
Golovin Subdistrict Total [d]	87	35	29	844	6,747	1,006	8,661
Marine Waters	15	77	56	451	2,528	530	3,642
Kwiniuk River - above tower	7	0	0	15	498	3	516
Kwiniuk River - below tower	38	42	1	471	3,280	144	3,938
Next Creek	4	0	0	6	15	8	29
Tubutulik River	11	44	3	47	381	145	620
Iron Creek	6	0	0	164	3	0	167
Other Rivers & Creeks	2	0	0	10	12	0	22
Elim Subdistrict Total [e]	43	163	60	1,164	6,717	830	8,934
Port Clarence - Marine Waters	58	30	1,715	461	3,514	3,075	8,795
Tuksuk Channel	11	1	971	143	765	1,137	3,017
Imuruk Basin	0						0
Kuzitrin River	0						0
Pilgrim River- above weir	111	5	2,872	30	30	35	2,972
Pilgrim River- below weir	167	4	6,582	3	13	56	6,658
Port Clarence District Total [f g]	383	40	12,140	637	4,322	4,303	21,442
Total	885	264	12,830	4,919	27,917	9,402	55,332

-continued-

[a] There were 6 locations where subsistence permits were issued in 2016 for northern Norton Sound: 1-Nome Subdistrict; 2-Cape Woolley; 3-Golovin Subdistrict; 4-Elim Subdistrict; 5-Pilgrim River; and 6-Port Clarence District. Except for Pilgrim River and Salmon Lake, each permit is valid for both marine and fresh waters. Permits fished include those permit holders who fished but reported no harvest.

[b] Of 591 Nome Subdistrict permits issued, 588 were returned.

[c] All 7 Cape Woolley permits issued were returned.

[d] Of 166 Golovin Subdistrict permits issued, 164 were returned.

[e] All 55 Elim Subdistrict permits issued were returned.

[f] Of 506 Pilgrim River permits issued, 505 were returned. Of 158 Port Clarence District permits issued, 157 were returned.

[g] One Salmon Lake permit was issued and returned with no fishing attempted.

Table 3.–Salmon counts of rivers and associated salmon escapement goal ranges (SEG, BEG or OEG), Norton Sound and Port Clarence, 2016.

	Chinook salmon				Chum salmon				
Stream	Weir/ tower count	Escapement goal range	Aerial survey count [a]	Escapement goal range	Weir/ tower count	Escapement goal range	Aerial survey count [a]	Aerial survey expansion	Escapement goal range
Salmon L.									
Grand Central R.									
Pilgrim R.	34				21,379				
Glacial L.									
Sinuk R.								9,408	
Cripple R.							390		
Penny R.							29		
Anvil Creek									
Snake R.	15				3,666	1,600–2,500 [b]			
Nome R.	25				7,093	2,900–4,300 [b]			
Flambeau R.							5,175	13,254	
Eldorado R.	0				18,938	6,000–9,200 [b]			
Bonanza R.			3				1,350	6,374	
Solomon R.	6				2,016		240		
Nome Subdistrict						**23,000–35,000 [c]**		**60,749**	
Fish R.	828				69,984				
Boston Cr.			75						
Niukluk R.									
Ophir Cr.									
Kwiniuk R.	135	250			8,526	11,500–23,000 [d]			
Tubutulik R.						9,200–18,400 [e]			
Ungalik R.									
Inglutalik R	3,285				43,226				
Shaktoolik R.	351				14,808				
Unalakleet R.	505				31,576				
Old Woman R.									
North R.	513	1,200–2,600			16,014				

-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.					6,155	**Combined**			
Grand Central R.					2,403	**4,000–8,000**			
Pilgrim R.	554			15,066			2,986		
Glacial L.					1,582	800–1,600			
Sinuk R.		1,610			85				405,200
Cripple R.		280							45,000
Penny R.		354							34,400
Anvil Creek									
Snake R.	1,115	962		120			204,641		
Nome R.	2,331	1,104		254			1,175,723	13,000	
Flambeau R.		652							1,450
Eldorado R. [b]	41	907		16			42,699		
Bonanza R.		561							139,200
Solomon R.	215	945		11			128,046		
Fish R.	3,300			24			1,282,892		
Boston Cr.									
Niukluk R.		773	**Combined**						
Ophir Cr.		203	**750–1,600**						
Kwiniuk R.	9,210	1,987	650–1,300	15			1,909,949	8,400	
Tubutulik R.									
Ungalik R.									
Inglutalik R	693			0			78,916		
Shaktoolik R.	480			0			1,180,551		
Unalakleet R.	132			580			4,752,639		
Old Woman R.									
North R.	2,241		550–1,100	9			1,045,410	25,000	

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

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

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

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

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

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

Table 4.–Commercial salmon set gillnet catches from Nome, Subdistrict 1, Norton Sound, 2016.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	7/09–7/10	24	2	0	0	0	0	0
2	Chum	7/22–7/24	48	1	0	0	0	0	0
3	Coho	7/29–7/31	48	0					
4	Coho	8/05–08/07	48	1	0	0	0	0	0
5	Coho	8/12–8/14	48	2	0	0	0	0	0
6	Coho	8/20–8/22	48	0					
7	Coho	8/26–8/28	48	0					
Totals				5	0	661	1,448	5	117

Note: An additional 1 chum, 8 pink, 5 sockeye, and 1 coho salmon were retained for personal use in 2016.

Table 5.–Commercial salmon set gillnet catches from Golovin, Subdistrict 2, Norton Sound, 2016.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	6/27–6/28	24	8	0	1,375	433	10	0
2	Chum	6/30	16	7	2	822	1,101	7	0
3	Chum	7/01	16	6	0	344	850	12	0
4	Chum	7/02	16	5	0	631	1,183	27	0
5	Chum	7/03	16	4	0	290	409	5	0
6	Chum	7/04	16	4	0	456	699	8	0
7	Chum	7/06	16	7	2	417	1,255	4	0
8	Chum	7/07	16	3	0	226	793	2	0
9	Chum	7/08	16	4	0	170	753	3	0
10	Chum	7/09	16	0					
11	Chum	7/10	16	3	0	43	491	1	0
12	Chum	7/11	16	2					
13	Chum	7/13	16	5	0	150	1517	6	0
14	Chum	7/14	16	1			Confidential		
15	Chum	7/15	16	1			Confidential		
16	Chum	7/16	16	1			Confidential		
17	Chum	7/17	16	0					
18	Chum	7/18	16	0					
19	Chum	7/20	16	1			Confidential		
20	Chum	7/21	16	2			Confidential		
21	Chum	7/22–7/24	58	5	0	62	1599	18	12
22	Coho	7/26–7/28	48	7	0	71	1654	11	47
23	Coho	7/29–7/31	48	1			Confidential		
24	Coho	8/01–8/03	48	5	0	13	210	2	59
25	Coho	8/05–8/07	48	4	3	16	200	1	191
26	Coho	8/08–8/10	48	3	2	21	92	0	214
27	Coho	8/12–8/14	48	4	2	2	37	4	188
28	Coho	8/15–8/17	48	2			Confidential		
29	Coho	8/20–8/22	48	3	0	4	17	1	91
Totals				10	18	5,331	15,346	138	880

Note: An additional 2 Chinook and 19 sockeye salmon were retained for personal use in 2016.

Table 6.–Commercial salmon set gillnet catches from Elim, Subdistrict 3, Norton Sound, 2016.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	6/29–6/30	24	18	9	1,212	1,379	24	0
2	Chum	7/02	16	15	4	619	889	23	0
3	Chum	7/03	16	10	4	341	537	24	0
4	Chum	7/04	16	5	4	403	1,115	11	0
5	Chum	7/05	16	9	0	278	852	3	0
6	Chum	7/06	16	12	5	372	1,241	10	0
7	Chum	7/08	16	12	2	600	3,841	20	0
8	Chum	7/09	16	8	0	164	1,229	2	0
9	Chum	7/10	16	4	1	182	799	13	0
10	Chum	7/11	16	4	0	134	888	3	0
11	Chum	7/12	16	9	3	289	1,739	28	0
12	Chum	7/13	16	12	3	249	2,899	27	0
13	Chum	7/15 [a]	16	2	0	74	1	0	0
14	Chum	7/16	16	0					
15	Chum	7/17	16	0					
16	Chum	7/18	16	6	0	295	2,876	24	2
17	Chum	7/19	16	7	0	216	3,107	21	2
18	Chum	7/20	16	0					
19	Chum	7/22–7/24	58	14	1	496	8,955	82	76
20	Coho	7/26–7/28	48	12	2	161	1,880	37	81
21	Coho	7/29–7/31	48	6	1	52	1,078	12	29
22	Coho	8/01–8/03	48	12	2	196	1,798	33	1,147
23	Coho	8/05–8/07	48	16	4	81	1,154	24	1,090
24	Coho	8/08–8/10	48	21	1	126	401	25	1,981
25	Coho	8/12–8/14	48	18	3	16	108	29	1,751
26	Coho	8/15–8/17	48	17	2	60	37	12	1,826
27	Coho	8/20–8/22	48	15	5	27	41	42	1,818
28	Coho	8/23–8/25	48	19	1	38	21	27	2,191
29	Coho	8/26–8/28	48	16	1	37	18	42	1,372
30	Coho	8/29–8/31	48	16	0	15	18	43	775
Totals				25	58	6,733	38,901	641	14,141

Note: An additional 11 Chinook, 3 chum, 127 pink, 87 sockeye, and 56 coho salmon were retained for personal use in 2016.

[a] Permit holders waived confidentiality.

Table 7.–Commercial salmon set gillnet catches from Norton Bay, Subdistrict 4, Norton Sound, 2016.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	6/28–6/29	24	12	30	2,015	559	1	0
2	Chum	6/30	16	5	14	606	339	1	0
3	Chum	7/1	16	8	7	734	967	3	0
4	Chum	7/2	16	10	5	1,315	1,062	10	0
5	Chum	7/3	16	12	11	873	1,092	4	0
6	Chum	7/4	16	6	1	497	548	3	0
7	Chum	7/5	16	2			Confidential		
8	Chum	7/7	16	8	4	664	2,570	7	0
9	Chum	7/8	16	6	4	398	1455	4	0
10	Chum	7/9	16	11	2	656	1561	18	3
11	Chum	7/10	16	7	0	408	1050	5	0
12	Chum	7/11	16	2			Confidential		
13	Chum	7/12	16	4	0	156	1941	5	0
14	Chum	7/14	16	4	1	594	1629	6	4
15	Chum	7/15	16	7	2	512	1489	11	4
16	Chum	7/16	16	3	0	130	164	2	2
17	Chum	7/17	16	0					
18	Chum	7/18	16	1			Confidential		
19	Chum	7/19	16	1			Confidential		
20	Chum	7/21	16	1			Confidential		
21	Chum	7/22–7/24	58	12	1	1,533	9288	16	70
22	Coho	7/26–7/28	48	9	3	393	5100	7	208
23	Coho	7/29–7/31	48	5	3	239	956	5	213
24	Coho	8/01–8/03	48	7	3	632	4869	3	594
25	Coho	8/05–8/07	48	11	2	540	523	5	1,203
26	Coho	8/08–8/10	48	9	4	357	246	8	1,346
27	Coho	8/12–8/14	48	10	1	101	11	8	721
28	Coho	8/15–8/17	48	4	5	109	8	2	852
29	Coho	8/20–8/22	48	6	0	105	16	8	674
30	Coho	8/23–8/25	48	5	2	106	2	14	356
31	Coho	8/26–8/28	48	6	1	66	0	4	382
32	Coho	8/29–8/31	48	2			Confidential		
33	Coho	9/02–9/04	48	0					
34	Coho	9/05–9/07	48	0					
Totals				18	107	14,069	38,335	171	6,652

Note: An additional 4 Chinook, 22 pink, 3 sockeye, and 4 coho salmon were retained for personal use in 2016.

Table 8.–Commercial salmon set gillnet catches from Shaktoolik, Subdistrict 5, Norton Sound, 2016.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	7/01–7/02	24	15	0	3,715	4,887	32	0
2	Chum	7/05	10	8	0	962	2,810	7	0
3	Chum	7/06	12	12	0	1,691	4,985	22	0
4	Chum	7/07	12	4	0	278	507	8	0
5	Chum	7/09	8	7	0	455	2,827	12	0
6	Chum	7/10	8	1	Confidential				
7	Chum	7/12	6	7	0	431	2,259	21	0
8	Chum	7/13	6	5	0	563	1437	17	0
9	Chum	7/14	6	4	0	440	1187	10	0
10	Chum	7/15	6	6	0	368	1119	8	1
11	Chum	7/16	6	0					
12	Chum	7/20	10	2	Confidential				
13	Chum	7/21	16	0					
14	Chum	7/22–7/24	58	12	0	696	3315	36	251
15	Coho	7/26–7/28	48	18	0	553	1836	39	1,078
16	Coho	7/29–7/31	48	18	0	493	497	34	2,024
17	Coho	8/01–8/03	48	16	0	304	339	21	368
18	Coho	8/05–8/07	48	22	0	274	46	13	3,425
19	Coho	8/08–8/10	48	22	0	263	0	24	4,706
20	Coho	8/12–8/14	48	23	0	163	1	29	2,337
21	Coho	8/15–8/17	48	21	0	158	0	49	2,195
22	Coho	8/20–8/22	48	11	0	32	0	16	1,723
23	Coho	8/23–8/25	48	18	0	178	0	31	3,369
24	Coho	8/26–8/28	48	20	0	11	1	10	2,872
25	Coho	8/29–8/31	48	14	0	17	0	17	883
26	Coho	9/02–9/04	48	9	0	4	0	4	360
27	Coho	9/05–9/07	48	2	Confidential				
Totals				28	0	12,145	28,307	466	25,849

Note: An additional 23 Chinook, 4 chum, 1 pink, 44 sockeye, and 17 coho salmon were retained for personal use in 2016.

Table 9.–Commercial salmon set gillnet catches from Unalakleet, Subdistrict 6, Norton Sound, 2016.

Period	Target species	Dates fished	Length (hours)	Permits fished	Chinook harvest	Chum harvest	Pink harvest	Sockeye harvest	Coho harvest
1	Chum	7/01–7/02	24	22	0	863	11,223	5	0
2	Chum	7/05	10	15	0	855	6,113	11	0
3	Chum	7/06	12	20	0	1,637	10,825	14	0
4	Chum	7/07	12	10	0	433	5,200	9	2
5	Chum	7/09	8	20	0	1,082	8,744	27	0
6	Chum	7/10	8	0					
7	Chum	7/12	6	22	0	455	7,700	10	7
8	Chum	7/13	6	15	0	479	4,623	16	2
9	Chum	7/14	6	19	0	391	6,004	19	6
10	Chum	7/15	6	12	0	313	1,979	8	2
11	Chum	7/16	6	3	0	51	526	0	1
12	Chum	7/20	10	6	0	91	691	2	14
13	Chum	7/21	16	0					
14	Chum	7/22–7/24	58	28	0	821	6,556	34	423
15	Coho	7/26–7/28	48	39	0	991	9,587	119	1,196
16	Coho	7/29–7/31	48	28	0	500	1,666	23	1,177
17	Coho	8/01–8/03	48	40	0	993	2,054	91	6,088
18	Coho	8/05–8/07	48	51	0	557	1,447	123	4,291
19	Coho	8/08–8/10	48	56	0	509	933	189	9,206
20	Coho	8/12–8/14	48	56	0	381	225	191	4,980
21	Coho	8/15–8/17	48	45	0	209	65	92	6,071
22	Coho	8/20–8/22	48	51	0	308	97	114	7,896
23	Coho	8/23–8/25	48	44	0	132	66	60	5,931
24	Coho	8/26–8/28	48	40	0	96	32	30	4,834
25	Coho	8/29–8/31	48	37	0	60	33	18	1,822
26	Coho	9/02–9/04	48	17	0	11	7	9	471
27	Coho	9/05–9/07	48	7	0	10	6	0	663
Totals				68	0	12,228	86,402	1,214	55,083

Note: An additional 101 Chinook, 1 chum, 64 pink, 95 sockeye, and 90 coho salmon were retained for personal use in 2016.

Table 10.–Kotzebue District commercial chum salmon catch and average weight by date, 2016.

Date	Permits fished	Catch	Pounds	Average weight
7/10	12	1,354	11,668	8.62
7/11	25	3,725	32,678	8.77
7/12	27	3,987	34,265	8.59
7/13	27	4,342	37,231	8.57
7/14	30	5,293	45,271	8.55
7/15	18	3,275	28,510	8.71
7/17	32	7,195	63,821	8.87
7/18	32	5,711	50,730	8.88
7/20	31	3,964	35,373	8.92
7/21	37	7,290	65,727	9.02
7/22	48	15,118	133,909	8.86
7/24	42	10,419	92,867	8.91
7/25	44	12,566	112,504	8.95
7/26	49	14,009	126,327	9.02
7/27	43	10,565	94,905	8.98
7/28	20	5,445	46,564	8.55
7/29	50	11,276	98,153	8.70
7/31	39	15,625	132,870	8.50
8/01	42	11,076	95,216	8.60
8/02	42	15,382	131,719	8.56
8/03	45	11,275	96,884	8.59
8/04	48	16,711	141,848	8.49
8/05	28	7,754	66,927	8.63
8/07	40	15,080	129,353	8.58
8/08	52	28,479	241,447	8.48
8/09	55	10,013	85,409	8.53
8/10	49	13,694	116,896	8.54
8/11	53	14,497	121,850	8.41
8/12	51	13,799	115,751	8.39
8/14	41	11,983	98,616	8.23
8/15	17	2,939	23,310	7.93
8/16	27	8,197	65,621	8.01
8/17	41	13,113	103,894	7.92
8/18	27	5,734	45,154	7.87
8/19	6	730	5,417	7.42
8/21	15	3,014	23,983	7.96
8/22	16	5,502	42,666	7.75
8/23	24	10,786	82,183	7.62
8/24	36	12,942	96,459	7.45
8/25	32	11,445	85,376	7.46
8/26	29	8,289	61,579	7.43
8/28	15	3,732	24,745	6.63
8/29	11	1,400	9,145	6.53
8/30	6	507	3,458	6.82
8/31	9	1,185	8,600	7.26
Total	86	400,417	3,366,879	8.41

Note: Also harvested during the 2016 commercial fishery and kept for personal use were 75 Chinook, 18 chum, 8 sockeye, 1,460 pink, and 5 coho salmon, and 1 whitefish, 710 Dolly Varden, and 51 sheefish.

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Table 11.–Historical chum salmon catch for Kobuk River drift test fishery, 1993–2016.

Year	Dates of operation	Number of drifts	CCPUE [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

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

Table 12.–Daily catch for the winter open access commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, February 15–March 24, 2016.

Date [a]	Landings	Number of crab	Crab harvested (lb)	Cumulative total (lb)	Number pots pulled	Average weight (lb)	CPUE
2/16	3	59	179	179	8	3.0	7
2/17	1	69	185	364	6	2.7	12
2/18	4	328	870	1,234	40	2.7	8
2/19	4	190	499	1,733	20	2.6	10
2/20	7	467	1,334	3,067	42	2.9	11
2/21	6	504	1,399	4,466	60	2.8	8
2/22	4	395	1,034	5,500	64	2.6	6
2/23	6	521	1,372	6,872	62	2.6	8
2/24	6	341	912	7,784	67	2.7	5
2/25	9	600	1,611	9,395	121	2.7	5
2/26	6	313	789	10,184	64	2.5	5
2/27	8	368	1,006	11,190	79	2.7	5
2/28	7	419	1,149	12,339	108	2.7	4
2/29	5	206	551	12,890	61	2.7	3
3/1	9	558	1,505	14,395	107	2.7	5
3/2	6	589	1,472	15,867	99	2.5	6
3/3	11	1,031	2,726	18,593	131	2.6	8
3/4	9	391	1,032	19,625	87	2.6	4
3/5	4	271	751	20,376	40	2.8	7
3/6	13	872	2,337	22,713	252	2.7	3
3/7	7	264	708	23,421	75	2.7	4
3/8	8	540	1,442	24,863	84	2.7	6
3/9	7	273	703	25,566	114	2.6	2
3/10	8	401	1,074	26,640	82	2.7	5
3/11	8	299	794	27,434	90	2.7	3
3/12	4	251	677	28,111	54	2.7	5
3/13	5	218	587	28,698	58	2.7	4
3/14	8	231	647	29,345	70	2.8	3
3/15	8	631	1,649	30,994	100	2.6	6
3/16	13	515	1,386	32,380	144	2.7	4
3/17	11	475	1,233	33,613	113	2.6	4
3/18	8	320	874	34,487	72	2.7	4
3/19	5	167	478	34,965	43	2.9	4
3/20	10	685	1,748	36,713	124	2.6	6
3/21	14	1,094	2,966	39,679	165	2.7	7
3/22	14	668	1,842	41,521	80	2.8	8
3/23	10	701	1,804	43,325	125	2.6	6
3/24	8	542	1,454	44,779	142	2.7	4
Total	284	16,767	44,779	44,779	3,253	2.7	5

Source: Fish ticket data.

[a] The open access fishery closed by emergency order March 24, and last deliveries were made March 24.

Table 13.–Daily catch for the CDQ king crab harvest, Norton Sound Section, Eastern Bering Sea, March 23–April 21 and June 27–July 9, 2016.

Date [a]	Landings	Number of crab	Crab harvested (lb)	Cumulative total (lb)	Number pots pulled	Average weight (lb)	CPUE
3/25	6	360	959	959	63	2.7	6
3/26	10	626	1,724	2,683	83	2.8	8
3/27	1	20	58	2,741	7	2.9	3
3/28	10	805	2,192	4,933	96	2.7	8
3/30	8	722	1,981	6,914	100	2.7	7
3/31	4	186	517	7,431	34	2.8	5
4/01	3	48	137	7,568	13	2.9	4
4/02	10	629	1,709	9,277	93	2.7	7
4/03	10	668	1,813	11,090	99	2.7	7
4/04	7	763	2,081	13,171	107	2.7	7
4/05	6	542	1,456	14,627	63	2.7	9
4/06	7	374	1,010	15,637	69	2.7	5
4/07	9	504	1,376	17,013	84	2.7	6
4/08	9	732	1,979	18,992	111	2.7	7
4/09	10	780	2,050	21,042	141	2.6	6
4/10	6	385	1,048	22,090	64	2.7	6
4/11	6	380	1,016	23,106	74	2.7	5
4/12	6	390	1,013	24,119	73	2.6	5
4/13	9	459	1,250	25,369	109	2.7	4
4/14	7	707	1,870	27,239	92	2.6	8
4/15	6	326	883	28,122	92	2.7	4
4/16	7	411	1,076	29,198	81	2.6	5
4/17	8	505	1,342	30,540	138	2.7	4
4/18	5	309	881	31,421	61	2.9	5
4/19	8	791	2,161	33,582	126	2.7	6
4/20	3	294	789	34,371	52	2.7	6
4/21	6	311	836	35,207	81	2.7	4
7/07	1	888	2,589	37,796	39	2.9	23
7/09	1	335	994	38,790	13	3.0	26
Total	189	14,250	38,790	38,790	2,258	2.7	6

Source: Fish ticket data.

[a] For the winter, the Community Development Quota (CDQ) fishery closed on April 21, and the last deliveries were made on April 21. For the summer, the CDQ fishery closed on July 9, and the last delivery was made on July 9.

Table 14.–Daily catch for the summer open access commercial king crab harvest, Norton Sound Section, Eastern Bering Sea, June 27–July 21, 2016.

Date [a]	Landings	Number of crab	Crab harvested (lb)	Cumulative total (lb)	Number pots pulled	Average weight (lb)	CPUE
6/29	13	5,534	16,834	16,834	469	3.0	12
6/30	5	4,485	13,465	30,299	170	3.0	26
7/1	7	5,338	15,394	45,693	261	2.9	20
7/2	4	3,445	10,528	56,221	145	3.1	24
7/3	11	9,163	27,506	83,727	398	3.0	23
7/4	10	7,223	21,908	105,635	344	3.0	21
7/5	15	9,139	26,924	132,559	506	2.9	18
7/6	6	2,400	7,361	139,920	205	3.1	12
7/7	12	9,441	28,558	168,478	385	3.0	25
7/8	7	5,173	15,350	183,828	267	3.0	19
7/9	16	11,638	35,843	219,671	606	3.1	19
7/10	9	5,716	16,773	236,444	253	2.9	23
7/11	1	566	1,679	238,123	40	3.0	14
7/12	22	14,607	44,800	282,923	799	3.1	18
7/13	6	2,579	7,800	290,723	213	3.0	12
7/14	11	5,655	17,513	308,236	338	3.1	17
7/15	3	2,749	8,327	316,563	140	3.0	20
7/16	23	12,285	37,222	353,785	871	3.0	14
7/17	17	10,013	30,128	383,913	530	3.0	19
7/18	8	2,997	9,101	393,014	232	3.0	13
7/19	21	7,628	23,562	416,576	785	3.1	10
Total	227	137,774	416,576	416,576	7,957	3.0	17

Source: Fish ticket data.

[a] The open access fishery closed by emergency order on July 21 at 6:00 AM, and the last deliveries were made on July 21.

Table 15.–Summer commercial harvest of red king crab from Norton Sound Section by statistical area, Norton Sound District, 2016.

Statistical area	Number crab [a]	Crab harvested (lb)	Number of pots pulled [a]	CPUE	Average weight (lb)
626401	6,469	19,488	969	7	3.01
636330	3,404	10,122	211	16	2.97
636401	51,171	154,383	2,633	19	3.02
646401	42,082	126,753	2,097	20	3.01
656330	104	307	30	3	2.95
656401	31,899	97,685	1,760	18	3.06
666401	2,068	6,030	100	21	2.92
666402	1,800	5,391	209	9	3.00
Total	138,997	420,159	8,009	17	3.02

Note: Data are for summer fishery only.

[a] Includes 1,223 crab (3,583 lb) and 52 pot pulls from the Community Development Quota fishery (summer harvest only).

APPENDIX A: NORTON SOUND FISHERIES

Appendix A1.–Commercial salmon catch by species, Norton Sound District, 1990–2016.

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
Avg 2011–15	202	922	83,225	92,910	109,479	286,738
Avg 2006–15	123	484	94,241	59,296	75,685	229,829

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, 1990–2016.

	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
Avg 2011–2015	2	14	26	17	24	59	125
Avg 2006–2015	1	9	19	10	24	55	105

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

Appendix A3.–Round weight and value of commercially caught salmon by species, Norton Sound District, 1990–2016.

Year	Pounds caught (Round wt in lb)					Salmon roe (lb)	Value of catch ($)
	Chinook	Sockeye	Coho	Pink	Chum		
1990	168,745		426,902	[a]	482,060	75	474,064
1991	107,541		469,495	[a]	597,272	221	413,479
1992	57,571		820,406	18,230	595,345	2,641	448,395
1993	151,504		287,702	406,820	347,072	2,608	368,723
1994	98,492		766,050	2,185,066	122,540	0	863,060
1995	174,771		356,190	198,121	290,445	0	356,164
1996	95,794		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

[a] Information not available.

Appendix A4.–Estimated mean prices paid to commercial salmon fishermen in dollars, Norton Sound District, 1990–2016.

Year	Chinook	Sockeye	Pink	Chum	Coho
1990	1.01	[a]	(0.75 for roe)	0.23	0.50
1991	0.87	[a]	[a]	0.27 (3.00 for roe)	0.36 (3.00 for roe)
1992	0.66	[a]	0.16	0.22	0.33 (1.50 for roe)
1993	0.72	0.40	0.15	0.24	0.22 (1.76 for roe)
1994	1.02	[a]	0.15	0.29	0.52
1995	0.66	[a]	0.18	0.18	0.43
1996	0.54	[a]	0.10	0.08	0.28
1997	1.00	[a]	0.06	0.11	0.47
1998	0.74	[a]	0.14	0.09	0.29
1999	0.82	[a]	[a]	0.11	0.35
2000	1.30	[a]	0.10	0.15	0.30
2001	1.00	0.37	[a]	0.19	0.25
2002	0.39	[a]	[a]	0.07	0.20
2003	0.64	0.45	[a]	0.14	0.44
2004	[a]	[a]	[a]	0.14	0.39
2005	1.22	0.45	[a]	0.15	0.44
2006	1.49	[a]	[a]	0.14	0.44
2007	0.55	0.55	0.14	0.24	0.53
2008	0.73	0.56	0.23	0.34	0.77
2009	[a]	0.34	0.18	0.33	0.93
2010	2.25	0.63	0.32	0.62	1.47
2011	3.01	1.04	0.25	0.68	1.70
2012	[a]	1.45	0.36	0.52	1.47
2013	[a]	1.49	0.22	0.55	1.77
2014	2.00	0.63	0.29	0.60	1.60
2015	2.25	0.60	0.14	0.50	1.10
2016	2.45	0.90	0.10	0.48	1.39
Avg 2011–2015	2.42	1.04	0.25	0.57	1.53

[a] None sold.

Appendix A5.–Mean commercial salmon harvest weights, Norton Sound District, 1990–2016.

	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

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

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

[c] None sold.

Appendix A6.–Commercial and subsistence salmon catch by species, by year in Nome Subdistrict, Norton Sound District, 1990–2016.

	Nome (Subdistrict 1)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	0	0	0	0	0	0	58	234	510	2,233	4,246	7,281	58	234	510	2,233	4,246	7,281
1991	0	0	0	0	0	0	83	166	1,279	194	3,715	5,437	83	166	1,279	194	3,715	5,437
1992	1	2	693	185	881	1,762	152	163	1,481	7,351	1,684	10,831	153	165	2,174	7,536	2,565	12,593
1993	0	2	611	0	132	745	52	80	2,070	873	1,766	4,841	52	82	2,681	873	1,898	5,586
1994	0	1	287	0	66	354	23	69	983	6,556	1,673	9,304	23	70	1,270	6,556	1,739	9,658
1995	0	1	369	0	122	492	26	148	1,365	336	3,794	5,669	26	149	1,734	336	3,916	6,161
1996	0	0	9	13	3	25	9	185	828	3,510	2,287	6,819	9	185	837	3,523	2,290	6,844
1997	0	0	0	0	0	0	10	50	325	175	2,696	3,256	10	50	325	175	2,696	3,256
1998	0	0	0	0	0	0	15	14	1,057	4,797	964	6,847	15	14	1,057	4,797	964	6,847
1999 [a]	0	0	0	0	0	0	11	85	161	58	337	652	11	85	161	58	337	652
2000	0	0	0	0	0	0	7	26	747	2,657	535	3,972	7	26	747	2,657	535	3,972
2001	0	0	0	0	0	0	2	92	425	113	858	1,490	2	92	425	113	858	1,490
2002	0	0	0	0	0	0	4	79	666	3,161	1,114	5,024	4	79	666	3,161	1,114	5,024
2003	0	0	0	0	0	0	63	76	351	507	565	1,562	63	76	351	507	565	1,562
2004	0	0	0	0	0	0	100	106	1,574	15,047	685	17,512	100	106	1,574	15,047	685	17,512
2005	0	0	0	0	0	0	62	177	1,287	5,075	803	7,404	62	177	1,287	5,075	803	7,404
2006 [b]	0	0	0	0	0	0	24	159	3,865	9,329	890	14,267	24	159	3,865	9,329	890	14,267
2007	0	0	0	0	0	0	18	297	1,103	850	2,938	5,206	18	297	1,103	850	2,938	5,206
2008	0	0	0	0	0	0	39	127	3,423	12,592	739	16,920	39	127	3,423	12,592	739	16,920
2009	0	0	0	0	0	0	32	64	1,132	487	387	2,102	32	64	1,132	487	387	2,102
2010	0	0	0	0	0	0	39	77	1,983	6,281	3,124	11,504	39	77	1,983	6,281	3,124	11,504
2011	0	0	0	0	0	0	19	47	1,229	1,389	1,428	4,112	19	47	1,229	1,389	1,428	4,112
2012	0	0	0	0	0	0	11	171	1,150	8,376	2,521	12,229	11	171	1,150	8,376	2,521	12,229
2013 [c]	[c]	[c]	[c]	[c]	[c]	[c]	48	211	1,804	845	3,065	5,973	48	211	1,804	845	3,065	5,973
2014	3	7	39	1,169	1,456	2,674	31	405	3,042	6,648	3,844	13,970	34	412	3,081	7,817	5,300	16,644
2015	4	244	13	509	4,861	5,631	21	1,081	1,790	3,180	3,967	10,039	25	1,325	1,803	3,689	8,828	15,670
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
5-year avg [d]	1	50	10	336	1,263	1,661	26	383	1,803	4,088	2,965	9,265	27	433	1,813	4,423	4,228	10,926
10-year avg [e]	1	25	5	168	632	831	28	264	2,052	4,998	2,290	9,632	29	289	2,057	5,166	2,922	10,463

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, so information is confidential.

[d] 2011–2015.

[e] 2006–2015.

Appendix A7.–Commercial and subsistence salmon catch by species, by year in Golovin Subdistrict, Norton Sound District, 1990–2016.

	Golovin (Subdistrict 2)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	52	21	9	9	15,993	16,066	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1991	49	1	0	0	14,839	14,889	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1992	6	9	2,085	0	1,002	3,102	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1993	1	4	2	8,480	2,803	11,290	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1994 [b]	0	0	3,424	0	111	3,535	253	168	733	8,410	1,337	10,901	253	168	4,157	8,410	1,448	14,436
1995 [b]	0	0	1,616	4,296	1,987	7,899	165	34	1,649	7,818	10,373	20,039	165	34	3,265	12,114	12,360	27,938
1996 [b]	0	0	638	0	0	638	86	134	3,014	17,399	2,867	23,500	86	134	3,652	17,399	2,867	24,138
1997 [b]	19	2	102	20	8,003	8,146	138	427	555	4,570	4,891	10,581	157	429	657	4,590	12,894	18,727
1998 [b]	1	0	3	106,761	723	107,488	184	37	1,292	13,340	1,893	16,746	185	37	1,295	120,101	2,616	124,234
1999 [b]	0	0	0	0	0	0	60	48	1,234	469	3,656	5,467	60	48	1,234	469	3,656	5,467
2000 [b]	0	0	1,645	17,408	164	19,217	169	18	2,335	10,906	1,155	14,583	169	18	3,980	28,314	1,319	33,800
2001 [b]	0	43	30	0	7,094	7,167	89	72	880	1,665	3,291	5,997	89	115	910	1,665	10,385	13,164
2002 [b]	0	0	0	0	0	0	69	66	1,640	14,430	1,882	18,087	69	66	1,640	14,430	1,882	18,087
2003 [b]	0	0	0	0	0	0	166	28	309	5,012	1,477	6,992	166	28	309	5,012	1,477	6,992
2004 [c]	0	0	0	0	0	0	164	6	654	19,936	880	21,640	164	6	654	19,936	880	21,640
2005 [c]	0	0	0	0	0	0	96	15	686	11,467	1,852	14,116	96	15	686	11,467	1,852	14,116
2006 [c]	0	0	0	0	0	0	136	38	1,760	14,670	722	17,326	136	38	1,760	14,670	722	17,326
2007 [c]	0	0	0	0	0	0	188	321	1,179	3,980	4,217	9,885	188	321	1,179	3,980	4,217	9,885
2008 [c]	0	0	256	2,699	623	3,578	146	95	2,337	10,155	350	13,083	146	95	2,593	12,854	973	16,661
2009 [c]	0	0	2,452	0	87	2,539	237	33	1,377	3,787	1,694	7,128	237	33	3,829	3,787	1,781	9,667
2010 [c]	3	2	5,586	2,039	17,212	24,842	59	32	2,020	9,620	1,133	12,864	62	34	7,606	11,659	18,345	37,706
2011 [c]	7	0	859	3	20,075	20,944	99	74	1,345	5,652	2,122	9,292	106	74	2,204	5,655	22,197	30,236
2012 [c]	2	14	573	31,055	3,791	35,435	57	52	1,143	7,635	1,056	9,943	59	66	1,716	38,690	4,847	45,378
2013 [c]	0	0	5,362	1,180	3,113	9,655	47	15	964	3,655	3,256	7,937	47	15	6,326	4,835	6,369	17,592
2014 [c]	28	47	4,156	7,888	13,560	25,679	36	91	1,720	7,363	1,719	10,929	64	138	5,876	15,251	15,279	36,608
2015 [c]	73	1,214	2,996	1,596	20,525	26,404	147	71	1,091	4,443	2,250	8,002	220	1,285	4,087	6,039	22,775	34,406
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
5-year avg. [d]	22	255	2,789	8,344	12,213	23,623	77	61	1,253	5,750	2,081	9,221	99	316	4,042	14,094	14,293	32,844
10-year avg. [e]	11	128	2,224	4,646	7,899	14,908	115	82	1,494	7,096	1,852	10,639	127	210	3,718	11,742	9,751	25,547

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

[a] Subsistence surveys were not conducted.

[b] Subsistence harvests were estimated from Division of Subsistence household surveys. Previous surveys often were partial surveys and did not capture later season harvests like coho salmon.

[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] 2011–2015.

[e] 2006–2015.

Appendix A8.–Commercial and subsistence salmon catch by species, by year in Elim Subdistrict, Norton Sound District, 1990–2016.

	Elim (Subdistrict 3)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	202	0	0	501	3,723	4,426	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1991 [b]	161	0	0	0	804	965	312	0	2,153	3,555	2,660	8,680	473	0	2,153	3,555	3,464	9,645
1992 [b]	0	0	3,531	0	6	3,537	100	0	1,281	6,152	1,260	8,793	100	0	4,812	6,152	1,266	12,330
1993 [b]	3	0	4,065	0	167	4,235	368	0	1,217	1,726	1,635	4,946	371	0	5,282	1,726	1,802	9,181
1994 [b]	0	0	5,345	0	414	5,759	322	104	1,180	9,345	3,476	14,427	322	104	6,525	9,345	3,890	20,186
1995 [b]	4	44	3,742	2,962	1,171	7,923	284	17	1,353	2,046	3,774	7,474	288	61	5,095	5,008	4,945	15,397
1996 [b]	0	0	1,915	68,609	0	70,524	417	52	1,720	9,442	2,319	13,950	417	52	3,635	78,051	2,319	84,474
1997 [b]	844	0	1,409	0	2,683	4,936	619	50	1,213	1,314	2,064	5,260	1,463	50	2,622	1,314	4,747	10,196
1998 [b]	105	0	1,462	145,669	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
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
5-year avg. [d]	129	348	9,421	16,967	14,974	41,839	143	42	1,494	3,822	2,007	7,508	272	390	10,916	20,789	16,981	49,348
10-year avg. [e]	66	175	7,738	11,271	10,379	29,629	207	24	1,745	4,307	1,945	8,228	273	199	9,483	15,579	12,324	37,857

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

[a] Subsistence surveys were not conducted.

[b] Subsistence harvests were estimated from Division of Subsistence household surveys. Previous surveys often were partial surveys and did not capture later season harvests like coho salmon.

[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] 2011–2015.

[e] 2006–2015.

Appendix A9.–Commercial and subsistence salmon catch by species, by year in Norton Bay Subdistrict, Norton Sound District, 1990–2016.

	Norton Bay (Subdistrict 4)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1900	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]		[a]	[a]	[a]	[a]	[a]	[a]
1991	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1992	27	0	0	0	1,787	1,814	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1993	267	0	0	290	1,378	1,935	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1994 [b]	0	0	0	0	0	0	308	1	370	6,049	4,581	11,309	308	1	370	6,049	4,581	11,309
1995 [b]	0	0	0	0	0	0	475	46	985	3,514	5,828	10,848	475	46	985	3,514	5,828	10,848
1996 [b]	0	0	0	0	0	0	295	3	676	3,929	4,161	9,064	295	3	676	3,929	4,161	9,064
1997 [b]	194	0	0	0	531	725	656	54	322	1,795	4,040	6,867	850	54	322	1,795	4,571	7,592
1998 [b]	0	0	0	0	0	0	684	0	388	2,009	6,192	9,273	684	0	388	2,009	6,192	9,273
1999 [b]	0	0	0	0	0	0	327	0	167	1,943	4,153	6,590	327	0	167	1,943	4,153	6,590
2000 [b]	0	0	0	0	0	0	397	2	267	2,255	4,714	7,635	397	2	267	2,255	4,714	7,635
2001 [b]	0	0	0	0	0	0	460	14	276	5,203	4,445	10,398	460	14	276	5,203	4,445	10,398
2002 [b]	0	0	0	0	0	0	557	0	509	6,049	3,971	11,086	557	0	509	6,049	3,971	11,086
2003 [b]	0	0	0	0	0	0	373	46	510	4,184	3,397	8,510	373	46	510	4,184	3,397	8,510
2004	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2005	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2006	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2007	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2008	7	0	600	1,232	507	2,346	187	2	1,084	4,489	3,330	9,092	194	2	1,684	5,721	3,837	11,438
2009	0	0	1,714	558	1,850	4,122	259	2	891	2,508	3,183	6,843	259	2	2,605	3,066	5,033	10,965
2010	0	7	1,606	2,597	6,007	10,217	341	21	461	3,115	3,180	7,118	341	28	2,067	5,712	9,187	17,335
2011	5	9	4,836	652	7,558	13,060	239	1	549	1,132	3,529	5,450	6	558	5,968	4,181	13,008	13,066
2012	10	16	4,378	49,970	8,417	62,791	103	0	310	2,623	2,721	5,757	113	16	4,688	52,593	11,138	68,548
2013	8	4	5,485	487	36,021	42,005	123	2	826	1,341	3,853	6,145	131	6	6,311	1,828	39,874	48,150
2014	71	22	9,562	28,393	13,436	51,484	163	1	1,219	2,321	4,431	8,135	234	23	10,781	30,714	17,867	59,619
2015	245	335	9,468	8,297	23,568	41,913	254	53	952	1,602	3,451	6,312	499	388	10,420	9,899	27,019	48,225
2016	111	174	6,656	38,357	14,069	59,367	241	235	929	1,978	2,724	6,107	352	409	7,585	40,335	16,793	65,474
5-year avg. [c]	68	77	6,746	17,560	17,800	42,251	176	11	771	1,804	3,597	6,360	197	198	7,634	19,843	21,781	47,522

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

[a] Subsistence surveys were not conducted.

[b] Subsistence harvests were estimated from Division of Subsistence household surveys. Previous surveys often were partial surveys that did not capture later season harvests like coho salmon.

[c] 2011–2015.

Appendix A10.–Commercial and subsistence salmon catch by species, by year in Shaktoolik Subdistrict, Norton Sound District, 1990–2016.

	Shaktoolik (Subdistrict 5)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	2,644	49	4,695	0	21,748	29,136	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1991	1,324	55	11,614	0	31,619	44,612	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1992	1,098	56	14,660	0	27,867	43,681	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1993	2,756	20	11,130	106,743	20,864	141,513	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1994 [b]	885	8	22,065	502,231	5,411	530,600	1,175	1	2,777	9,133	1,221	14,307	2,060	9	24,842	511,364	6,632	544,907
1995 [b]	1,239	5	10,856	37,377	14,775	64,252	1,303	72	2,682	7,176	2,534	15,885	2,542	77	13,538	44,553	17,309	80,137
1996 [b]	1,340	1	13,444	304,982	3,237	323,004	1,114	31	3,615	8,370	4,425	17,555	2,454	32	17,059	313,352	7,662	340,559
1997 [b]	2,449	0	4,694	0	5,747	12,890	1,146	62	2,761	5,779	1,612	11,360	3,595	62	7,455	5,779	7,359	24,250
1998 [b]	910	0	3,624	236,171	7,080	247,785	982	92	1,872	6,270	1,034	10,250	1,892	92	5,496	242,441	8,114	258,035
1999 [b]	581	0	2,398	0	2,181	5,160	818	183	1,556	5,092	467	8,116	1,399	183	3,954	5,092	2,648	13,276
2000 [b]	160	3	7,779	85,493	2,751	96,186	440	20	2,799	5,432	2,412	11,103	600	23	10,578	90,925	5,163	107,289
2001 [b]	90	0	2,664	0	1,813	4,567	936	143	2,090	10,172	1,553	14,894	1,026	143	4,754	10,172	3,366	19,461
2002 [b]	1	0	680	0	261	942	1,230	4	2,169	8,769	800	12,972	1,231	4	2,849	8,769	1,061	13,914
2003 [b]	2	0	4,031	0	485	4,518	881	50	2,941	12,332	587	16,791	883	50	6,972	12,332	1,072	21,309
2004	0	0	12,734	0	1,372	14,106	943	12	1,994	7,291	139	10,379	943	12	14,728	7,291	1,511	24,485
2005	50	0	21,818	0	791	22,659	807	0	1,913	12,075	202	14,997	857	0	23,731	12,075	993	37,656
2006	8	0	32,472	0	3,321	35,801	382	36	1,968	4,817	351	7,554	390	36	34,440	4,817	3,672	43,355
2007	5	0	31,810	0	6,076	37,891	515	28	1,443	2,708	465	5,159	520	28	33,253	2,708	6,541	43,050
2008	6	24	37,624	8,219	6,042	51,915	422	2	1,504	4,920	201	7,049	428	26	39,128	13,139	6,243	58,964
2009	4	36	13,063	5,146	10,941	29,190	417	57	2,141	6,101	374	9,090	421	93	15,204	11,247	11,315	38,280
2010	4	18	11,868	4,622	40,483	56,995	327	115	1,940	6,406	1,680	10,468	331	133	13,808	11,028	42,163	67,463
2011	45	69	15,368	29	25,388	40,899	235	100	1,241	2,681	490	4,747	280	169	16,609	2,710	25,878	45,646
2012	25	29	7,828	19,253	20,141	47,276	214	9	1,110	4,609	634	6,576	239	38	8,938	23,862	20,775	53,852
2013	6	45	6,890	14	23,268	30,223	136	108	2,146	3,346	983	6,719	142	153	9,036	3,360	24,251	36,942
2014	16	47	19,753	33,137	29,455	82,408	158	82	1,159	3,961	682	6,042	174	129	20,912	37,098	30,137	88,450
2015	49	53	25,637	15,156	27,503	68,398	168	211	2,080	4,975	482	7,916	217	264	27,717	20,131	27,985	76,314
2016	23	510	25,866	28,308	12,149	66,856	251	111	1,854	3,534	558	6,308	274	621	27,720	31,842	12,707	73,164
5-year avg. [c]	28	49	15,095	13,518	25,151	53,841	182	102	1,547	3,914	654	6,400	210	151	16,642	17,432	25,805	60,241
10-year avg. [d]	17	32	20,231	8,558	19,262	48,100	297	75	1,673	4,452	634	7,132	314	107	21,905	13,010	19,896	55,232

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

[a] Subsistence surveys were not conducted.

[b] Subsistence harvests were estimated from Division of Subsistence household surveys. Previous surveys often were partial surveys that did not capture later season harvests like coho salmon.

[c] 2011–2015.

[d] 2006–2015.

Appendix A11.–Commercial and subsistence salmon catch by species, by year in Unalakleet Subdistrict, Norton Sound District, 1990–2016.

	Unalakleet (Subdistrict 6)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	5,998	358	52,015	0	23,659	82,030	2,476	[a]	[a]	[a]	[a]	[a]	8,474	[a]	[a]	[a]	[a]	[a]
1991	4,534	147	52,033	0	39,609	96,323	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1992	3,409	229	84,449	6,284	52,547	146,918	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1993	5,944	251	26,290	42,061	28,156	102,702	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1994 [b]	4,400	71	71,019	480,158	12,288	567,936	3,035	404	11,386	27,163	3,325	45,313	7,435	475	82,405	507,321	15,613	613,249
1995 [b]	7,617	78	31,280	37,009	24,843	100,827	3,114	591	9,833	16,625	5,458	35,621	10,731	669	41,113	53,634	30,301	136,448
1996 [b]	3,644	0	52,200	113,837	7,369	177,050	3,023	181	11,187	18,026	4,227	36,644	6,667	181	63,387	131,863	11,596	213,694
1997 [b]	9,067	159	26,079	0	17,139	52,444	4,191	196	6,746	10,600	1,603	23,336	13,258	355	32,825	10,600	18,742	75,780
1998 [b]	6,413	7	24,534	99,412	6,210	136,576	4,066	201	7,489	13,654	3,038	28,448	10,479	208	32,023	113,066	9,248	165,024
1999 [b]	1,927	0	10,264	0	5,700	17,891	2,691	537	8,140	10,060	3,692	25,120	4,618	537	18,404	10,060	9,392	43,011
2000 [b]	582	11	29,803	17,278	2,700	50,374	2,429	212	5,878	10,540	3,000	22,059	3,011	223	35,681	27,818	5,700	72,433
2001 [b]	116	1	15,102	0	1,512	16,731	2,810	359	6,270	11,269	2,918	23,626	2,926	360	21,372	11,269	4,430	40,357
2002 [b]	4	1	1,079	0	339	1,423	2,367	280	4,988	15,915	3,877	27,427	2,371	281	6,067	15,915	4,216	28,850
2003 [b]	10	21	13,029	0	3,075	16,135	2,585	297	6,192	21,779	1,785	32,638	2,595	318	19,221	21,779	4,860	48,773
2004	22	47	29,282	0	4,924	34,275	2,829	417	6,653	22,755	2,154	34,808	2,851	464	35,935	22,755	7,078	69,083
2005	101	12	63,705	0	3,192	67,010	2,193	656	7,886	25,447	2,660	38,842	2,294	668	71,591	25,447	5,852	105,852
2006	12	3	98,336	0	6,721	105,072	2,537	326	9,905	22,547	2,712	38,027	2,549	329	108,241	22,547	9,433	143,099
2007	13	2	88,418	2,121	11,788	102,342	1,666	292	5,859	11,674	2,057	21,547	1,678	294	94,277	13,795	13,845	123,889
2008	65	36	77,227	48,839	17,648	143,815	1,402	137	7,452	15,116	2,805	26,912	1,467	173	84,679	63,955	20,453	170,727
2009	80	89	60,230	11,625	20,647	92,671	1,892	200	6,923	11,707	2,708	23,430	1,972	289	67,153	23,332	23,355	116,101
2010	124	71	32,839	10,641	30,588	74,263	1,257	297	3,780	9,002	3,159	17,495	1,381	368	36,619	19,643	33,747	91,758
2011	124	279	29,518	6,292	34,003	70,216	607	189	2,486	5,608	3,316	12,206	731	468	32,004	11,900	37,319	82,422
2012	157	74	22,274	52,445	28,161	103,111	808	192	4,558	9,460	3,973	18,991	965	266	26,832	61,905	32,134	122,102
2013	131	171	29,390	6,056	54,873	90,621	468	221	6,117	7,724	3,129	17,659	599	392	35,507	13,780	58,002	108,280
2014	70	232	63,308	83,312	32,313	179,235	442	146	7,232	12,707	3,476	24,003	512	378	70,540	96,019	35,789	203,238
2015	384	738	101,659	34,543	40,924	178,248	961	248	5,673	7,544	2,381	16,807	1,345	986	107,332	42,087	43,305	195,055
2016	101	1,309	55,173	86,466	12,229	155,278	687	352	6,623	10,783	3,058	21,503	788	1,661	61,796	97,249	15,287	176,781
5-year avg. [c]	173	299	49,230	36,530	38,055	124,286	657	199	5,213	8,609	3,255	17,933	830	498	54,443	45,138	41,310	142,219
10-year avg. [d]	116	170	60,320	25,587	27,767	113,959	1,204	225	5,999	11,309	2,972	21,708	1,320	394	66,318	36,896	30,738	135,667

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

[a] Subsistence surveys were not conducted.

[b] Subsistence harvests were estimated from Division of Subsistence household surveys. Previous surveys often were partial surveys that did not capture later season harvests like coho salmon.

[c] 2011–2015.

[d] 2006–2015.

Appendix A12.–Subsistence salmon catch by species and year for St. Michael and Stebbins in Norton Sound District, 1994–2016.

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	567	3,051	317	0	933	4,868

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, 1994–2016.

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	649	3,658	1,874	32	1,893	8,106

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, 1990–2016.

	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	1,709	1,789	12,478	23,019	13,964	52,959	0	271	3,720	1,381	331	5,703
2016	321	2,888	102,890	208,961	51,176	366,236	1,403	1,388	13,688	39,828	11,436	67,743			–	–	–	
5-year avg. [b]	422	1,078	83,292	93,254	109,456	287,501	1,262	798	12,081	27,986	14,559	56,687	12	76	4,665	2,315	691	7,760
10-year avg. [c]	246	568	94,283	59,449	75,674	230,220	2,018	678	13,592	34,076	12,461	62,824	155	48	6,423	2,912	477	10,015

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] 2011–2015.

[c] 2006–2015.

Appendix A15.–Sport salmon harvest by species, by year, for the Unalakleet River, 1990–2016.

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	Information is not yet available				
Avg 2011–2015	11	2,776	201	374	3,361
Avg 2006–2015	147	3,711	181	658	4,697

Appendix A16.–Sport salmon harvest by species, by year for the Fish and Niukluk rivers, 1990–2016.

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	Information is not yet available				
Avg 2011–2015	0	855	35	142	1,032
Avg 2006–2015	3	1,000	42	197	1,242

Appendix A17.–Sport salmon harvest by species, by year for the Nome River, 1990–2016.

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		Information is not yet available			
Avg 2011–2015	0	261	46	857	1,165
Avg 2006–2015	1	750	23	1,196	1,970

Appendix A18.–Comparative salmon aerial survey escapement indices of Norton Sound streams unless noted otherwise, 1990–2016.

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

-continued-

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

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

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

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

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

[a] Represents "high count" for season.

[b] Helicopter survey.

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

[d] Includes counts from Casadepaga and Ophir Creeks.

[e] Includes counts from Ophir Creek.

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

Appendix A19.–Total Norton Sound escapement index for chum, pink, coho, and Chinook salmon from weir and tower projects at Kwiniuk, Niukluk, Nome, and Snake rivers (starting 1995), North River (starting 1996), and Eldorado River (starting 1997) to 2016.

Year	Chum	Pink	Coho [a]	Chinook
1995	138,318	49,409	7,333	626
1996 [b]	124,571	2,535,593	16,175	2,027
1997	109,961	163,728	11,434	5,550
1998	98,166	3,070,848	4,496	2,741
1999	55,352	73,077	10,069	1,846
2000	65,007	1,883,867	19,678	1,324
2001	70,451	79,706	30,645	1,718
2002	93,931	2,239,565	21,625	2,925
2003	49,749	392,827	13,761	2,466
2004	40,494	6,432,486	28,399	2,022
2005	68,585	2,594,334	44,351	1,530
2006	126,045	5,763,830	56,484	1,256
2007	123,394	708,669	37,112	2,324
2008	41,660	3,932,201	49,737	1,252
2009	41,812	275,834	39,234	3,052
2010	191,626	1,484,282	31,173	1,481
2011	102,235	206,127	13,001	933
2012 [c]	51,796	1,013,565	6,011	1,056
2013 [d]	50,529	73,928	16,897	621
2014 [d]	90,287	735,843	23,769	3,920
2015 [d]	96,843	626,383	20,640	2,323
2016 [d]	54,237	4,378,422	14,938	688

Note: 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.

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

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

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

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

Appendix A20.–Total escapement (4–6 rivers) and catch (commercial, subsistence, and sport fish) for chum, pink, coho, and Chinook salmon for Norton Sound District, 1995–2016.

Year [a, b]	Chum	Pink	Coho	Chinook
1995	213,371	169,496	76,768	15,291
1996 [c]	156,128	3,089,682	112,710	12,617
1997 [d]	161,248	189,439	60,033	25,989
1998 [d]	129,669	3,712,761	52,489	17,105
1999	76,493	95,302	40,546	9,315
2000	85,243	2,091,074	84,983	6,655
2001	97,223	109,878	66,232	6,926
2002	108,444	2,300,537	39,368	8,524
2003	63,099	441,387	45,306	7,445
2004	51,829	6,513,682	87,800	7,027
2005	78,719	2,652,592	146,616	5,280
2006	142,373	5,825,726	217,986	4,961
2007	157,932	734,723	181,306	5,137
2008	75,834	4,069,508	198,406	4,380
2009	85,297	320,631	147,837	6,795
2010	325,688	1,560,810	110,991	3,802
2011	227,485	231,000	84,038	2,538
2012	127,176	1,265,834	57,739	2,488
2013	187,009	102,117	91,638	1,633
2014	214,776	960,447	156,063	5,315
2015	258,775	714,224	191,032	5,360
2016 [e]	116,849	4,627,211	131,516	2,412

Note: 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.

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

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

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

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

[e] Information for 2016 does not include sport fish catch.

Appendix A21.–Nome Subdistrict chum salmon estimated escapement, 1999–2016.

Year	Rivers	Aerial survey counts	Estimated escapement [a]	Year	Rivers	Aerial survey counts	Estimated escapement [a]
1999	Nome		1,048	2000	Nome	658	4,056
	Snake[b]		484		Snake[b]		1,911
	Eldorado[b]		4,218		Eldorado[b]	3,383	11,617
	Flambeau	51	637		Flambeau	819	3,947
	Solomon	51	637		Solomon	150	1,294
	Sinuk	1,697	6,370		Sinuk[c]		7,198
	Bonanza	361	2,304		Bonanza	1,130	4,876
			15,698				34,898
2001	Nome	946	2,859	2002	Nome		1,720
	Snake[b]	752	2,182		Snake[b]	402	2,776
	Eldorado[b]	4,450	11,635		Eldorado[b]		10,215
	Flambeau	3,612	10,465		Flambeau	1,876	6,804
	Solomon	280	1,949		Solomon	325	2,150
	Sinuk	3,746	10,718		Sinuk	1,682	6,333
	Bonanza	1,084	4,745		Bonanza	595	3,199
			44,553				33,197
2003	Nome	888	1,957	2004	Nome		3,903
	Snake	440	2,201		Snake		2,146
	Eldorado	1,257	3,591		Eldorado		3,277
	Flambeau	647	3,380		Flambeau	2,250	7,667
	Solomon	73	806		Solomon[c]		1,436
	Sinuk	677	3,482		Sinuk[c]		3,197
	Bonanza	220	1,664		Bonanza[c]		2,166
			17,081				23,792
2005	Nome	2,082	5,584	2006	Nome	394	5,677
	Snake	1,842	2,967		Snake	840	4,160
	Eldorado	5,445	10,369		Eldorado	2,355	42,105
	Flambeau	2,261	7,692		Flambeau	16,000	27,828
	Solomon	775	3,806		Solomon	305	2,062
	Sinuk	1,072	4,710		Sinuk	1,115	4,834
	Bonanza	1,370	5,534		Bonanza	60	708
			40,662				87,374
2007	Nome	1,449	7,034	2008	Nome	106	2,607
	Snake	1,702	8,147		Snake		1,244
	Eldorado	6,315	21,312		Eldorado		6,746
	Flambeau	4,452	12,006		Flambeau	4,235	11,618
	Solomon	673	3,469		Solomon[c]		959
	Sinuk	7,210	16,481		Sinuk[c]		5,367
	Bonanza	2,628	8,491		Bonanza[c]		3,636
			76,940				32,177

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Year	Rivers	Aerial survey counts	Estimated escapement [a]	Year	Rivers	Aerial survey counts	Estimated escapement [a]
2009	Nome		1,565	2010	Nome	2,998	5,906
	Snake		891		Snake	2,625	6,973
	Eldorado	1,069	4,943		Eldorado[d]	30,600	42,612
	Flambeau	860	4,075		Flambeau	13,600	25,009
	Solomon	89	918		Solomon	454	2,678
	Sinuk	344	2,232		Sinuk	3,955	11,107
	Bonanza	1,851	6,744		Bonanza	686	3,513
			21,368				97,798
2011	Nome		3,582	2012	Nome		2,015
	Snake		4,343		Snake		1,235
	Eldorado		16,227		Eldorado		13,393
	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
			66,122				52,076
2013	Nome		4,811	2014	Nome		5,589
	Snake		2,755		Snake		3,983
	Eldorado		26,121		Eldorado		27,054
	Flambeau	16,088	27,928		Flambeau	10,776	21,462
	Solomon[e]		1,377		Solomon[e]		1,502
	Sinuk	19,500	31,691		Sinuk	9,050	19,136
	Bonanza	5,284	13,437		Bonanza	8,602	18,508
			108,120				97,234
2015	Nome		6,111	2016	Nome		7,093
	Snake		4,241		Snake		3,666
	Eldorado		25,560		Eldorado		18,938
	Flambeau		12,011		Flambeau		13,254
	Solomon[e]		1,128		Solomon[e]		2,016
	Sinuk		29,643		Sinuk		9,408
	Bonanza		13,212		Bonanza		6,374
			91,906				60,749

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

[b] Escapement was estimated by counting tower.

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

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

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

Appendix A22.–Historical escapement of salmon and Dolly Varden at Eldorado River counting tower, 1997–2002 and weir, 2003–2016.

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	57	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	July 26–Aug 02	0	18,938	42,699	41	16	57

Notes: ND is no data. 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.

[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.

Appendix A23.–Historical escapement of salmon and Dolly Varden at Snake River counting tower 1995–2002 and weir 2003–2016.

Year	Operating Period	Chinook	Chum	Pink	Coho	Sockeye	Dolly Varden
1995	July 01–Aug 18	0	4,393	917	856	0	NA
1996	July 03–Aug 22	5	2,772	44,558	1,638	0	NA
1997	July 07–Aug 18	12	6,184	6,742	1,157	0	NA
1998	July 01–Aug 11	0	11,067	219,679	178	0	NA
1999	July 01–Aug 14	20	484	116	90	0	NA
2000	June 29–Aug 25	28	1,911	4,723	406	0	NA
2001	July 08–Sept 05	33	2,182	1,295	1,335	0	NA
2002	June 28–Sept 16	9	2,776	4,103	851 [a]	8	149
2003	June 26–Sept 11	50	2,201	2,856	489	84	111
2004	June 23–Sept 03	17	2,146	126,917	474	22	290
2005	June 27–Sept 11	31	2,967	13,813	2,948	275	28
2006	July 01–Sept 11	32	4,160	74,028	4,776	302	614
2007	July 01–Sept 14	61	8,147	4,634	1,781	1,354	121
2008	July 06–Sept 06	13	1,244	145,761	5,206	143	452
2009	July 08–Aug 30 [b]	6	891	769	50	2	14
2010	July 03–Sept 11	43	6,973	51,099	2,243	124	198
2011	July 08–Sept 11	1	4,352	7,090	343	14	5
2012	July 06–Aug 15 [c]	1	978	8,601	22	3	3
2013	July 19–Sept 10	8	2,755	1,333	1,203	163	1
2014	July 05–Sept 10	11	3,983	20,067	1,424	86	62
2015	July 04–Sept 14 [d]	7	4,241	16,321	1,638	56	67
2016	July 01–Sept 20 [e]	15	3,666	204,641	1,115	120	277

Notes: ND is no data. Starting with 2008, some numbers might have changed compared to previous reports (e.g., Menard et al. 2013) because interpolation methods were standardized in 2015.

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

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

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

[d] Weir was knocked out August 25–29. Counts were interpolated during this period.

Appendix A24.–Historical salmon escapement at Kwiniuk River counting tower, 1990–2016.

Year	Operating Period	Chum	Pink	Chinook	Coho
1990	June 21–July 25	13,957	416,512	900	0
1991	June 18–July 27	19,801	53,499	708	0
1992	June 27–July 28	12,077	1,464,716	479	0
1993	June 27–July 27	15,824	43,063	600	0
1994	June 23–Aug 09	33,012	2,303,114	625	2,547
1995	June 21–July 26	42,500	17,511	498	114
1996	June 20–July 25	28,493	907,893	577	461
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	41
2001	June 27–Sept 15	16,598	8,423	261	9,532
2002	June 17–Sept 11	37,995	1,114,410	778	6,459
2003	June 15–Sept 15	12,123	22,329	744	5,490
2004	June 16–Sept 14	10,362	3,054,684	663	11,240
2005	June 17–Sept 13	12,083	341,048	342	12,950
2006	June 22–Sept 12	39,519	1,347,090	195	22,341
2007	June 21–Sept 10	27,756	54,255	258	9,429
2008	June 23–Sept 07	9,483	1,444,213	237	10,461
2009	June 24–Sept 13	8,739	42,963	444	8,677
2010	June 25–Sept 07	71,388	634,220	135	8,049
2011	June 20–Sept 11	31,604	30,023	57	3,288
2012	June 23–Aug 16	5,577	393,302	54	777
2013	June 24–Sept 11	5,631	13,212	15	3,940
2014	June 15–Sept 08	39,789	326,558	429	14,713
2015	June 15–Sept 03	37,831	67,295	318	7,151
2016	June 15–Sept 16	8,526	1,909,949	135	9,210

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

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

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

Appendix A26.–Historical salmon escapement at Nome River counting tower, 1993–1995, and weir, 1996–2016.

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	2,893	142,604	54	726	ND
1995	June 22–Sept 06	5,093	13,893	5	1,650	ND
1996	June 26–July 23	3,339	95,681 [a]	5	66	ND
1997	June 27–Aug 27	5,147	8,035	22	321	ND
1998	July 01–Aug 11	1,930	359,469	70	96	ND
1999	July 02–Aug 25	1,048	2,033	3	417	6
2000	June 29–Aug 25	4,056	41,673	25	698	19
2001	July 08–Sept 11	2,859	3,138	7	2,418	55
2002	June 29–Sept 11	1,720	35,057	7	3,418	29
2003	July 05–Sept 10	1,957	11,402	12	548	47
2004	June 25–Sept 12	3,903	1,051,146	51	2,283	114
2005	June 27–Sept 11	5,584	285,759	69	5,848	381
2006	July 02–Sept 07	5,677	578,555	43	8,308	188
2007	July 03–Sept 16	7,034	24,395	13	2,437	534
2008	July 02–Sept 17	2,607	1,186,554	28	4,605	90
2009	July 01–Sept 20	1,565	16,490	10	1,370	103
2010	June 30–Sept 16	5,877	165,934	9	4,114	43
2011	July 01–Sept 12	3,578	14,384	12	1,831	22
2012	July 04–Aug 15	2,028	151,791	6	237	48
2013	July 05–Sept 16	4,811	10,257	9	2,624	38
2014	July 05–Sept 11	5,589	96,397	8	2,637	34
2015	July 01–Sept 20 [b]	6,111	75,603	23	2,418	96
2016	July 01–Sept 20	7,093	1,175,723	25	2,331	254

Notes: ND is no data. 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.

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

[b] Counts during the period August 25–29 were estimated via linear interpolation due to high water events rendering weir inoperable.

Appendix A27.–Salmon escapement at Solomon River weir, 2013–2016.

Year	Operating period	Chum	Pink	Chinook	Coho	Sockeye
2013	July 05–Aug 26	1,377	2,733	0	178	3
2014	July 02–Aug 20	1,502	20,691	0	79	0
2015	June 26–Aug 24	1,128	18,764	5	46	3
2016	June 30–Aug 18	2,016	128,046	6	215	11

Note: The Solomon River weir was initiated in 2013.

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

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

Note: The Glacial Lake weir was discontinued after 2015.

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

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

[c] A video project was tested during 2012 and was in operation 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.

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

Appendix A29.–Historical salmon escapement at Inglutalik River counting tower, 2011–2016.

Year	Operating period	Chum	Pink	Chinook	Coho
2011	June 24–Aug 14	62,897	475,167	1,469	862
2012	June 23–Aug 23	33,123	90,349	1,159	1,431
2013 [a]	June 21–Aug 11	51,099	201,438	3,411	4,488
2014	June 20–July12	62,153	61,752	1,676	978
2015	June 23–Aug 21	82,156	1,041,693	1,543	8,247
2016	June 16–July 17	43,226	78,916	3,285	693

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

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

Appendix A30.–Historical salmon escapement at North River counting tower, 1996–2016.

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

Note: 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.

[a] Tower was not operational July 20–August 19 and August 24–25.

Appendix A31.–Historical salmon escapement at Unalakleet River weir, 2010–2016.

Year	Operating Period	Chum	Pink	Chinook	Coho	Sockeye
2010	June 22–July 31	70,811	832,904	1,021	5,382	130
2011	June 17–Aug 07	104,050	354,361	1,030	10,231	181
2012	June 24–Aug 15	70,859	674,250	823	17,548	237
2013	June 20–Aug 22	106,715	143,250	667	25,550	217
2014 [a]	June 28–Aug 27	55,341	1,194,708	1,126	44,524	206
2015	June 18–Aug 15	97,885	1,616,042	2,789	40,964	996
2016	June 11–July 20	31,756	4,752,635	505	132	580

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.

[a] Weir was flooded out July 21–25.

Appendix A32.–Chum salmon escapement by river, Nome Subdistrict, 1993–2016.

Year	Rivers West of Cape Nome			Rivers East of Cape Nome				Total [e]
	Sinuk [a]	Snake [b]	Nome [c]	Flambeau [a]	Eldorado [d]	Bonanza [a]	Solomon [a]	
1993	6,052	2,115	5,925	6,103	9,048	3,007	2,525	34,775
1994	4,905	3,519	2,893	12,889	13,202	5,178	1,066	43,652
1995	9,464	4,395	5,093	16,474	18,955	11,182	2,106	67,669
1996	6,658	2,772	3,339	13,613	32,970	7,049	2,141	68,542
1997	9,212	6,184	5,147	9,455	14,302	4,140	2,111	50,551
1998	6,720	11,067	1,930	9,129	13,808	4,552	925	48,131
1999	6,370	484	1,048	637	4,218	2,304	637	15,698
2000	7,198	1,911	4,056	3,947	11,617	4,876	1,294	34,899
2001	10,718	2,182	2,859	10,465	11,635	4,745	1,949	44,553
2002	6,333	2,776	1,720	6,804	10,243	3,199	2,150	33,225
2003	3,482	2,201	1,957	3,380	3,591	1,664	806	17,081
2004	3,197	2,145	3,903	7,667	3,273	2,166	1,436	23,787
2005	4,710	2,948	5,584	7,692	10,426	5,534	1,914	38,808
2006	4,834	4,128	5,677	27,828	41,985	708	2,062	87,222
2007	16,481	8,147	7,034	12,006	21,312	8,491	3,469	76,940
2008	5,367	1,244	2,607	11,618	6,746	3,636	959	32,177
2009	2,232	891	1,565	4,075	4,943	6,744	918	21,368
2010	11,107	6,973	5,877	25,009	42,612	3,513	2,678	97,769
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	2,755	4,811	27,928	26,131	13,437	1,377	108,130
2014	19,136	3,983	5,589	21,462	27,054	18,508	1,502	97,234
2015	29,643	4,241	6,111	12,011	25,560	13,212	1,128	91,906
2016	9,408	3,666	7,093	13,254	18,938	6,374	2,016	60,749
Total	240,483	86,057	97,424	296,019	402,190	147,578	43,075	1,312,826

Note: 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.

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

[b] Snake River escapements are estimated by aerial survey (1993–1994), tower counts (1995–2002), and weir counts (2003–2016). Escapement goal range is 1,600–2,500 chum salmon.

[c] Nome River escapements are estimated by aerial survey expansion (1993), tower counts (1994–1995), and weir counts (1996–2016). Escapement goal range is 2,900–4,300 chum salmon.

[d] Eldorado River escapements are estimated by aerial survey (1993–1996), tower counts (1997–2002), and weir counts (2003–2016). Escapement goal range is 6,000–9,200 chum salmon.

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

Appendix A33.–Pink salmon escapement by year and river, Nome Subdistrict, 1993–2016.

	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		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	917	13,893	8,086	4,243	619	350	29,358
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	20,616	394,826
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	128,016	2,096,929
Total	5,887,340	1,023,923	5,559,009	120,815	1,161,467	1,358,176	655,944	15,766,674

Notes: ND is no data. 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.

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

[b] Snake River escapements are estimated by aerial survey (1993–1994), tower counts (1995–2002), and weir counts (2003–2016).

[c] Nome River escapements are estimated by tower counts (1993–1995) and weir counts (1996–2016). 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 (2003–2016).

Appendix A34.–Number of customary trade permits issued, Norton Sound District and Port Clarence District, 2007–2016.

	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

APPENDIX B: PORT CLARENCE FISHERIES

Appendix B1.–Comparative sockeye salmon aerial survey indices, Port Clarence District, 1990–2016.

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

[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 (2003–2016).

Year	Operating period	Chinook	Chum	Pink	Coho	Sockeye	Dolly Varden
1997	July 12–Aug 21	356	15,619 [a]	5,557	452	15,619[a]	ND
1998	Did not operate						
1999	July 13–Aug 06	6	2,617	35,577	104	4,650	ND
2000	July 05–Aug 18	72	861	374	21	12,141	ND
2001	Did not operate						
2002	July 04–Aug 04	150	5,590	3,882	246	3,888	ND
2003	June 21–Sept 14	1,016	15,200	14,100	677	42,729	550
2004	June 21–Sept 14	925	10,239	50,760	1,573[b]	85,417	264
2005	June 24–Sept 05	216	9,685	13,218	304	55,951	112
2006	June 30–Sept 09	275	45,361	17,701	973	52,323	505
2007	June 29–Sept 10	501	35,334	3,616	605	43,432	339
2008 [c]	June 25–Sept 01	133	25,008	92,641	260	20,452	409
2009	June 26–Aug 31	52	5,427	483	18	953	130
2010	June 24–Sept 01	44	25,379	29,239	272	1,654	285
2011	June 28–Sept 01	44	41,740	3,364	269	8,449	229
2012 [d]	June 26–Aug 18	65	25,733	46,201	95	7,090	65
2013 [c]	June 27–Sept 08	37	47,557	1,060	890	12,428	27
2014 [c]	June 25–Aug 27	48	25,634	4,197	425	9,719	66
2015 [c]	July 02–Aug 25	99	41,121	2,807	296	36,052	76
2016 [c]	June 23–Aug 25	34	21,379	2,986	554	15,066	135

Note: ND is no data.

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

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

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

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

Appendix B3.–Estimated number of subsistence fishing families and harvest in Port Clarence District, 1994–2016.

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

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

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

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

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

Appendix B4.–Application of 20-05-00 liquid blend of phosphorous and nitrogen fertilizer to Salmon Lake, 1997–2016.

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

APPENDIX C: KOTZEBUE FISHERIES

Appendix C1.–Kotzebue District chum salmon catch statistics, 1990–2016.

Year	Chum salmon		Other [a]	Number of fishermen	Season catch per fisherman
	Number of fish	Pounds			
1990	163,263	1,453,040	538	153	1,067
1991	239,923	1,951,041	714	142	1,690
1992	289,184	2,397,302	2,714	149	1,941
1993 [b]	73,071	613,968	1,507	114	641
1994 [c]	153,452	1,166,494	73	109	1,408
1995	290,730	2,329,898	93	92	3,160
1996 [d]	82,110	657,224	1,204	55	1,493
1997	142,720	1,141,741	649	68	2,099
1998	55,907	447,256	2,971	45	1,242
1999	138,605	1,108,898	87	60	2,310
2000	159,802	1,370,637	106	64	2,497
2001	211,672	1,847,361	64	66	3,207
2002	8,390	74,341	0	3	2,797
2003	25,423	218,091	0	4	6,356
2004	51,038	419,059	1,450	43	1,187
2005	75,971	621,573	1,258	41	1,853
2006	137,961	1,040,023	0	42	3,285
2007	147,087	1,209,842	0	46	3,198
2008	190,550	1,541,922	0	48	3,970
2009	187,562	1,505,734	0	62	3,025
2010	270,343	2,160,264	0	67	4,035
2011	264,225	2,158,365	0	89	2,970
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
Avg 1996–2015	181,898	1,489,293	389	58	3,139

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

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

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

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

Appendix C2.–Kotzebue District mean prices paid per pound in dollars to salmon fishermen by species, 1990–2016.

	Chum salmon				
Year	Average weight	Average price	Chinook salmon	Inconnu	Dolly Varden
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]

[a] Did not purchase.

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

Appendix C3.–Kotzebue District commercial fishery dollar value estimates, 1990–2016.

Year	Gross value of catch to fishermen [a]	Number of fishermen	Average value per fisherman
1990	$438,044	153	$2,863
1991	$437,948	142	$3,084
1992	$533,731	149	$3,582
1993 [b]	$235,061	114	$2,062
1994	$233,512	109	$2,142
1995	$316,031	92	$3,435
1996	$56,310	55	$1,024
1997	$187,978	68	$2,764
1998	$70,587	45	$1,569
1999	$179,781	60	$2,996
2000	$246,786	64	$3,856
2001	$322,650	66	$4,889
2002	$7,572	3	$2,524
2003	$26,377	4	$6,594
2004	$64,420	43	$1,498
2005	$124,820	41	$3,044
2006	$229,086	42	$5,454
2007	$243,149	46	$5,286
2008	$385,270	48	$8,026
2009	$376,554	62	$6,073
2010	$860,125	67	$12,838
2011	$867,085	89	$9,743
2012	$567,664	83	$6,839
2013	$689,163	66	$10,442
2014	$2,879,016	94	$30,628
2015	$867,583	105	$8,263
2016	$1,123,248	86	$13,061
Avg 1996–2015	$462,599	$58	$6,718

[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, 1990–2016.

	Commercial catch			Subsistence catch [a]			
Year	Chum	Other [b]	Total	Chum	Number of fishermen interviewed	Average catch per fisherman	Total documented catch
1990	163,263	32	163,295	8,268	[c]	[c]	171,563
1991	239,923	44	239,967	14,740	[c]	[c]	254,707
1992	289,184	204	289,388	14,303	[c]	[c]	303,691
1993	73,071 [d]	131	73,202	15,430	[c]	[c]	88,632
1994	153,452 [e]	3	153,455	36,226	375	97	189,681
1995	290,730	5	290,735	102,881 [f]	593	173	393,616
1996	82,110 [g]	3	82,113	99,740 [f]	596	167	181,853
1997	142,720	45	142,765	57,906 [f]	530	109	200,671
1998	55,907	210	56,117	48,980 [f]	592	83	105,097
1999	139,120	5	139,125	94,342 [f]	353	267	233,467
2000	159,802	10	159,812	65,975 [f]	422	156	225,787
2001	211,672	6	211,678	49,232 [f]	408	121	260,910
2002	8,390	0	8,390	16,880 [h]	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
Average 1996–2015	181,929	314	182,086	Average 1996–2014 48,585	427	114	220,323

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	Commercial catch				Subsistence catch [a]			
Year	Chum	Other [b]	Total		Chum	Number of fishermen interviewed	Average catch per fisherman	Total documented catch
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	305,383	38	305,421			Subsistence surveys were not conducted		
2016	400,417	1,548	401,965			Subsistence surveys were not conducted		
Average 1996–2015	181,929	314	182,086	Average 1996–2014	48,585	427	114	220,323

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

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

[c] Information not available.

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

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

[f] Includes the town of Kotzebue.

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

[h] 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, 1990–2016.

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

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

Note: No surveys were flown in 2000, 2005, 2007, 2010–2013, and 2015–2016.

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

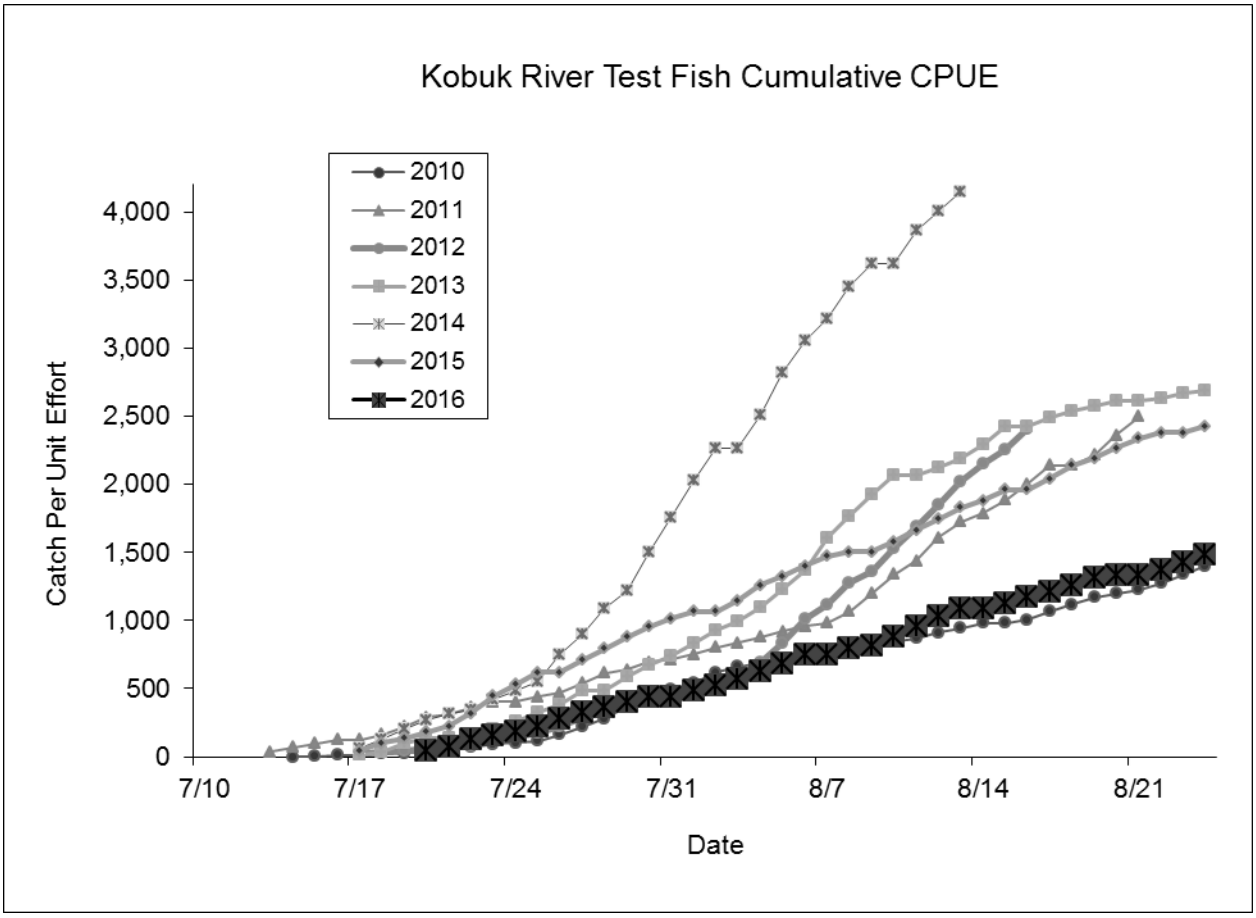
[b] Poor survey conditions or incomplete, early, or late survey.

[c] Unacceptable survey conditions.

[d] Surveyed well before peak of migration.

[e] Aerial survey goals were revised in 2007.

[f] Unclear where these fish were observed.



Appendix C8.–Kobuk River chum salmon drift test fishery cumulative catch per unit effort (CPUE), 2009–2016.

APPENDIX D: HERRING FISHERIES

Appendix D1.–Norton Sound herring and spawn-on-kelp harvests (in short tons) by U.S. commercial fishermen, 1990–2016.

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	29	29	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 2014–2016.

[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, 1990–2016.

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

[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 2015–2016 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] Twenty-five tons out of total sac roe herring catch was sold off as bait to NSEDC.

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

Appendix D3.–Norton Sound commercial herring harvest (tons) by subdistrict, by year, 1990–2016.

	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	29	0	0	0	0	0	29	

[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).

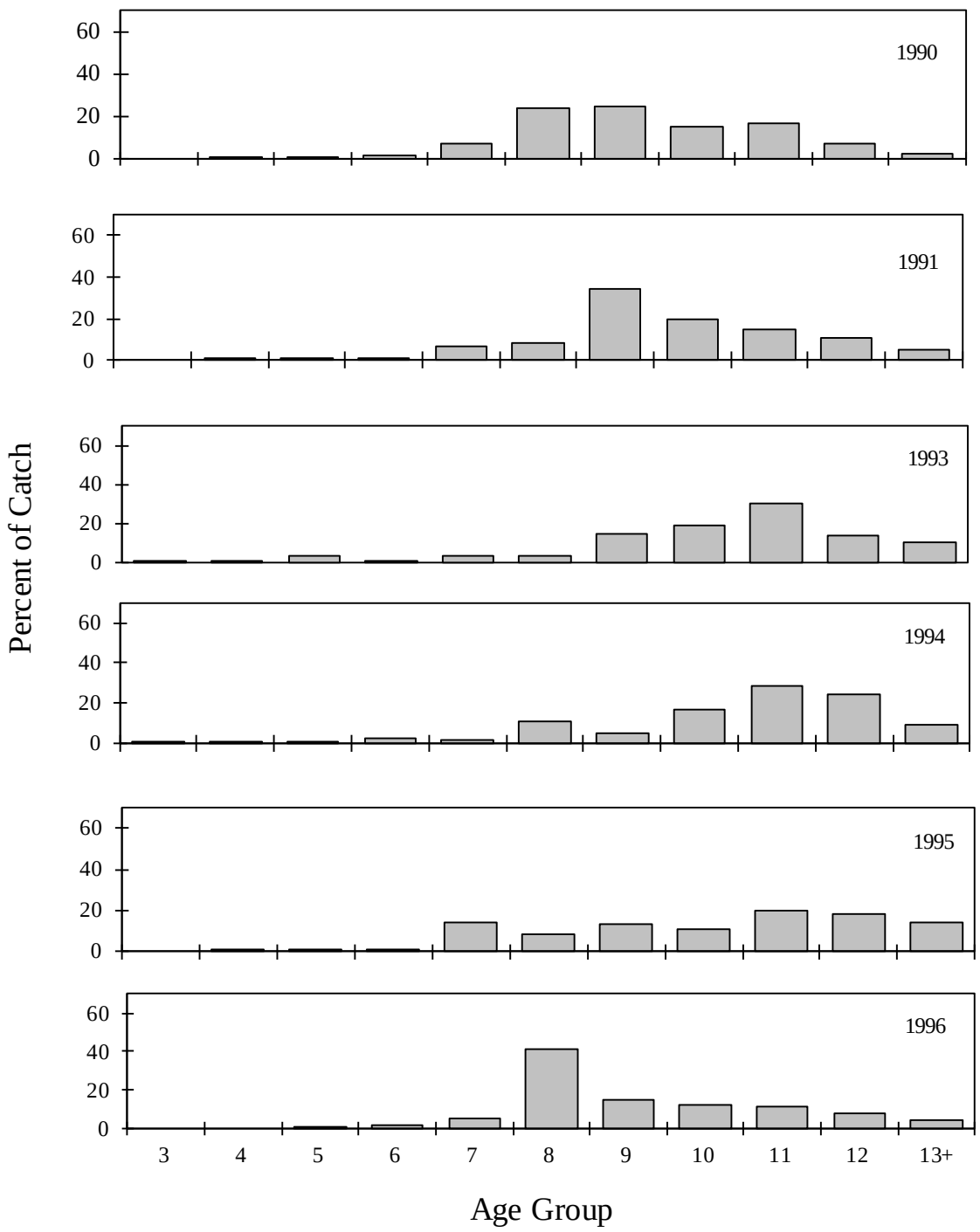
[h] Does not include an estimated 5 st of wastage.

[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.

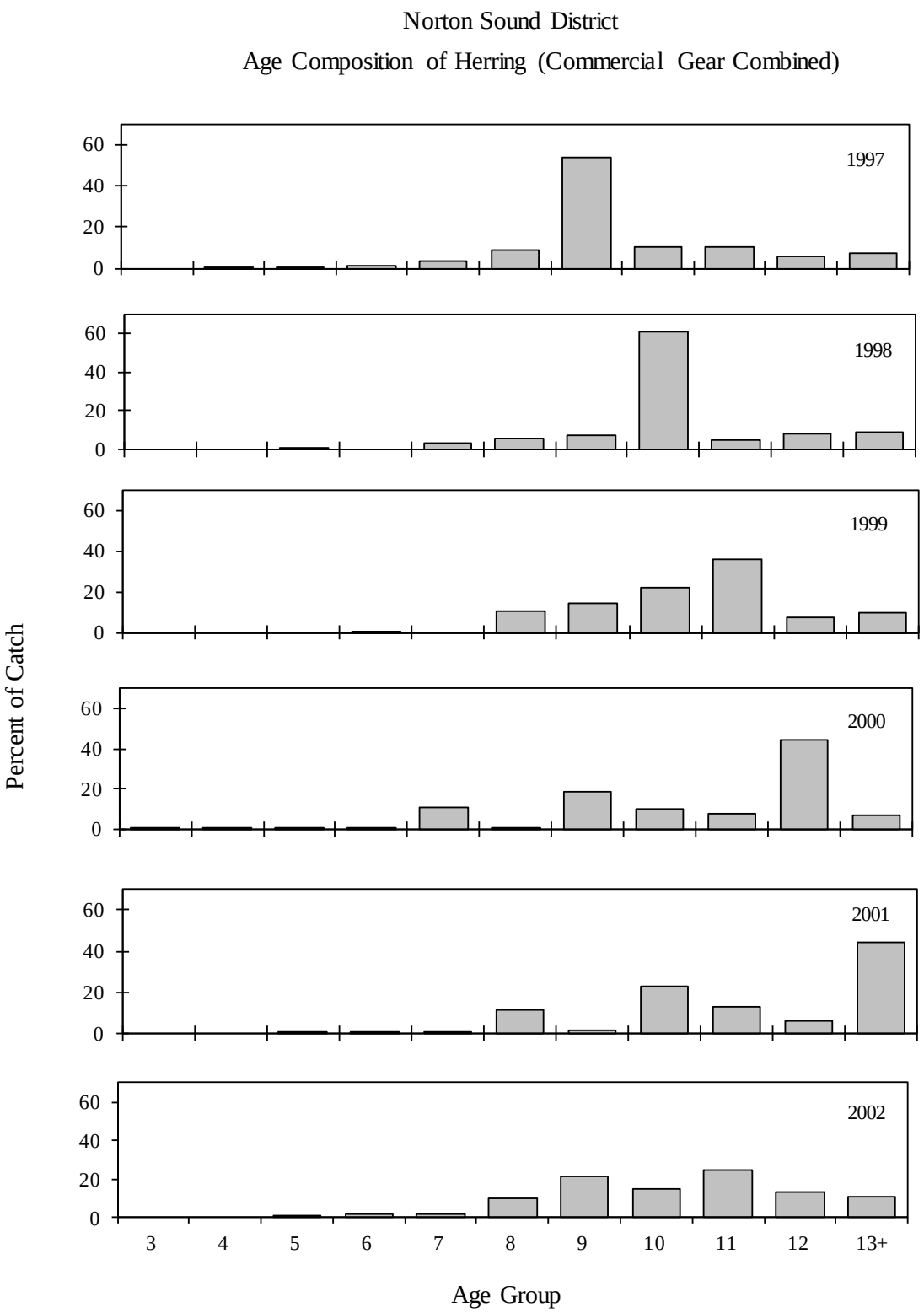
Appendix D4.–Port Clarence District commercial herring fishery, 1986–1996.

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



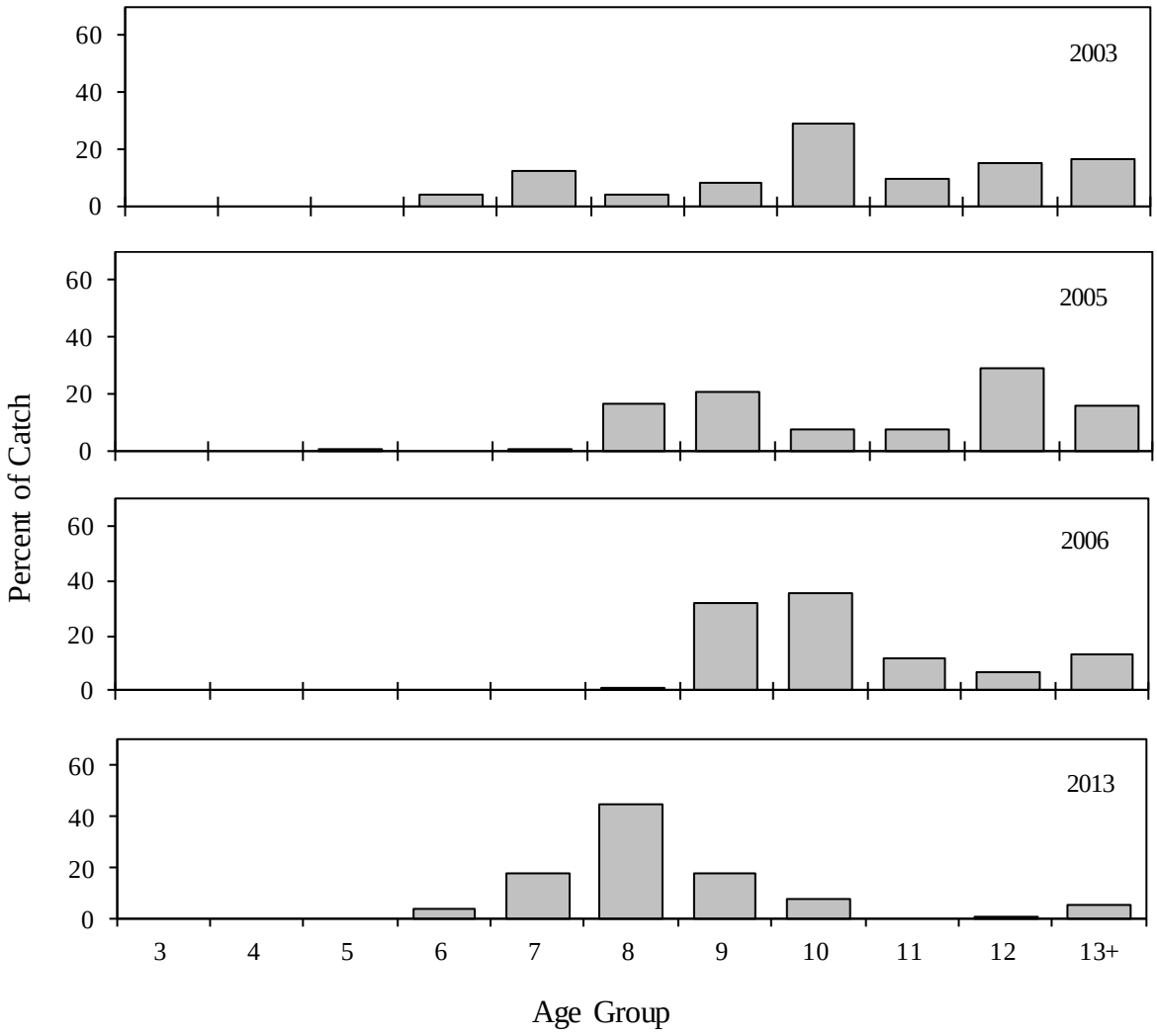
Appendix D5.–Norton Sound herring age class composition by percentage of commercial catch, commercial gear combined (beach seine and gillnet), 1990–1996.

Note: No commercial fishing occurred in 1992.



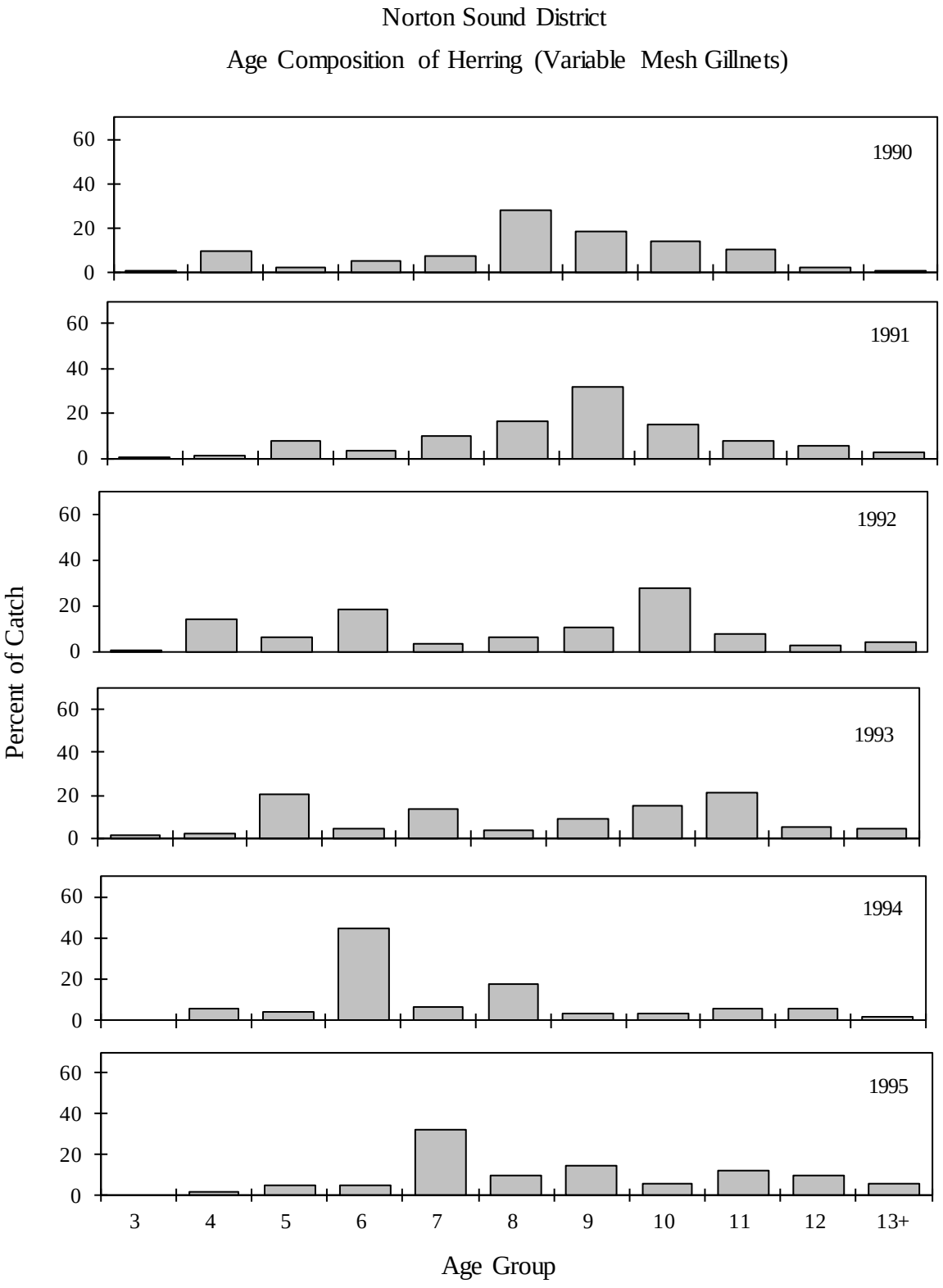
Appendix D6.–Norton Sound herring age class composition by percentage of commercial catch, commercial gear combined (beach seine and gillnet), 1997–2002.

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

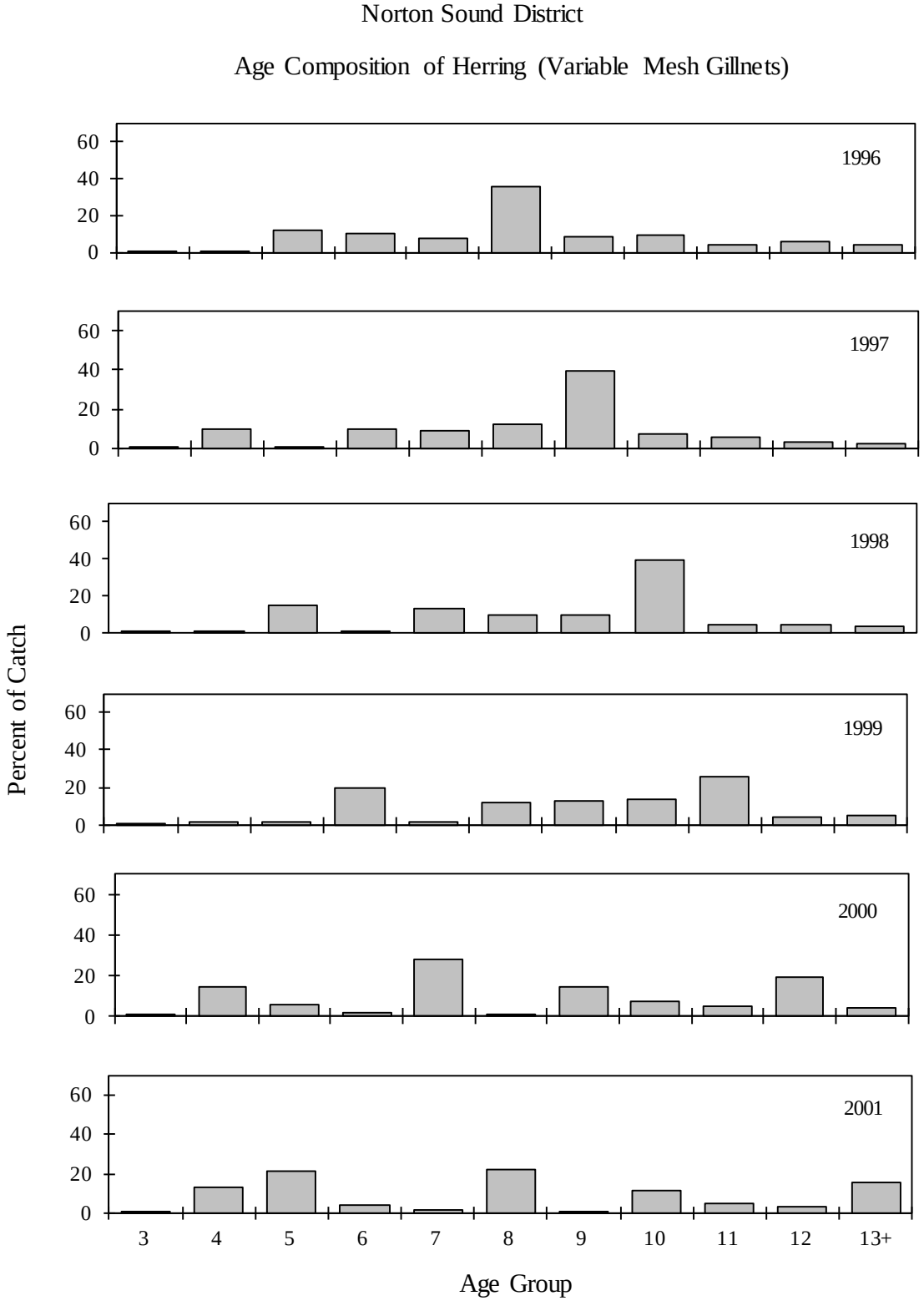


Appendix D7.–Norton Sound herring age class composition by percentage of commercial catch, gillnet only, 2003–2016.

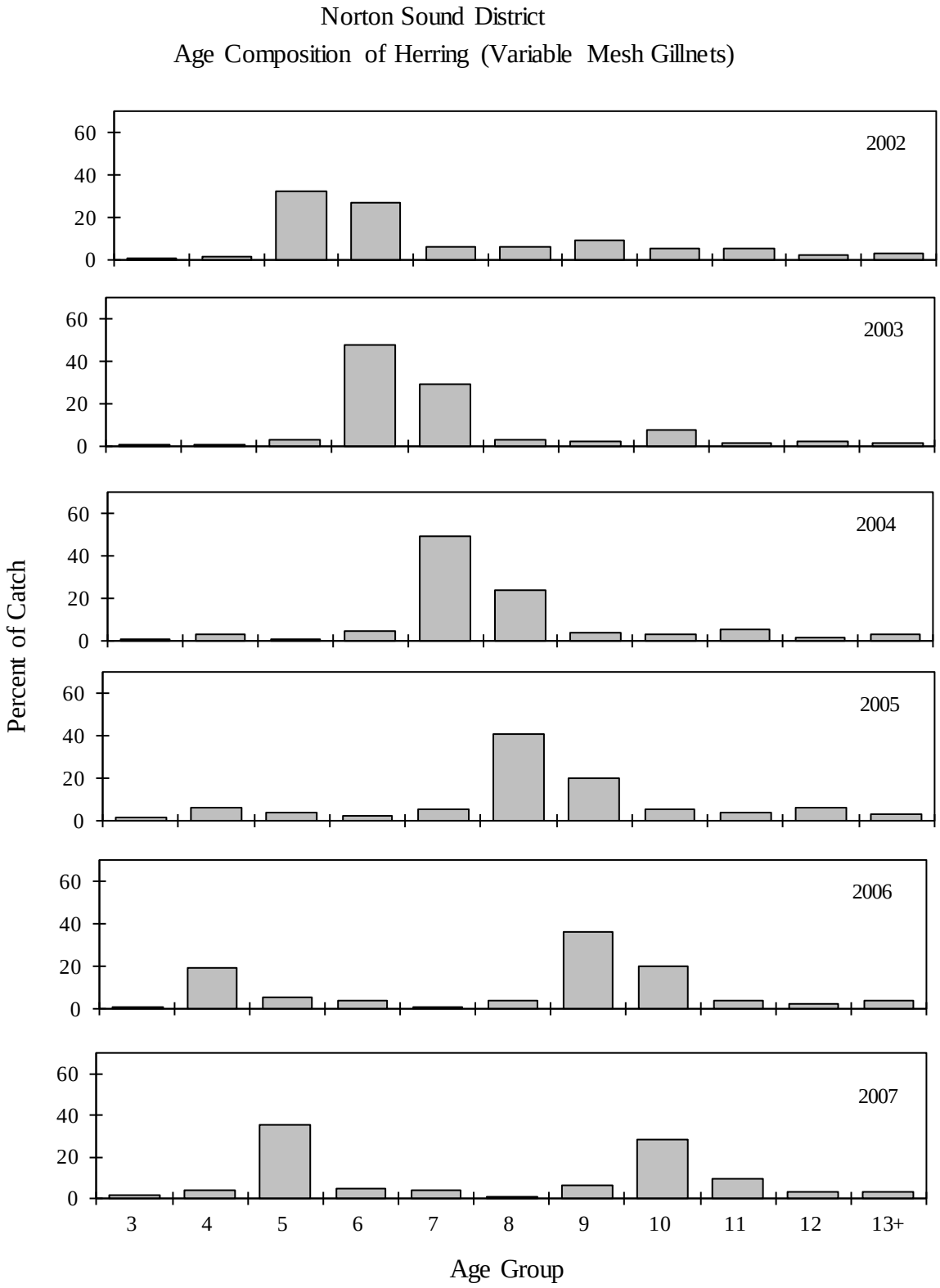
Note: No fishery in 2004. No commercial samples were available 2007–2012 and 2014–2016.



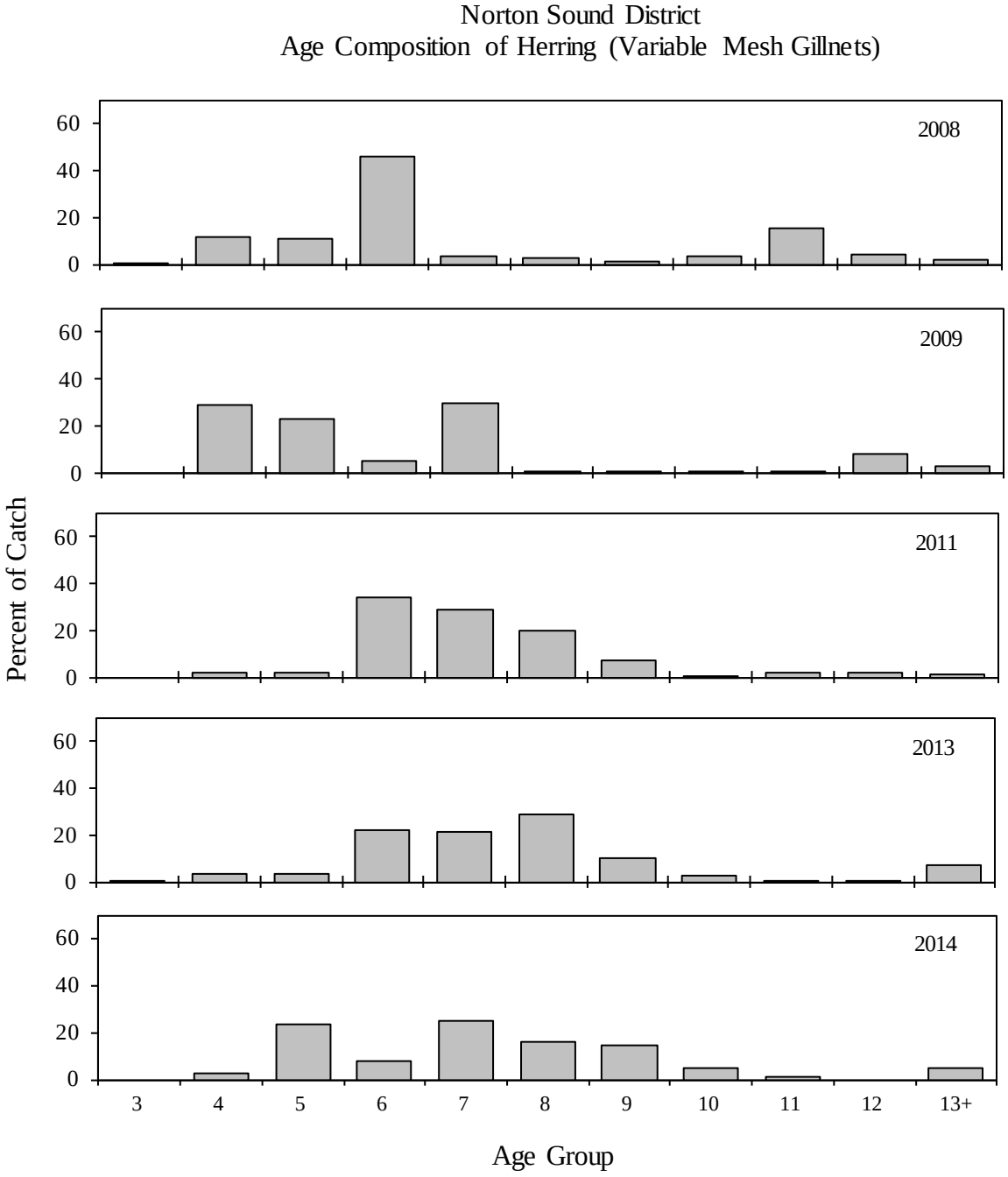
Appendix D8.–Norton Sound herring age class composition by percentage of total catch, variable mesh gillnets, 1990–1995.



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, 2008–2016.

Note: Herring age class composition by percentage of total catch for 2010, 2012, and 2015–2016 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, 1990–2016.

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

-continued-

Year	GHL (lb) [b]	Commercial harvest (lb) [a,b] Open access	Commercial harvest (lb) [a,b] CDQ	Number of Vessels	Number of Permits	Number of Landings	Number of pots Registered	Number of pots Pulls	Avg weight (lb)	Exvessel price/lb	Fishery value (millions $)	Season length Days	Season length dates Open access	Season length dates CDQ
2011	0.36	0.37	0.03	24	25	173	1,040	6,808	2.8	5.23	2.016	33	6/28–7/30	6/28–7/08
2012	0.47	0.44	0.03	40	29	312	1,200	10,041	2.9	5.41	2.556	72	6/29–8/11	6/29–9/08
2013	0.50	0.37	0.02	37	33	460	1,420	15,058	3.0	5.63	2.165	74	7/03–9/14	7/03–9/14 [h]
2014	0.38	0.36	0.03	52	33	309	1,560	10,127	3.0	5.12	1.960	52	6/25–8/02	6/25–8/15
2015	0.39	0.37	0.03	42	36	251	1,480	8,356	2.8	5.40	2.130	26	6/29–7/24	6/29–7/24 [k]
2016	0.52	0.46	0.04	36	38 [l]	229 [l]	1,520	8,009 [l]	3.0	6.50	2.710	25	6/27–7/21	6/27–7/08

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 actually began July 8.

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

[g] First delivery was made July 10.

[h] First delivery was made July 16.

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

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

[k] Final delivery was made July 17.

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

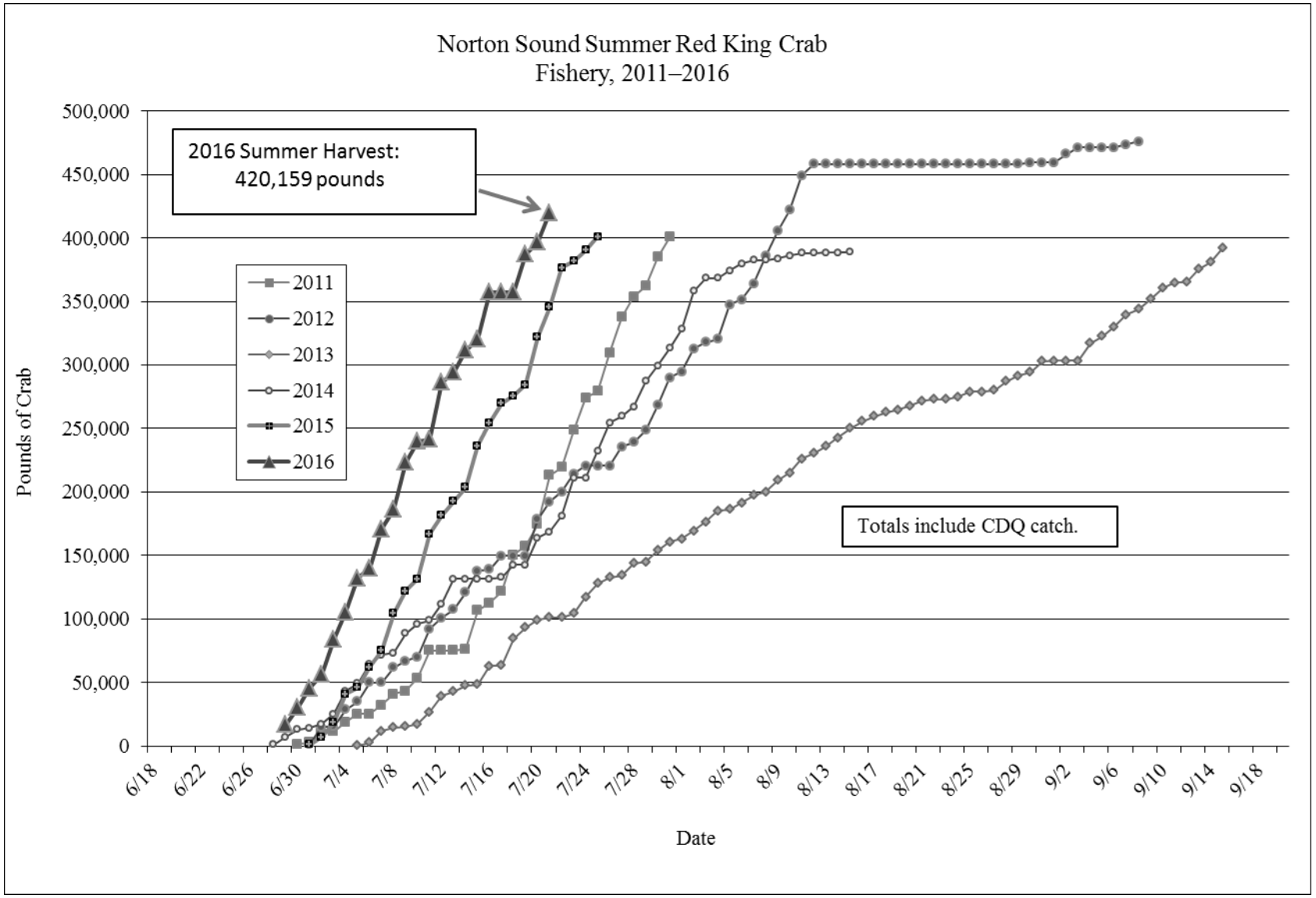
Appendix E2.–Average length and percentage of recruit and postrecruit male red king crab from summer commercial fishery catch samples in Norton Sound Section, Eastern Bering Sea, 1990–2016.

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

[a] Recruits are all new-shell, legal size, male king crab of carapace length <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, 2011–2016.

Appendix E4.–Historical winter commercial red king crab fishery catch statistics and economic performance, Norton Sound Section, Eastern Bering Sea, 1990–2016.

Year	Commercial harvest (lb) [a]	Permits fished	Landings	Pot pulls	CPUE	Average weight (lb)	Exvessel price/lb	Fishery value ($)	Season dates [b]
1990 [c]	9,792	12	199	257	14	2.8	5.33 [d]	19,327 [d]	11/15–5/15
1991 [c]	10,064	11	187	609	6	2.7	5.00 [d]	19,000 [d]	11/15–5/15
1992	21,177	13	287	1,823	4	2.8	3.60	76,283	11/15–5/15
1993 [c]	4,926	8	66	[c]	[c]	2.8	2.84 [d]	14,000 [d]	11/15–5/15
1994	17,214	25	183	1,018	6	3.0	3.01	51,709	11/15–5/15
1995	21,813	42	345	3,302	2	2.9	3.09	66,190	11/15–5/15
1996	5,064	9	68	292	7	2.5	3.16	14,838	11/15–5/15
1997	[d]	2	[d]	[d]	[d]	[d]	2.81	[d]	11/15–5/15
1998	2,349	5	31	749	1	2.4	3.57	8,168	11/15–5/15
1999	7,041	5	61	425	6	2.6	3.69	24,777	11/15–5/15
2000	7,894	10	90	1,230	2	2.6	3.72	29,300	11/15–5/15
2001	2,943	3	21	534	2	2.7	3.60	10,582	11/15–5/15
2002	6,860	11	68	1,247	2	2.7	3.53	22,682	11/15–5/15
2003	16,827	13	128	1,960	3	2.5	3.52	57,577	11/15–5/15
2004 [e]	1,293	2	16	397	1	2.5	3.95	5,110	11/15–5/15
2005	5,619	4	51	1,076	2	2.7	4.52	25,054	11/15–5/15
2006	[d]	1	[d]	[d]	[d]	[d]	3.98	[d]	11/15–5/15
2007	8,023	8	106	926	4	2.4	3.06	24,464	11/15–5/15
2008	14,676	9	129	1,008	6	2.5	3.03	43,664	11/15–5/15
2009	12,348	7	130	1,282	4	2.5	3.01	32,649	11/15–5/15
2010	12,028	10	184	1,848	3	2.5	3.54	41,265	11/15–5/15
2011	8,669	5	129	1,747	2	2.6	3.59	30,776	11/15–5/15
2012	24,142	35	319	1,668	5	2.6	6.47	150,569	11/15–5/15
2013	62,179	26	495	6,093	4	2.8	6.73	402,256	11/15–5/15
2014	34,587	21	323	4,037	4	2.3	6.94	234,291	11/15–5/15
2015	98,750	44	664	7,314	6	2.4	6.57	617,434	11/15–4/30
2016 [f]	79,986	48	471	5,459	5	2.7	7.22	559,803	2/15–4/21
Average 2011–15	45,665	26	386	4,172	4	2.5	6.06	287,065	
Average 2006–15	27,562	17	248	2,593	6	2.6	4.69	157,812	

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

[a] Deadloss included in total.

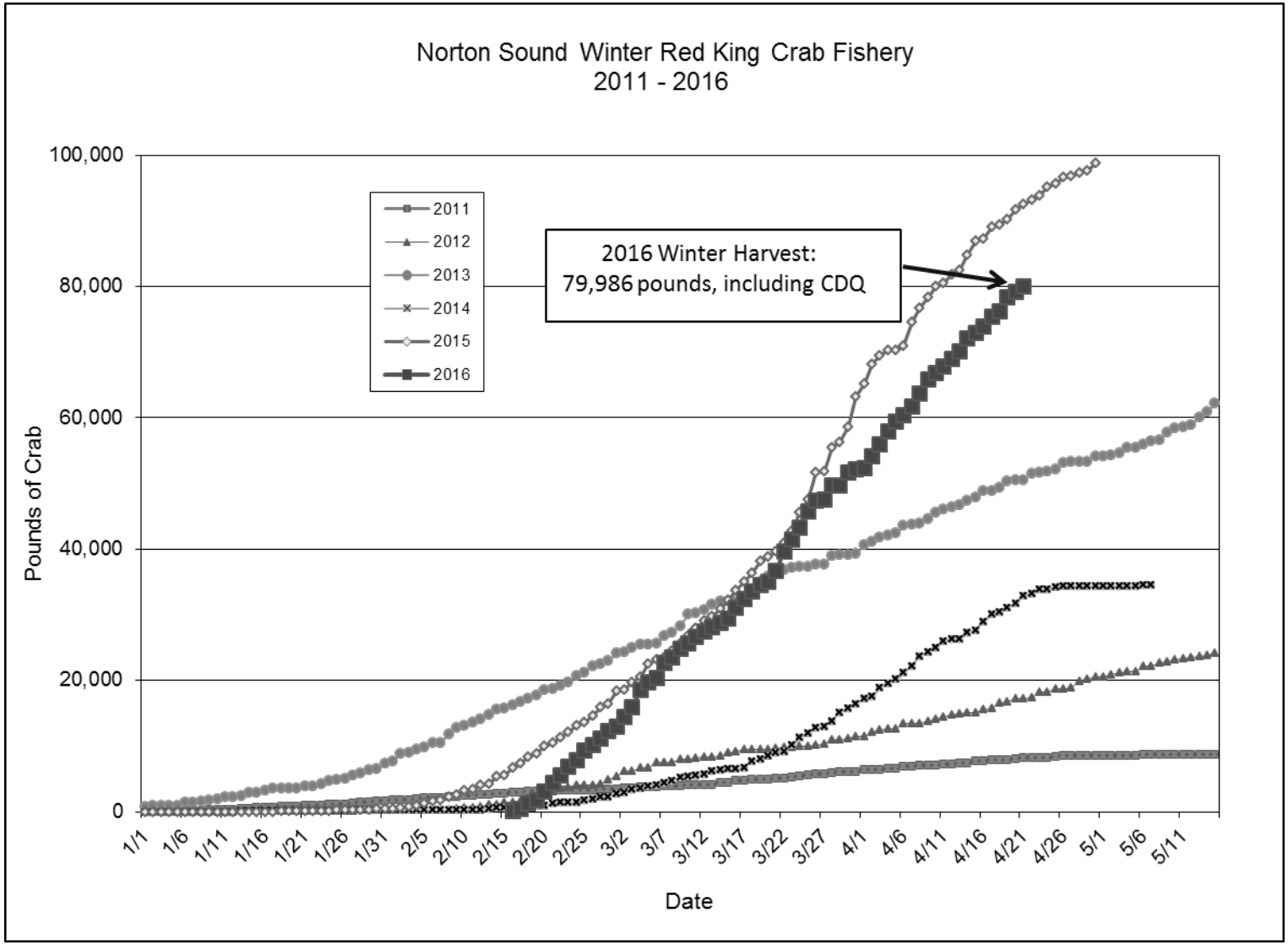
[b] Prior to 2015, season dates were from November 15 of the previous year to May 15 of the current year. In 2015, season dates were from November 15, 2014 to April 30, 2015.

[c] Information is not available.

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

[e] Confidentiality was waived by the fishermen.

[f] Information includes 35,207 pounds, 187 landings, 22 permits, 2,201 pot pulls, and $255,686 from the winter CDQ fishery.



Appendix E5.–Current and historical catch performance for the Norton Sound winter commercial crab fishery, 2010–2016.

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

Appendix E6.–Summer subsistence red king crab harvests, Norton Sound, Eastern Bering Sea, 2004–2016.

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
Average 2011–15	41	40	21	3,294	1,901	2.4	4,519	98
Average 2006–15	31	30	16	2,274	1,307	2.4	3,079	89

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, 1989–2016.

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
Average 2011–15	152	151	104	11,509	6,517	2.0	13,468	62
Average 2006–15	136	135	97	11,567	6,580	2.1	13,357	66

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

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

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

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

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

Appendix E8.–Summer and winter, commercial and subsistence red king crab harvests in pounds, Norton Sound, Eastern Bering Sea, 1990–2016.

	Commercial					Subsistence				
Year	Summer harvest	Winter harvest	Winter/ total harvest (%)	Total harvest	Guideline harvest level	Summer harvest [a]	Winter harvest [a]	Winter/ total harvest (%)	Total harvest	Combined total harvest [b]
1990	192,831	9,792	5	202,623	200,000	[c]	27,464	100	27,464	230,087
1991	[d]	10,064	100	10,064	[d]	[c]	15,911	100	15,911	25,975
1992	74,029	21,177	22	95,206	340,000	[c]	27,345	100	27,345	122,551
1993	335,790	4,926	1	340,716	340,000	[c]	2,479	100	2,479	343,195
1994	327,858	17,214	5	345,072	340,000	[c]	10,241	100	10,241	355,313
1995	322,676	21,813	6	344,489	340,000	[c]	12,968	100	12,968	357,457
1996	224,231	5,064	2	229,295	340,000	[c]	3,408	100	3,408	232,703
1997	92,988	[e]	[e]	92,988	80,000	[c]	1,512	100	1,512	94,500 [f]
1998	29,684	2,349	7	32,033	80,000	[c]	16,296	100	16,296	48,329
1999	23,553	7,041	23	30,594	80,000	[c]	15,744	100	15,744	46,338
2000	312,524	7,894	2	320,418	336,000	[c]	11,961	100	11,961	332,379
2001	288,199	2,943	1	291,142	303,000	[c]	558	100	558	291,700
2002	259,601	6,860	3	266,461	248,000	[c]	7,888	100	7,888	274,349
2003	267,207	16,827	6	284,034	253,000	[c]	8,114	100	8,114	292,148
2004	340,746	1,293	0	342,039	326,500	805	2,338	74	3,143	345,182
2005	400,804	5,619	1	406,423	370,000	727	8,542	92	9,269	415,692
2006	451,748	[e]	[e]	451,748	454,000	155	2,974	95	3,129	454,877 [f]
2007	312,875	8,023	3	320,898	315,000	2,318	20,525	90	22,843	343,741
2008	395,135	14,676	4	409,811	412,000	2,705	19,255	88	21,959	431,770
2009	397,587	12,348	3	409,935	375,000	1,502	9,456	86	10,958	420,893
2010	417,304	12,028	3	429,332	400,000	1,518	14,018	90	15,536	444,868
2011	400,840	8,669	2	409,509	358,000	6,193	13,811	69	20,004	429,513
2012	475,990	24,142	5	500,132	465,450	2,189	15,774	88	17,963	518,095
2013	391,863	62,179	14	454,042	495,600	4,663	17,240	79	21,902	475,944
2014	389,008	34,587	8	423,595	382,800	3,025	5,886	66	8,911	432,506
2015	401,115	98,750	20	499,865	394,600	6,525	14,613	69	21,138	514,478
2016	420,159	79,986	16	500,145	517,200	4,825	11,898	71	16,723	516,868
Average 2011–15	411,763	45,665	10	457,429	419,290	4,519	13,465	74	17,984	474,107
Average 2006–15	403,347	27,562	7	430,887	405,245	3,079	13,355	82	16,434	445,757

[a] Harvest in pounds is derived by multiplying number of crab by 0.5 pound less than the average weight from the respective commercial fishery.
[b] Combined total harvest is from summer and winter, commercial and subsistence red king crab harvests.
[c] There were no recorded summer subsistence harvests prior to 2004.
[d] There was no summer commercial fishery, therefore no GHL was set.
[e] Information is confidential.
[f] Does not contain winter commercial harvest because it is confidential information.

Appendix E9.–The results of the population assessment trawl surveys conducted for red king crab in Norton Sound since 1990.

Year	Date	Research agency	Population abundance estimates [a] (number of crab) Pre-2 males [b]	Pre-1 males [b]	Legal males [c]	Legal male biomass (millions of lb) [d]	Standard error (number of crab) 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

[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.

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

[c] Legal male red king crab were defined as ≥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 ≥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.

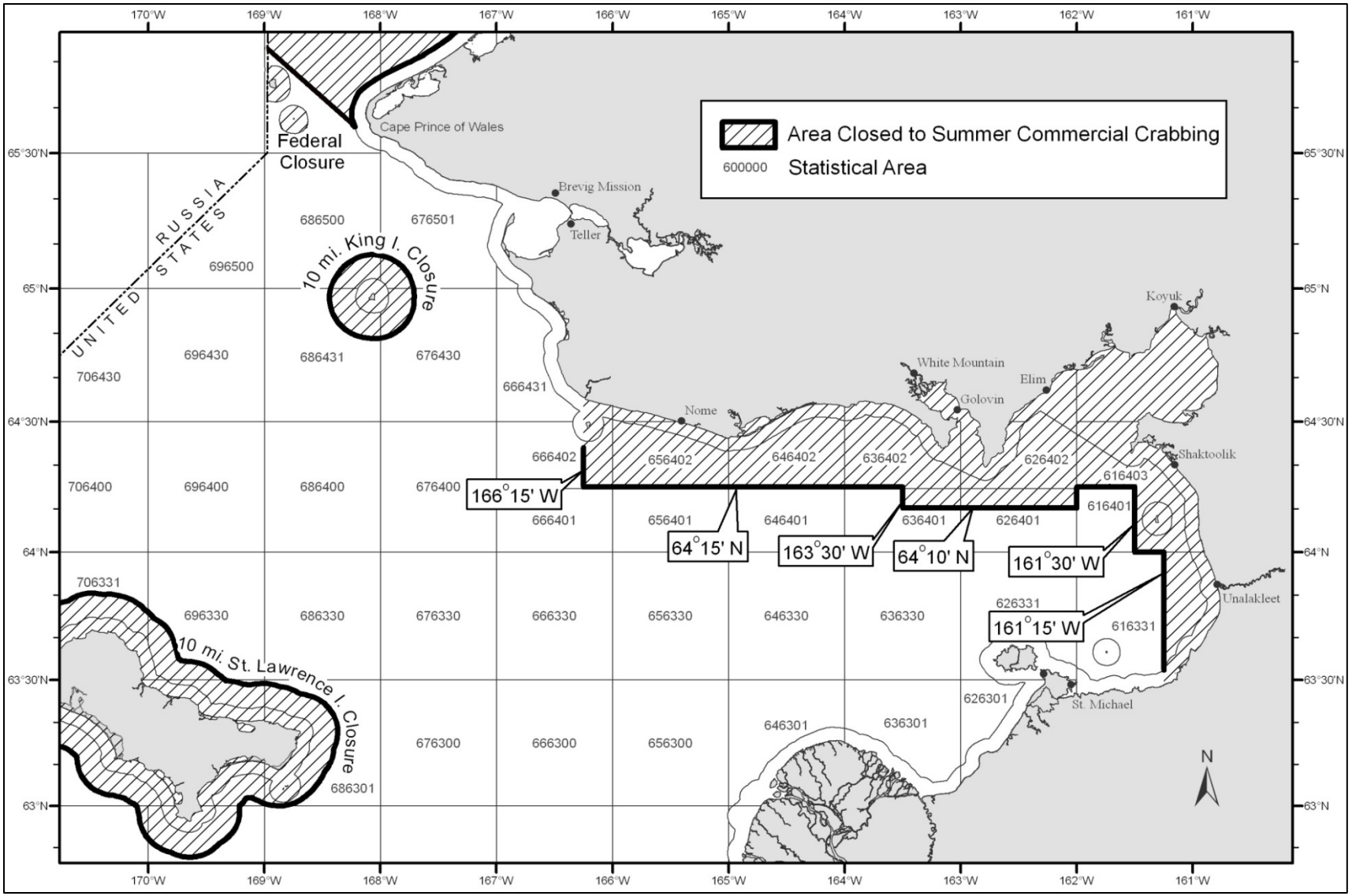
[c] Includes Prerecruit 3.

Appendix E11.–Reported number of crab pots lost during the commercial and subsistence winter crab fisheries, and ADF&G studies/surveys, 2005–2016.

Year	Commercial [a]	Subsistence	ADF&G winter study & spring/fall tagging studies [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

[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, 1990–2016 (catch in pounds).

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

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Appendix E13.–Page 2 of 3.

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

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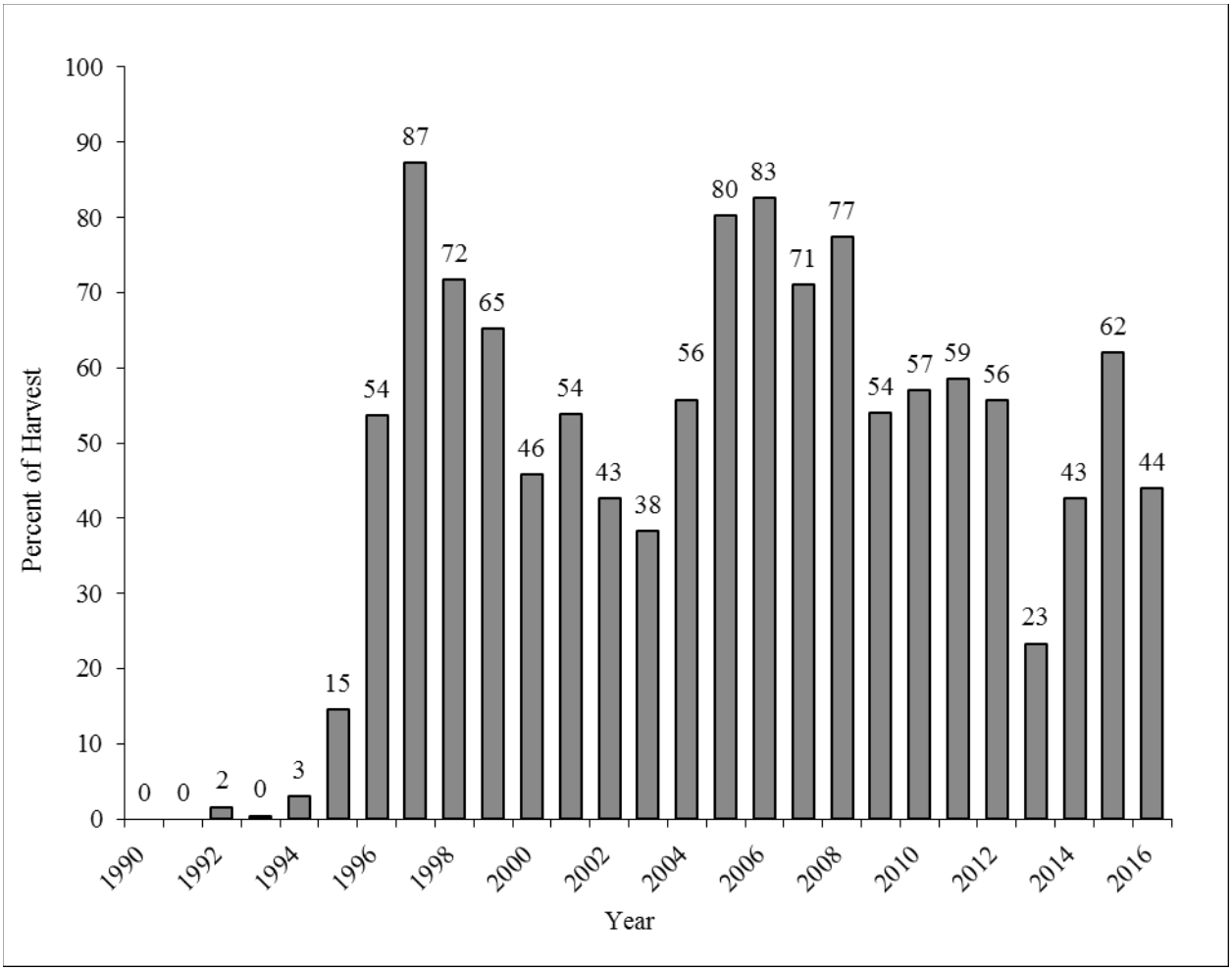
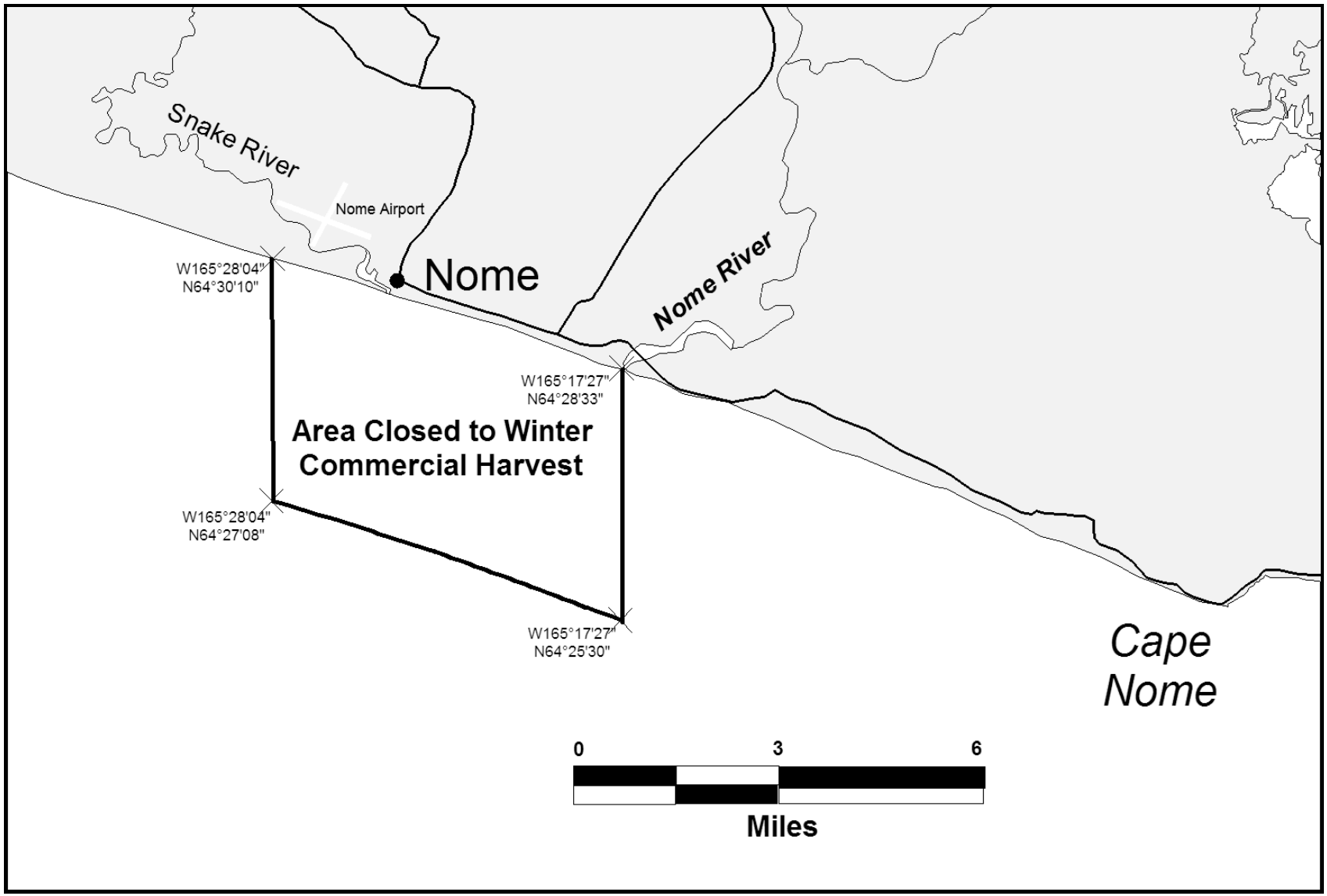
Statistical Area	2010	2011	2012	2013	2014	2015	2016	Total
616331	0	0	0	0	4,923	3,410	0	26,625
616401	0	0	0	7,729	4,692	1,929	0	21,202
626331	0	2,489	0	686	0	0	0	40,406
626401	52,054	85,271	115,524	36,802	69,936	103,881	19,488	1,206,060
626402	0	0	0	0	0	0	0	1,352
636330	2,584	0	1,454	12,035	7,565	2,680	10,122	93,975
636401	182,040	146,973	148,183	34,027	78,572	137,285	154,502	2,458,841
636402	0	0	0	0	0	0	0	5,220
646301	0	0	0	0	0	0	0	18,516
646330	1,205	0	1,204	4,195	5,390	1,812	0	42,031
646401	77,437	83,099	98,811	59,737	36,409	58,929	126,906	790,151
646402	0	0	0	5,271	0	0	0	212,483
656300	0	0	0	0	0	0	0	3,139
656330	17,660	1,546	8,168	8,515	0	4,828	307	274,720
656401	82,747	77,149	85,920	147,569	122,631	69,355	97,414	1,487,024
656402	0	0	0	37,743	0	0	0	389,993
666230	0	0	0	0	0	0	0	1,721
666300	0	0	0	0	0	0	0	43,764
666330	0	2,042	1,000	0	0	0	0	102,084
666401	0	0	15,726	33,469	38,099	9,308	6,030	571,460
666402	1,577	2,271	0	1,419	18,968	7,699	5,391	131,629
666431	0	0	0	2,669	1,825	0	0	9,937
676300	0	0	0	0	0	0	0	546
676330	0	0	0	0	0	0	0	0
676400	0	0	0	0	0	0	0	13,167
676430	0	0	0	0	0	0	0	0
676501	0	0	0	0	0	0	0	1,008
686330	0	0	0	0	0	0	0	0
686431	0	0	0	0	0	0	0	340
Total	417,304	400,840	475,990	391,863	389,008	401,115	420,160	7,947,394
(tons)	209	200	238	196	195	201	210	3,764

Note: No commercial fishery occurred in 1991.

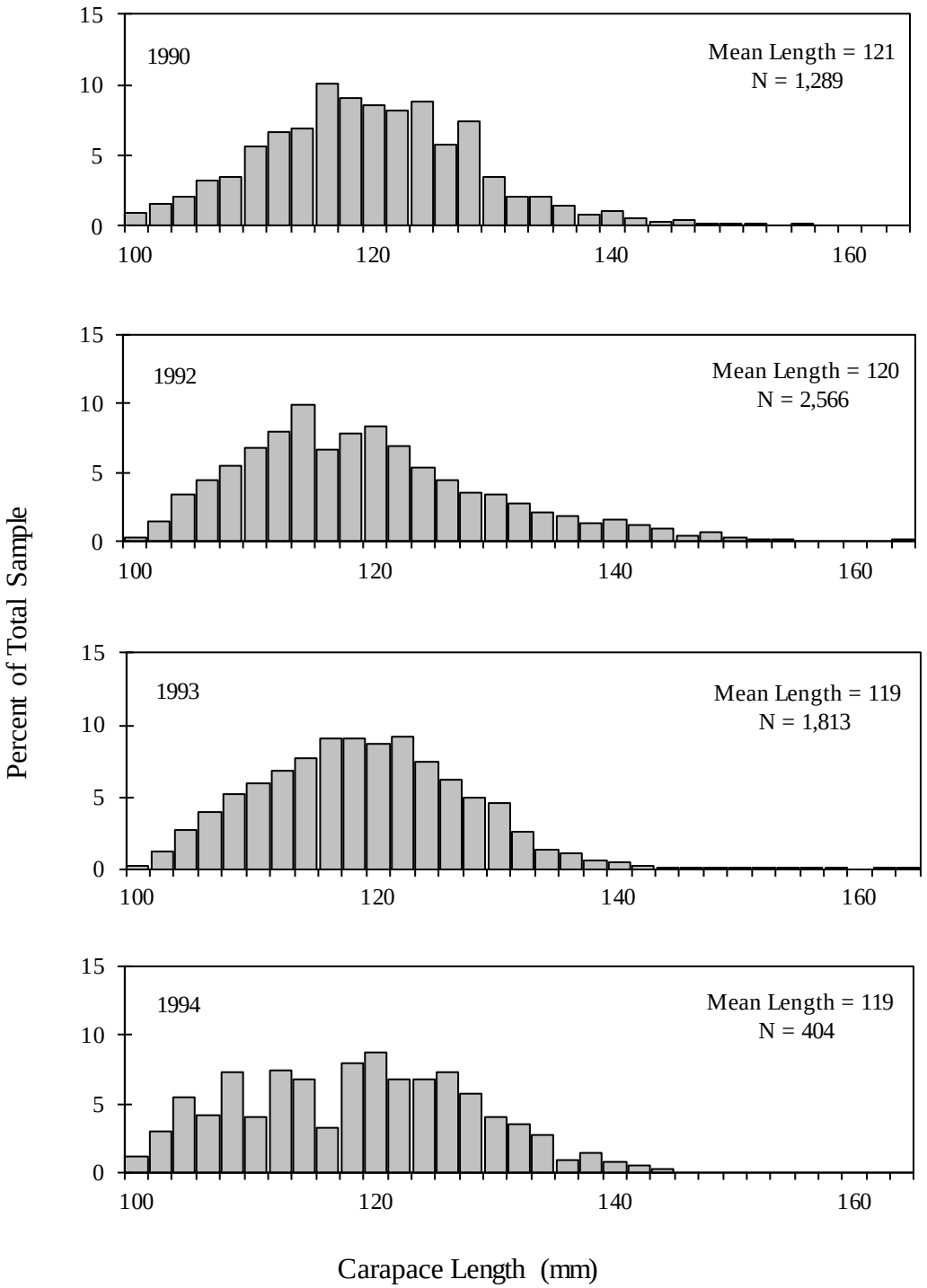
[a] Does not include approximately 2,490 lb not reported on fish tickets.



Appendix E14.–The percent of crab harvested during the Norton Sound summer commercial red king crab fishery east of 164°W longitude, 1990–2016.

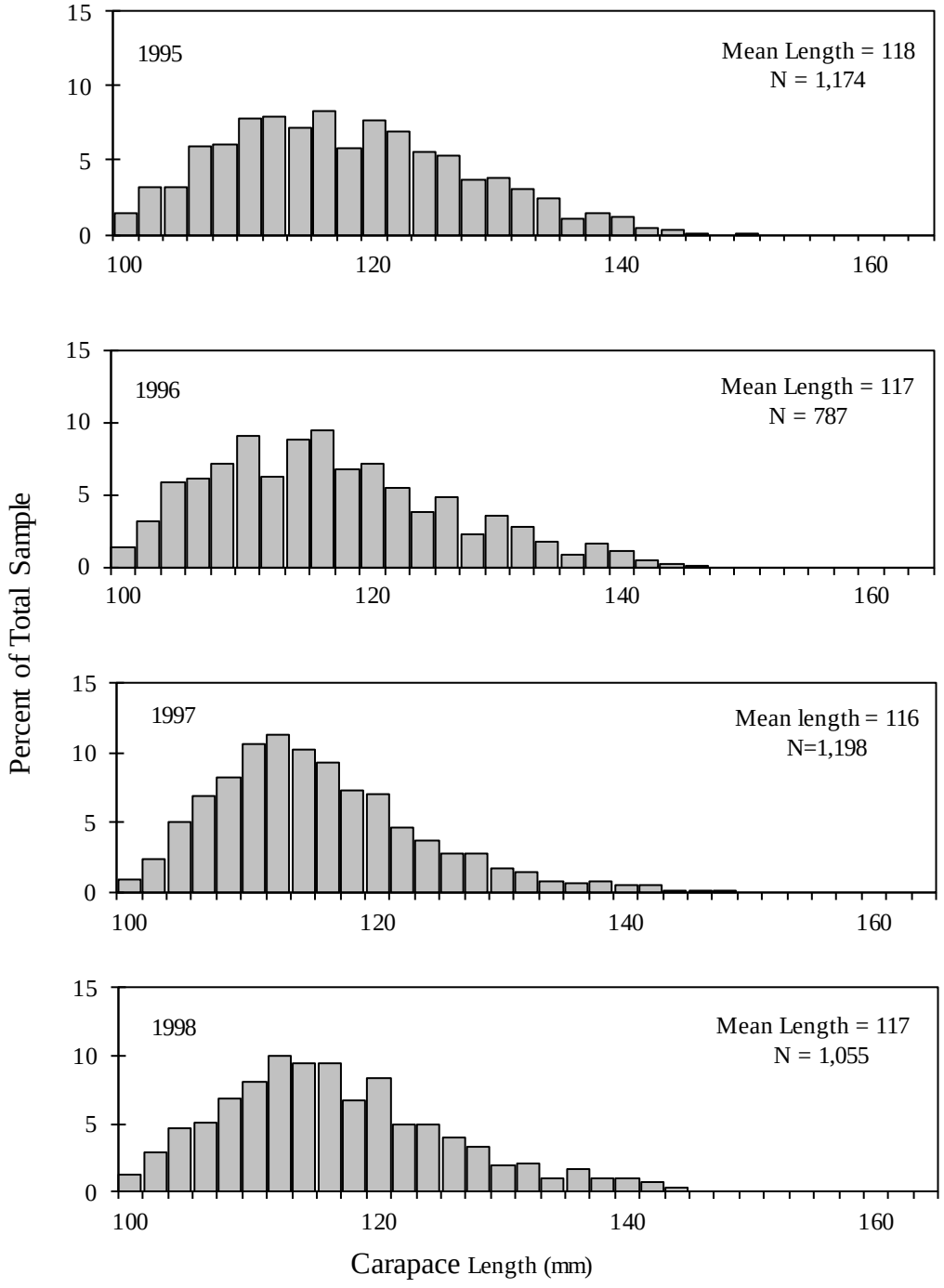


Appendix E15.–Closed waters area in effect for the Norton Sound winter commercial crab fishery.

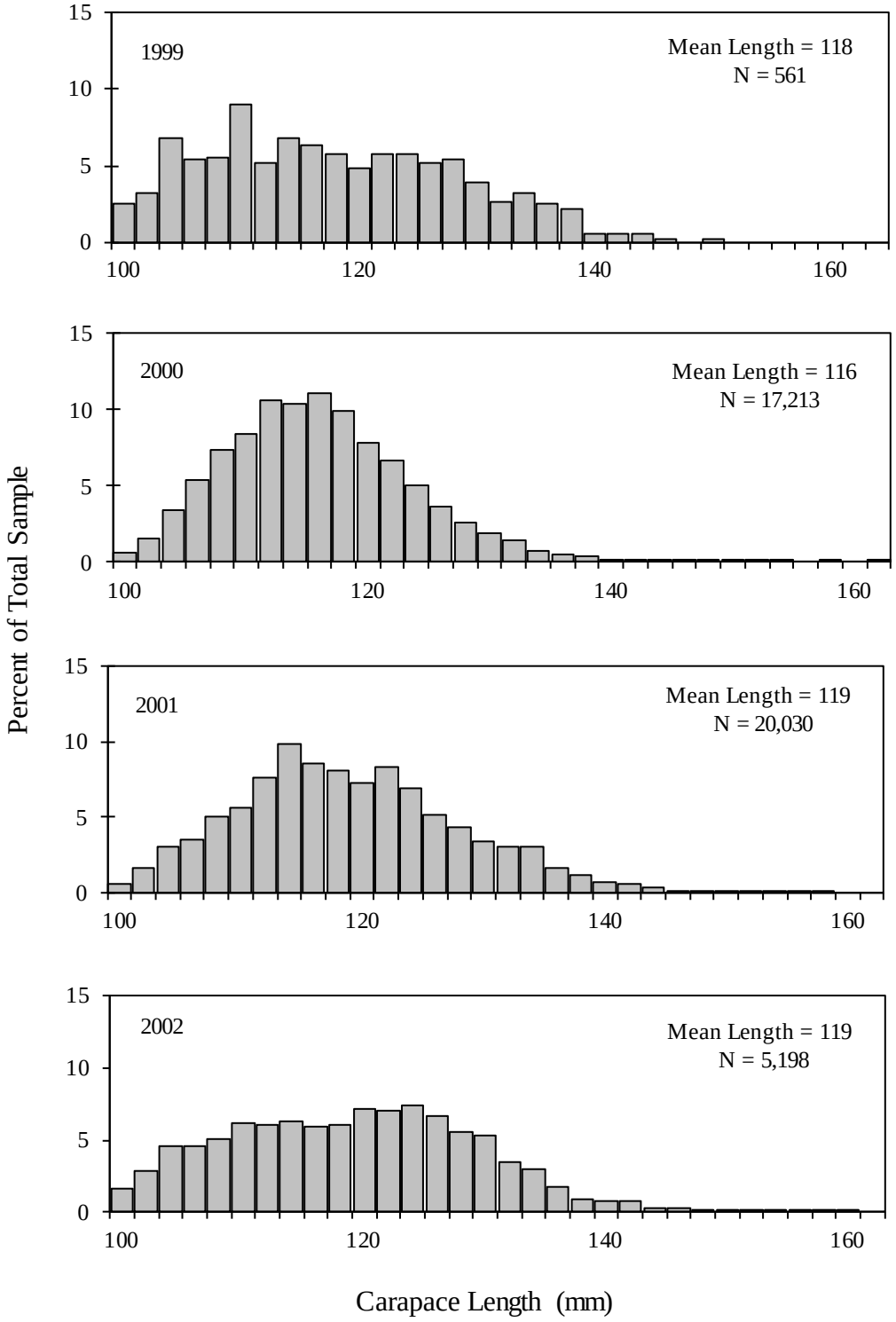


Appendix E16.–Length composition of Norton Sound red king crab summer commercial harvests, 1990–1994.

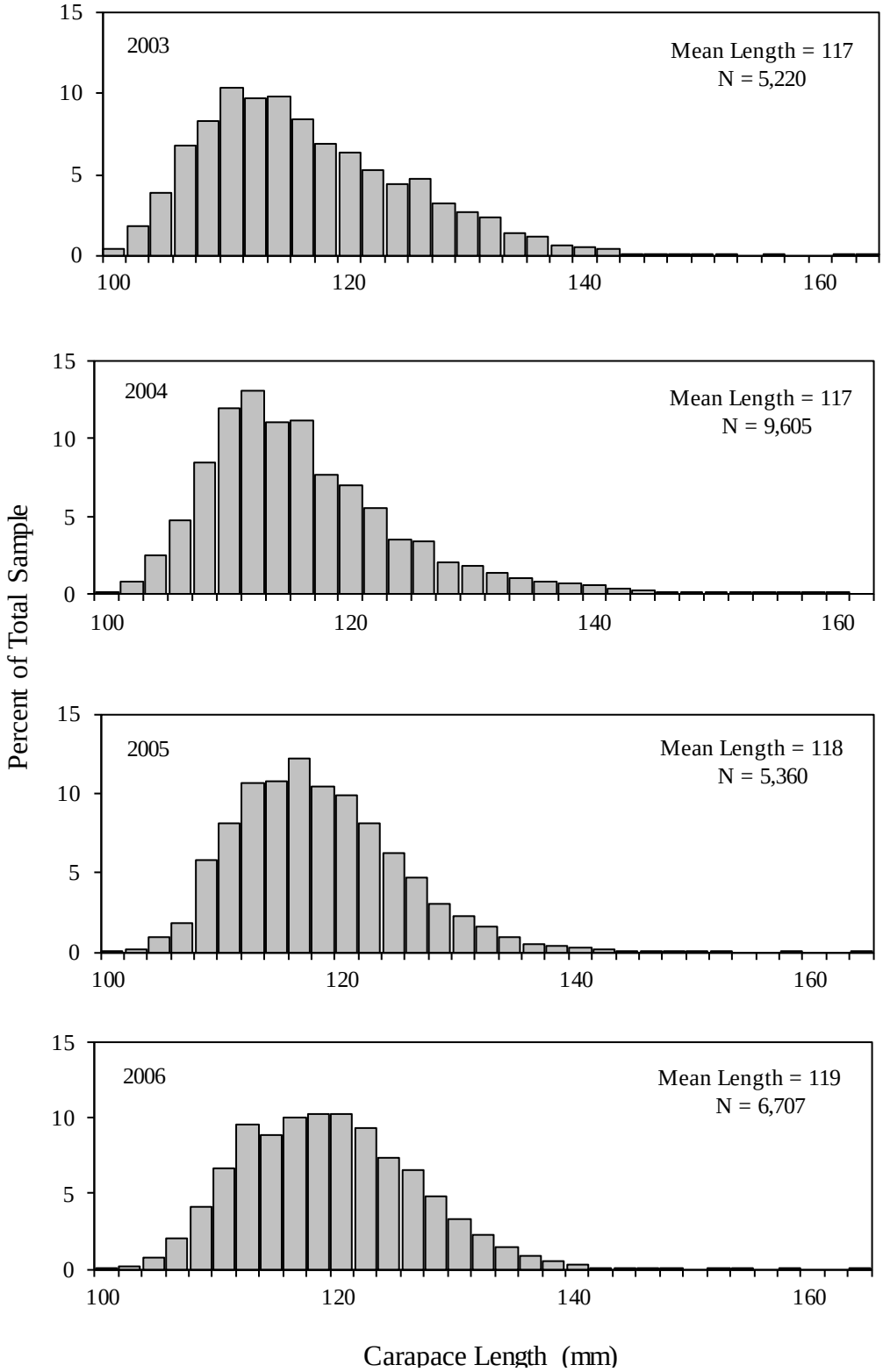
Note: No fishery in 1991.



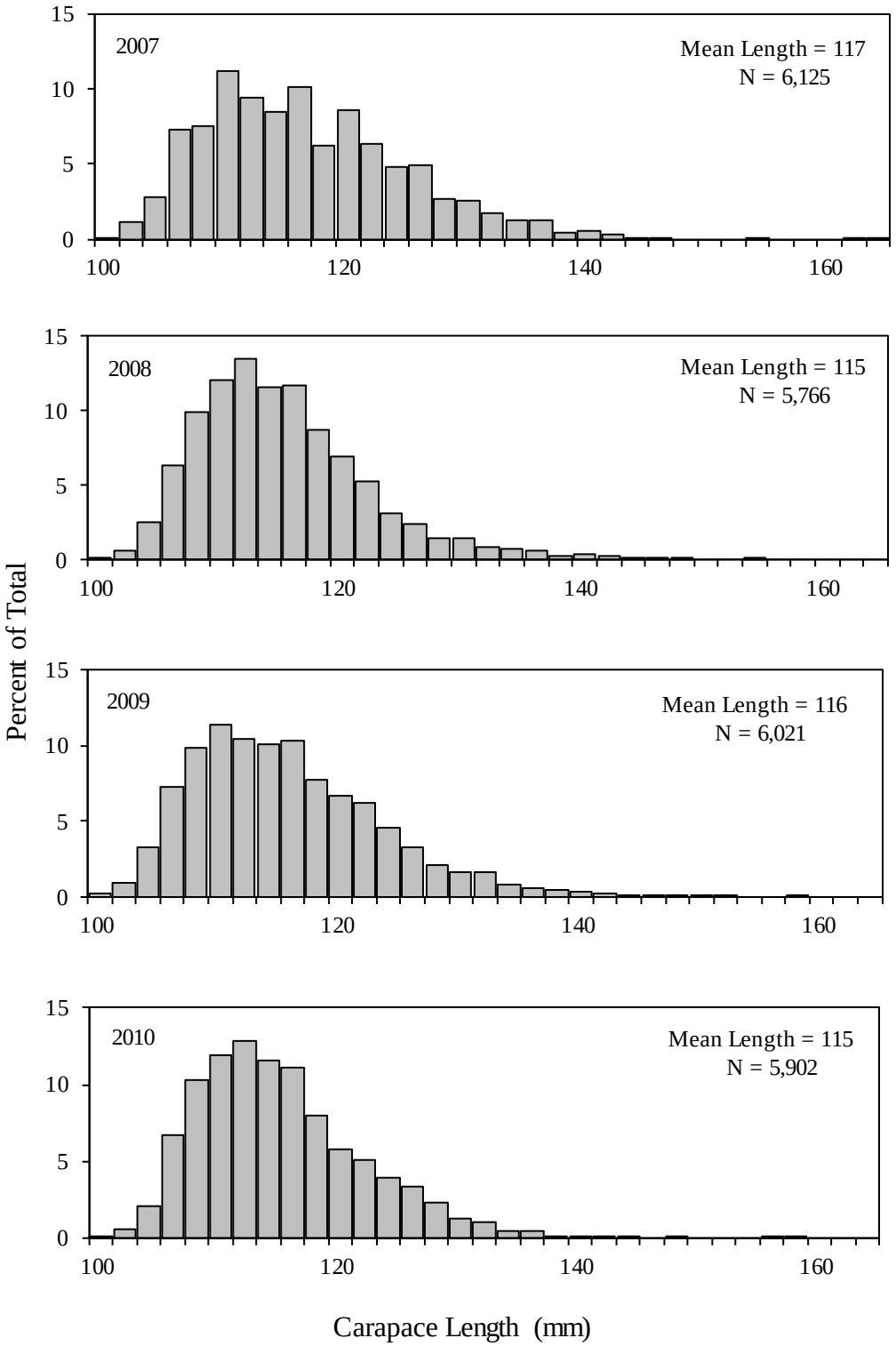
Appendix E17.–Length composition of Norton Sound red king crab summer commercial harvests, 1995–1998.



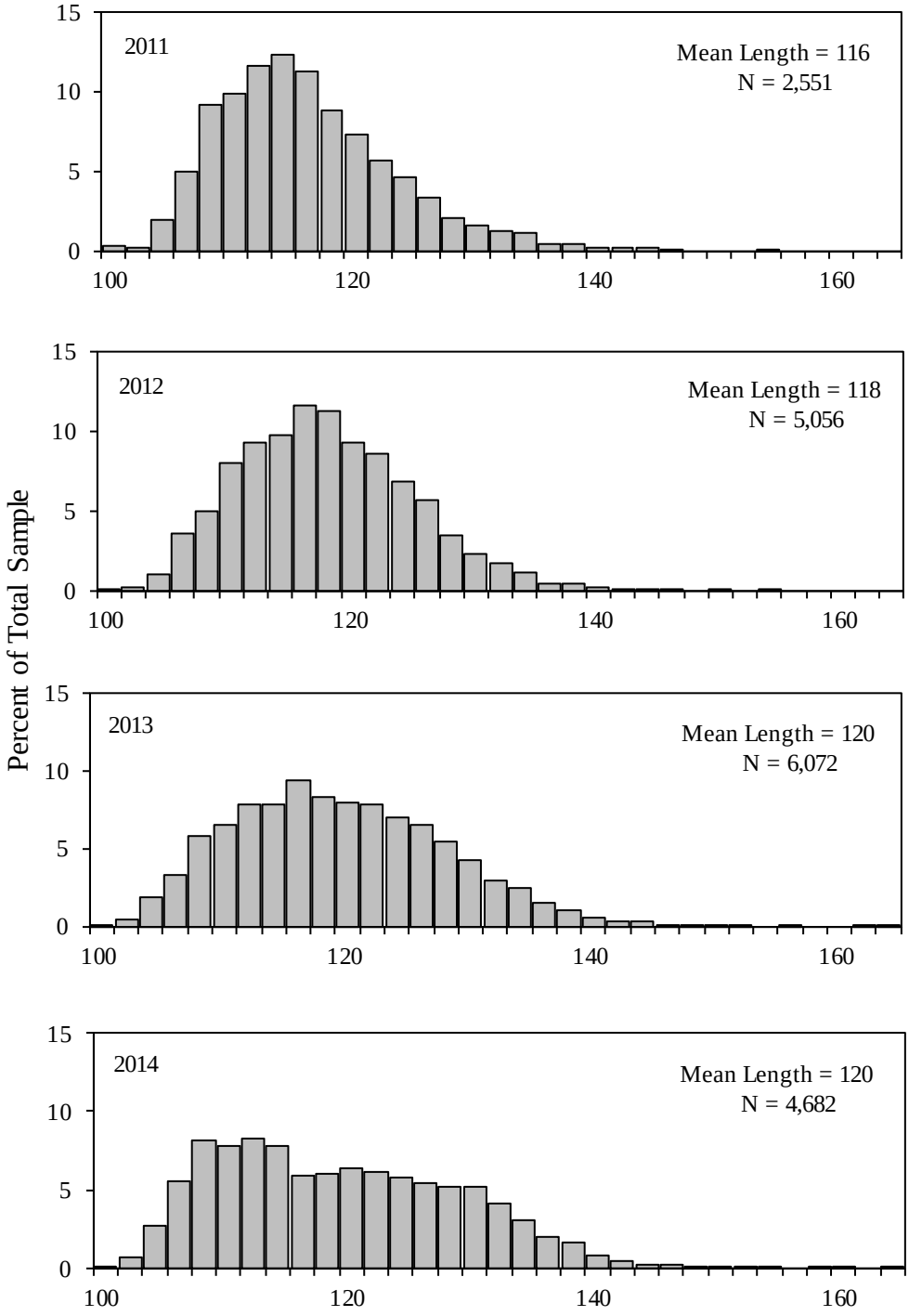
Appendix E18.–Length composition of Norton Sound red king crab summer commercial harvests, 1999–2002.



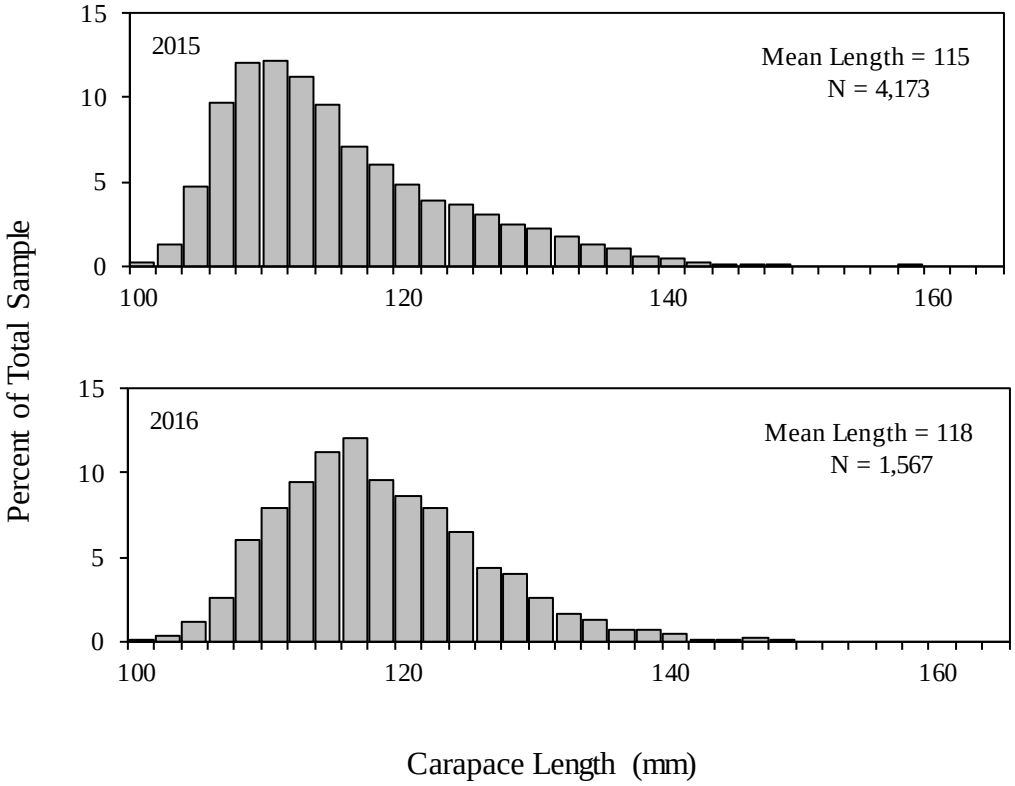
Appendix E19.–Length composition of Norton Sound red king crab summer commercial harvests, 2003–2006.



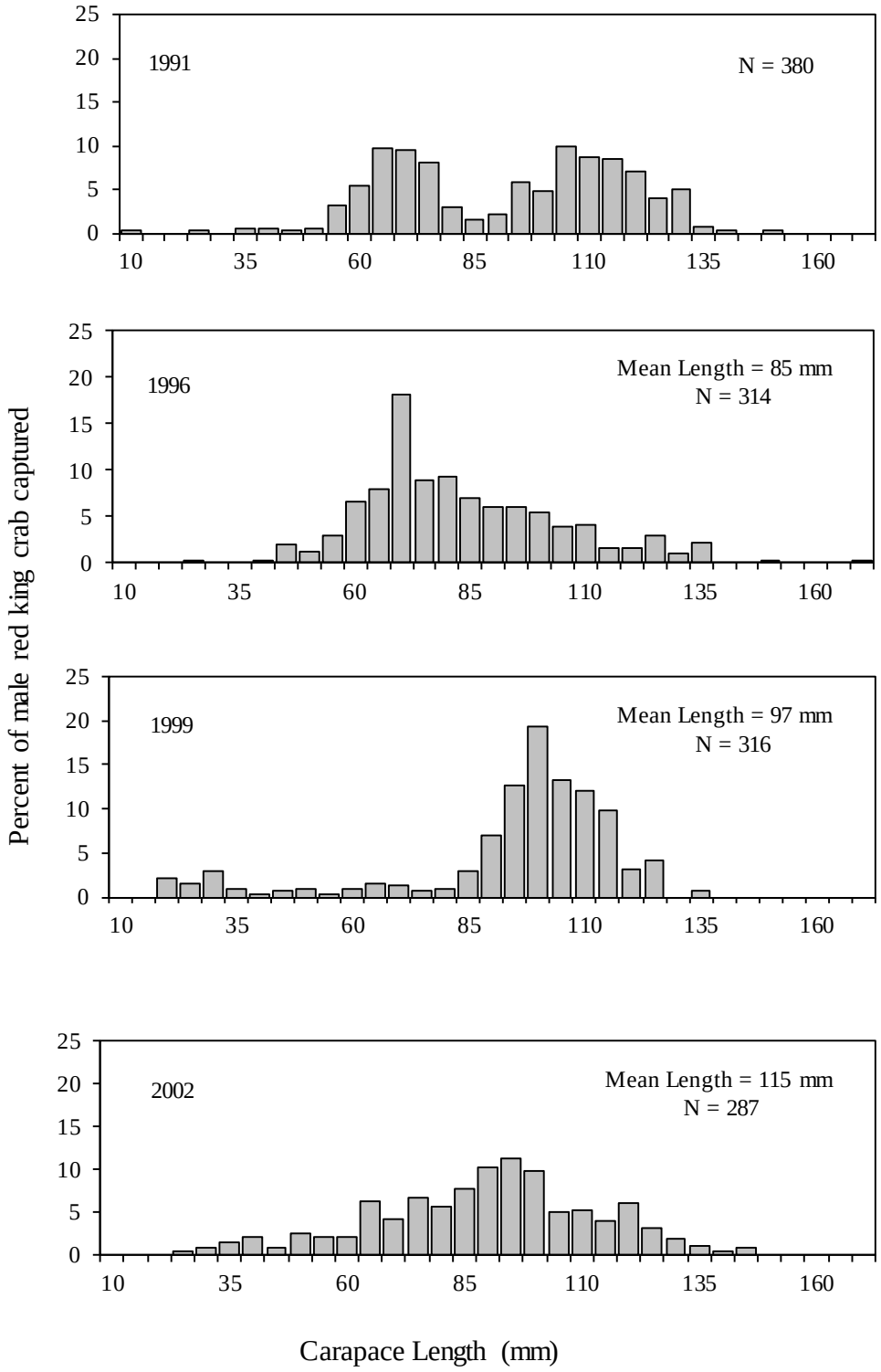
Appendix E20.–Length composition of Norton Sound red king crab summer commercial harvests, 2007–2010.



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

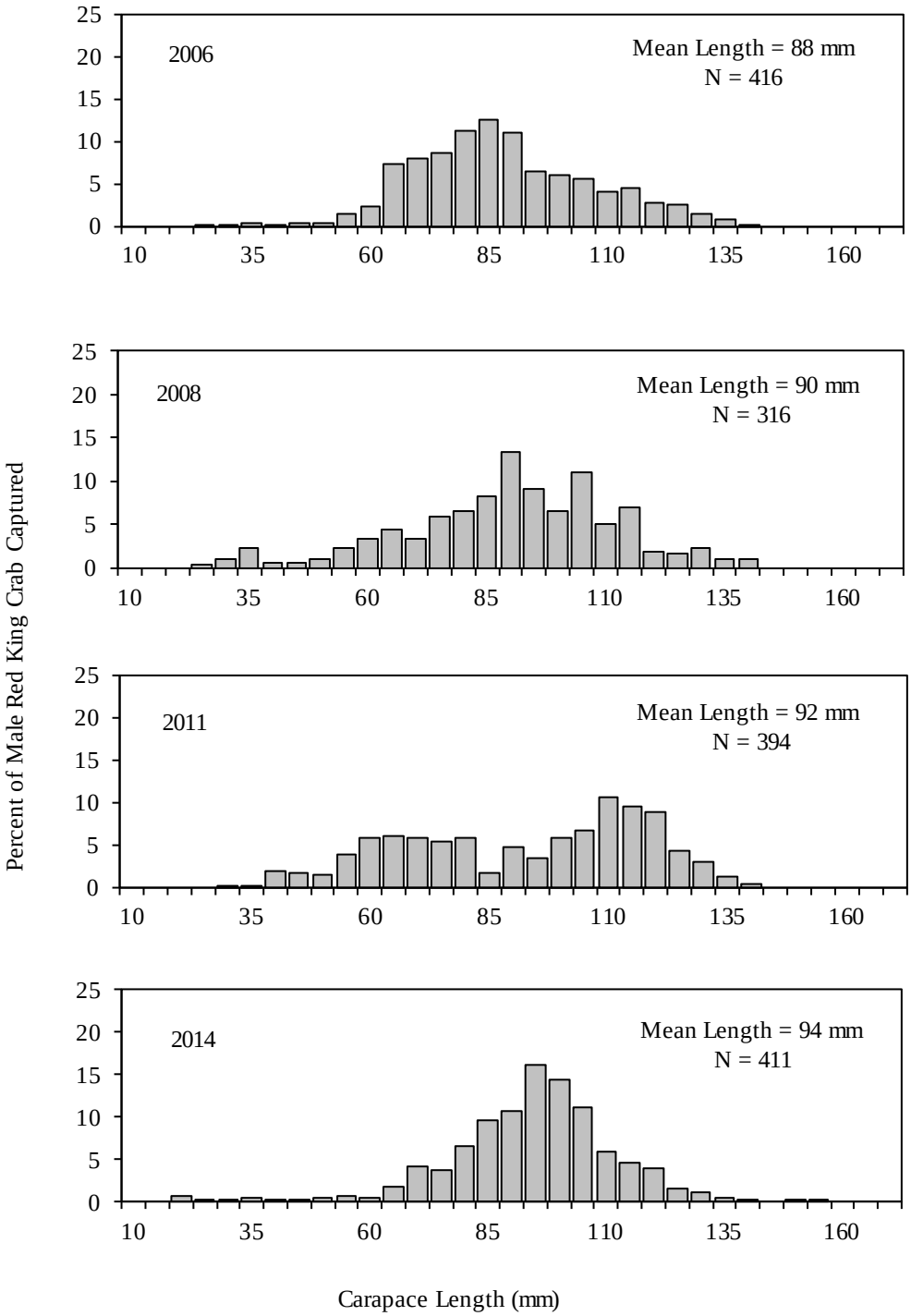


Appendix E22.–Length composition of Norton Sound red king crab summer commercial harvest, 2015–2016.



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

Note: Mean length information is not available for 1991.



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

APPENDIX F: MISCELLANEOUS FISHERIES

Appendix F1.–Kotzebue District winter commercial sheefish harvest statistics, 1990–2016.

Year [b]	Number of fishermen	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]						
1995	1	226	2,240	9.9	0.50	1,120
1996	2	308	3,002	9.7	0.44	1,321
1997 [e]						
1998	1	254	2,400	9.4	0.43	1,032
1999–2000 [e]						
2001	1	19	200	10.5	1.00	200
2002	4	30	300	10.0	1.00	300
2003	1	122	1,250	10.2	0.56	700
2004	1	37	474	12.8	1.91	905
2005	3	242	3,744	15.5	1.20	4,493
2006–2010 [e]						
2011	1		[f]		2.09	[f]
2012–2014 [e]						
2015	2		[f]		1.02	[f]
2016	2		[f]		1.25	[f]

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

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

[c] Data unavailable or incomplete.

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

[e] No reported commercial catches.

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

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

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

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

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

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

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

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

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

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

Appendix F3.–Non-salmon sport fish harvests in Norton Sound and Kotzebue/Chukchi Sea, 1990–2016.

	Norton Sound		Kotzebue / Chukchi Sea		
Year	Dolly Varden	Arctic Grayling	Dolly Varden	Arctic Grayling	Inconnu/ Sheefish
1990	3,765	1,378	806	622	151
1991	10,365	5,121	1,149	1,981	603
1992	2,382	492	582	968	1,904
1993	5,907	1,584	914	916	1,029
1994	3,071	1,331	2,365	814	564
1995	2,908	1,037	939	910	1,142
1996	4,285	1,485	913	2,136	485
1997	4,467	1,262	598	1,903	906
1998	2,240	298	440	1,788	414
1999	6,708	1,600	796	1,247	635
2000	7,952	1,203	1,599	1,233	1,201
2001	3,174	994	1,693	1,244	1,305
2002	2,252	1,565	1,884	1,994	500
2003	5,531	1,778	533	1,473	2,509
2004	4,318	824	1,285	1,983	1,634
2005	2,617	595	239	269	393
2006	3,180	419	2,328	760	810
2007	2,808	314	2,924	836	1,066
2008	3,319	965	852	293	61
2009	3,373	1,185	1,406	445	957
2010	1,835	232	493	366	595
2011	4,041	1,398	865	486	385
2012	252	520	781	626	104
2013	1,184	500	1,074	563	218
2014	154	0	216	237	244
2015	412	154	221	664	1,191
2016	Information is not yet available				
Average					
2011–2015	1,209	514	631	515	428
2006–2015	2,056	569	1,116	528	563

Appendix F4.–Kotzebue District incidentally caught and sold Dolly Varden during the commercial salmon fishery, 1990–2016.

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

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

[b] Some data extrapolated from average reported weight.

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

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

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

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

Note: Data are not available for all years.

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

[b] No data are available on poundage.

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

Appendix F6.–Dolly Varden sport fish harvests in Norton Sound, by river, 1990–2016.

	Location									
Year	Marine Water	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other Streams	Total
1990	183	1,078	166	614	348				1,227	3,616
1991	0	1,220	856	1,474	1,474	729	1,252	2,219	1,141	10,365
1992	204	557	131	746	270	139	115	131	89	2,382
1993	205	917	448	427	1,003	536	331	893	1,147	5,907
1994	90	431	63	410	699	305	117	197	759	3,071
1995	0	462	74	976	346	158	131	366	395	2,908
1996	12	873	388	1,506	402	485	97	49	473	4,285
1997	189	328	65	936	2,071	346	81	186	265	4,467
1998	0	302	14	588	160	311	0	383	482	2,240
1999	330	791	45	2,384	1,952	88	44	154	920	6,708
2000	1,069	340	0	4,462	1,687	59	199	0	136	7,952
2001	166	43	270	1,002	1,197	86	108	162	140	3,174
2002	67	511	72	789	259	47	18	18	471	2,252
2003	0	1,223	482	134	110	712	13	0	2,857	5,531
2004	72	226	0	3,593	120	42	0	53	212	4,318
2005	95	553	12	500	1,148	141	27	0	141	2,617
2006	0	959	0	1,307	0	531	51	153	179	3,180
2007	14	625	0	731	193	144	461	481	159	2,808
2008	0	46	0	1,062	1,061	107	46	0	997	3,319
2009	0	253	0	2,794	108	50	50	0	118	3,373
2010	0	165	0	1,411	12	117	0	24	106	1,835
2011	0	0	11	2,219	1,631	0	10	0	170	4,041
2012	0	111	0	88	0	9	33	0	11	252
2013	0	17	0	483	0	0	0	0	684	1,184
2014	0	0	0	40	0	20	0	15	79	154
2015	0	97	0	120	0	195	0	0	0	412
2016	Information is not yet available									
Average										
2011–'15	0	45	2	590	326	45	9	3	189	1,209
2006–'15	1	227	1	1,026	301	117	65	67	250	2,056

Note: Data are not available for all years.

Appendix F7.–Aerial survey counts of overwintering and spawning Dolly Varden in the Kotzebue District, 1990–2016.

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]

[a] Counts are considered minimal because data listed include both poor and good surveys.

[b] Includes spawner counts on the Kelly, Kugurorok, and Nimiuktuk rivers, and tributaries of the Noatak River.

[c] Surveys conducted by Division of Sport Fish.

[d] Not surveyed.

[e] Poor weather hampered or prevented survey.

[f] Poor conditions on the Nimiuktuk did not allow a count.

[g] Spawning survey conducted very early (August 20, 2003).

[h] Counting conditions were poor due to presence of river ice.

Appendix F8.–Subsistence whitefish catch and effort in the Kotzebue District, 1991–2014.

Year [a]	Number of households interviewed		Number of whitefish harvested	Average catch per household
1991 [b]	63		16,015	254
1992 [b]	66		17,485	265
1993 [b]	70		19,060	272
1997	413	[c]	84,851	205
1998	435	[c]	39,754	91
1999	191	[c]	56,326	295
2000	237	[c]	70,097	296
2001	363	[c]	30,976	85
2002	101	[d]	25,607	254
2003	446		73,242	164
2004	440	[c]	50,501	115
2012	360	[c]	38,113	106
2013	618	[e]	100,948	163
2014	866	[f]	82,903	96

Note: Subsistence surveys were not conducted 1994–1996, 2005–2011, and after 2014.

[a] Whitefish harvest information was collected during chum salmon subsistence surveys and is considered a fraction of the annual catch. Whitefish numbers include all species of whitefish, except sheefish.

[b] Subsistence interviews from Noatak, Noorvik, and Shungnak villages only.

[c] Subsistence harvest information is from Ambler, Kiana, Kobuk, Noatak, Noorvik, and Shungnak.

[d] Subsistence harvest information is from Noatak and Noorvik only.

[e] Subsistence harvest information is from Ambler, Buckland, Kiana, Kobuk, Noatak, Noorvik, Selawik, and Shungnak.

[f] Subsistence harvest information is from Ambler, Buckland, Kiana, Kobuk, Noatak, Noorvik, Selawik, Shishmaref, Shungnak, and Kotzebue.

Appendix F9.–Norton Sound District winter commercial whitefish harvest statistics, 2006–2016.

Year [a]	Number of fishermen	Number of whitefish	Total pounds	Price per pound ($)	Estimated value ($)
2006–2007	1	3,209	3,723	0.44	2,635
2007–2008 [b]					
2008–2009 [b]					
2009–2010 [b]					
2010–2011	1	1,733	2,009	0.50	1,005
2011–2012	1	1,853	2,148	0.40	859
2012–2013	2	68	105	0.50	53
2013–2014 [c]	1	3,947	4,726	0.50	2,288
2014–2015 [b]					
2015–2016	3	1,971	2,076	0.50	1,038

[a] Season was from September 15 to June 15. Confidentiality was waived by fishermen.

[b] No reported sales.

[c] Total pounds include personal use.

Appendix F10.–Norton Sound District winter commercial saffron cod harvest statistics, 1993–2016.

Year [a]	Number of fishermen	Total pounds	Price per pound ($)	Estimated value ($)
1993–1994	[b]	1,402	[b]	[b]
1994–1995	[b]	52	0.50	26
2009–2010 [c]	1	1,748	0.30	524
2010–2011	5	8,031	0.50	4,016
2011–2012	9	3,780	0.47	1,772
2012–2013	25	33,939	0.50	16,970
2013–2014	27	19,050	0.50	9,525
2014–2015	16	12,973	0.50	6,487
2015–2016	6	3,921	0.50	1,961

Note: Information is not available for 1996–2008.

[a] Season was from September 15 to June 15.

[b] Information is not available.

[c] Confidentiality was waived by the fisherman.

APPENDIX G: OVERVIEW OF 2016

Appendix G1.–List of common and scientific names of finfish species of the Norton Sound, Port Clarence, Kotzebue, and Arctic Districts.

Common Name	Scientific Name
Arctic lamprey	*Lampetra camtschatica*
Arctic char	*Salvelinus alpinus*
Arctic cod	*Boreogadus saida*
Arctic flounder	*Liopsetta glacialis*
Arctic grayling	*Thymallus arcticus*
Alaska plaice	*Pleuronectes quadrituberculatus*
Burbot	*Lota lota*
Bering cisco	*Coregonus laurettae*
Bering poacher	*Ocella dodecaedria*
Bering wolfish	*Anarjicas orientalis*
Blackfish	*Dallia pectoralis*
Boreal smelt (rainbow-toothed)	*Osmerus mordax*
Broad whitefish	*Coregonus nasus*
Capelin	*Mallotus villosus*
Dolly Varden	*Salvinus malma*
Pond smelt	*Hypomesus olidus*
Humpback whitefish	*Coregonus pidschian*
Inconnu (sheefish)	*Stenodus leucichthys*
Lake trout	*Salvelinus namaycush*
Least cisco	*Coregonus sardinella*
Longhead dab	*Liranda probiscidea*
Ringtail snailfish	*Liparis rutteri*
Northern Pike	*Esox lucius*
Longnose sucker	*Casostomus catostomus*
Pricklebacks	*Stichaeidae*
Pacific herring	*Clupea harengus pallasii*
Rock flounder	*Lepidosetta bilineata*
Rock greenling (terpug)	*Hexagrammus lagocephalus*
Round whitefish	*Prosopium cylindraceum*
Sculpins	*Cottodae*
Pink salmon	*Oncorhynchus gorbuscha*
Chum salmon	*Oncorhynchus keta*
Coho salmon	*Oncorhynchus kisutch*
Sockeye salmon	*Oncorhynchus nerka*
Chinook salmon	*Oncorhynchus tshawytscha*
Saffron cod	*Eleginus gracilis*
Starry flounder	*Platichthys stellatus*
Sandlance	*Amrodytes hexapterus*
Sturgeon poacher	*Angonus acipenserinus*
Threespine stickleback	*Gasterocteus aculeatus*
Ninespine stickleback	*Pungitius 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, 2016.

SALMON

Eldorado River Weir

a) Location: Eldorado River, approximately 15 miles upstream from the Safety Sound highway bridge, and approximately 3 miles above the furthest upstream connecting channel to the Flambeau River.

b) Description: Determine daily and seasonal timing and magnitude of chum and pink salmon escapements. Collect age, sex, and length data from chum salmon from weir trap. Cooperative project operated by NSEDC with assistance from ADF&G.

Fish River Tower

a) Location: Fish River, approximately 9 miles upstream of White Mountain.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapement. NSEDC project with assistance from ADF&G.

Inglutalik River Tower

a) Location: Inglutalik River, approximately 18 miles upstream from the mouth at Norton Bay.

b) Description: Determine daily and seasonal timing and magnitude of Chinook, chum, pink, and coho salmon escapements. Collect age, sex, and length data from Chinook, chum, and coho salmon from beach seine. Cooperative project operated by NSEDC with assistance from ADF&G.

Kwiniuk River Tower

a) Location: Kwiniuk River, approximately 5 miles upstream from mouth.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapements. Determine age, sex, and length of Chinook and chum salmon in the Kwiniuk River escapement from beach seining. ADF&G project with additional funding from NSEDC.

Nome River Weir

a) Location: Nome River, approximately 1 mile upstream of the VOR site.

b) Description: To determine daily and seasonal timing and magnitude of salmon escapement. Compare aerial survey totals with weir counts in order to improve survey accuracy. Collect age and sex data through escapement sampling of weir trap. ADF&G project with additional funding from NSEDC.

North River Tower

a) Location: North River, approximately 2 miles below bridge.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapements. Cooperative project operated by NSEDC with assistance from ADF&G.

Pilgrim River Weir

a) Location: Pilgrim River, approximately 6 miles downstream of Pilgrim River bridge at mile 65 of the Kougarok Road / Nome–Taylor Highway.

b) Description: Determine daily and seasonal timing and magnitude of the salmon escapements. Collect age, sex, and length data from weir trap. Cooperative project operated by NSEDC with assistance from ADF&G.

Shaktoolik River Sonar/Tower

a) Location: Shaktoolik River, approximately 2 miles upstream from the village of Shaktoolik.

b) Description: Determine daily and seasonal timing and magnitude of salmon escapements. Cooperative project operated by NSEDC with assistance from ADF&G.

-continued-

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. Cooperative project operated by ADF&G and NSEDC.

Solomon River Weir

a) Location: Solomon River, at approximately mile 35.5 on the Nome-Council road.

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

Unalakleet River Weir

a) Location: Unalakleet River, approximately 15 miles upstream from village of Unalakleet.

b) Description: Determine daily and seasonal timing and magnitude of Chinook, chum, and pink escapements. Collect age, sex, and length data from Chinook and chum salmon from weir trap. Cooperative ADF&G, BLM, NSEDC, and Unalakleet IRA project.

Chum Salmon Acoustic Tagging Project

a) Location: Chum salmon were tagged in the marine waters of Norton Sound Subdistrict 1 within 2,000 meters of shore. Acoustic receivers were placed in 7 curtain arrays spaced throughout the subdistrict and perpendicular to shore. Acoustic receivers were also placed in each of the large chum-rearing streams within Subdistrict 1.

b) Description: Track movement of tagged chum salmon within marine waters of Norton Sound Subdistrict 1 and attempt to identify tagged chum salmon to their river of origin within the subdistrict. A cooperative project between ADF&G and NSEDC.

Kobuk River Test Fish

a) Location: Lower Kobuk River, approximately 2 miles downriver of Kiana.

b) Description: Evaluate chum salmon abundance migrating into the Kobuk River drainage using systematic drift gillnet catches. To qualitatively assess the impact of the Kotzebue District commercial salmon fishery on chum abundance into the Kobuk River drainage for fisheries management purposes. Describe migratory timing in the lower Kobuk River. Sample for age, sex, and length. ADF&G project.

Salmon Lake Limnology Project / Sockeye Salmon Restoration

a) Location: Salmon Lake, throughout; and smolt trap 2 miles downstream from lake, on Pilgrim River.

b) Description: Restore sockeye salmon population to higher historical levels. Biological (age, weight, and length) samples taken from emigrating smolt and enumerated by mark–recapture. Hydroacoustic-tow net studies conducted to estimate rearing fry population and gather growth data. Fertilization of Salmon Lake. Operated by NSEDC.

Subsistence Salmon Fishing Surveys

a) Location: Norton Sound District.

b) Description: Determine subsistence utilization of salmon for formulating management procedures and goals. Subsistence salmon permits were issued in northern Norton Sound and Port Clarence District by Commercial Fisheries Division. Koyuk, Shaktoolik, St. Michael, Stebbins, and Unalakleet were also surveyed by Commercial Fisheries Division. ADF&G project.

-continued-

CRAB

Summer King Crab Tagging Study

a) Location:	Tagging conducted along transects 5 and 10 miles from shore from Cape Nome to Golovnin Bay; observers were placed on commercial fishing vessels throughout the open fishing area of Norton Sound.
b) Description:	Investigate movement, size composition, potential critical habitat, and handling of red king crab in Norton Sound. Cooperative project between ADF&G and NSEDC.

Appendix G3.–Norton Sound and Kotzebue Sound processors, 2016.

Company	Address	Type of Processing	District
Aqua Tech	P.O. Box 10119 Anchorage, AK 99510	Fresh Crab	Norton Sound
Norton Sound Seafood Products	Nome, AK 99762 and Unalakleet, AK 99684	Frozen/Fresh Salmon Herring & Miscellaneous Finfish Bait Frozen/Fresh King Crab	Norton Sound
Maniilaq Services, Inc. dba Arctic Circle Wild Salmon	1700 Seventh Avenue Suite 2100 Seattle, WA 98101	Buy and Fly Frozen/Fresh Salmon	Kotzebue Sound
Copper River Seafoods	1118 East Fifth Avenue Anchorage, AK 99501	Buy and Fly Frozen/Fresh Salmon	Kotzebue Sound
Pacific Star Seafoods	520 Bridge Access Rd. Kenai, AK 99611	Buy and Fly Frozen/Fresh Salmon	Kotzebue Sound

Appendix G4.–Saint Michael subsistence salmon harvest survey form, 2016.

NORTON SOUND 2016 SUBSISTENCE SALMON HARVEST SURVEY **Community ID# 325**

Alaska Department of Fish and Game **Household ID#_____**

Community: SAINT MICHAEL

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 <u>usually</u> subsistence fish for salmon? ☐ YES ☐ NO

<u>FOR SALMON FISHING HOUSEHOLDS ONLY ("Yes" to #1)</u>

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.

	NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY GEAR TYPE)			OF TOTAL HARVEST How many salmon were caught	
SPECIES	**SUBSISTENCE GILL NET or SEINE** (Number of fish)	**ROD & REEL** (Number of fish)	**KEPT FROM Commercial Fishing** (Number of fish)	In the Pikmiktalik River (Number of fish)	In Marine W. adjacent to Pikmik. R. (Number of fish)
CHUM SALMON Dog					
CHINOOK SALMON King					
PINK SALMON Humpy					
SOCKEYE SALMON Red					
COHO SALMON Silver					

4. Comments or Suggestions?

Appendix G5.–Stebbins subsistence salmon harvest survey form, 2016.

NORTON SOUND 2016 SUBSISTENCE SALMON HARVEST SURVEY **Community ID# 327**

Alaska Department of Fish and Game- **Household ID#**_____

Community: STEBBINS

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 <u>usually</u> subsistence fish for salmon? ☐ YES ☐ NO

<u>FOR SALMON FISHING HOUSEHOLDS ONLY ("Yes" to #1)</u>

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.

	NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY GEAR TYPE)			OF TOTAL HARVEST How many salmon were caught	
SPECIES	**SUBSISTENCE GILL NET or SEINE** (Number of fish)	**ROD & REEL** (Number of fish)	**KEPT FROM Commercial Fishing** (Number of fish)	In the Pikmiktalik River (Number of fish)	In Marine W. adjacent to Pikmik. R. (Number of fish)
CHUM SALMON Dog					
CHINOOK SALMON King					
PINK SALMON Humpy					
SOCKEYE SALMON Red					
COHO SALMON Silver					

4. Comments or Suggestions?

Appendix G6.–Unalakleet Subdistrict subsistence salmon harvest survey form, 2016.

NORTON SOUND 2016 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 <u>usually</u> subsistence fish for salmon? ☐ YES ☐ NO

<u>FOR SALMON FISHING HOUSEHOLDS ONLY ("Yes" to #1)</u>

3. Please estimate how many salmon your household caught for subsistence use this year, including with a rod and reel. It is important not to double count fish harvests. Report only your share of the catch if fishing with others. Include salmon you gave away, ate fresh, fed to dogs, lost to spoilage, or obtained from helping others process fish.

SPECIES	NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY GEAR TYPE)		NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY LOCATION)		
	SUBSISTENCE GILL NET or SEINE (Number of fish)	ROD & REEL (Number of fish)	MARINE WATERS	UNALAKLEET RIVER	NORTH RIVER
CHUM SALMON Dog					
CHINOOK SALMON King					
PINK SALMON Humpy					
SOCKEYE SALMON Red					
COHO SALMON Silver					

4. Comments or Suggestions?

Appendix G7.–Shaktoolik Subdistrict subsistence salmon harvest survey form, 2016.

NORTON SOUND 2016 SUBSISTENCE SALMON HARVEST SURVEY **Community ID# 307**

Alaska Department of Fish and Game- **Household ID#**_____

Community: SHAKTOOLIK

Survey Date: **Household Size:** _____

Interviewer: **(If new household) PO Box:**_____

Household participation is voluntary. Individual household data will not be released without permission of household head.

1. Did your household fish for salmon for subsistence use this year? (Include fishing with a rod and reel) ☐ YES ☐ NO

2. Does your household <u>usually</u> subsistence fish for salmon? ☐ YES ☐ NO

<u>FOR SALMON FISHING HOUSEHOLDS ONLY ("Yes" to #1)</u>

3. Please estimate how many salmon your household caught for subsistence use this year, including with a rod and reel. It is important not to double count fish harvests. Report only your share of the catch if fishing with others. Include salmon you gave away, ate fresh, fed to dogs, lost to spoilage, or obtained from helping others process fish.

SPECIES	NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY GEAR TYPE)		NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY LOCATION)	
	SUBSISTENCE GILL NET or SEINE (Number of fish)	ROD & REEL (Number of fish)	MARINE WATERS	SHAKTOOLIK RIVER
CHUM SALMON Dog				
CHINOOK SALMON King				
PINK SALMON Humpy				
SOCKEYE SALMON Red				
COHO SALMON Silver				

4. Comments or Suggestions?

Appendix G8.–Norton Bay Subdistrict subsistence salmon harvest survey form, 2016.

NORTON SOUND 2016 SUBSISTENCE SALMON HARVEST SURVEY **Community ID# 204**

Alaska Department of Fish and Game- **Household ID#**_____

Community: KOYUK

Survey Date: **Household Size:** _____

Interviewer: **(If new household) PO Box:**_____

Household participation is voluntary. Individual household data will not be released without permission of household head.

1. Did your household fish for salmon for subsistence use this year? (Include fishing with a rod and reel) ☐ YES ☐ NO

2. Does your household <u>usually</u> subsistence fish for salmon? ☐ YES ☐ NO

<u>FOR SALMON FISHING HOUSEHOLDS ONLY ("Yes" to #1)</u>

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.

	NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY GEAR TYPE)		NUMBER OF SALMON YOUR HOUSEHOLD HARVESTED (BY LOCATION)			
SPECIES	**SUBSISTENCE GILL NET or SEINE** (Number of fish)	**ROD & REEL** (Number of fish)	**MARINE WATERS**	**KOYUK RIVER**	**INGLUTALIK RIVER**	**UNGALIK RIVER**
CHUM SALMON Dog						
CHINOOK SALMON King						
PINK SALMON Humpy						
SOCKEYE SALMON Red						
COHO SALMON Silver						

4. Comments or Suggestions?

Appendix G9.–Emergency Orders issued during 2016.

RED KING CRAB

Emergency Order: 3-C-Z-01-16 Effective Date: February 15, 2016

EXPLANATION: This emergency order opens the Norton Sound winter through the ice commercial red king crab fishery from 10:00 AM Monday, February 15 until 12:00 noon Saturday, 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 2016 Norton Sound commercial red king crab fishery is 517,200 pounds with 8% reserved for the winter commercial fishery. Therefore the GHL is 41,376 pounds.

Emergency Order: 3-C-Z-02-16 Effective Date: March 24, 2016

EXPLANATION: This emergency order closes the Norton Sound winter through the ice commercial red king crab fishery at 2:00 PM Thursday, March 24. All pots must be unbaited with doors secured opened by that time, except for those CDQ permit holders that have registered for the CDQ fishery.

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 2016 Norton Sound commercial red king crab fishery is 517,200 pounds with 8% reserved for the winter commercial fishery. Therefore the GHL is 41,376 pounds. The GHL is projected to be reached by 2:00 PM Thursday, March 24, 2016 requiring the closure of the fishery.

Emergency Order: 3-C-Z-03-16 Effective Date: March 23, 2016

EXPLANATION: This emergency order opens the CDQ commercial red king crab fishery on Wednesday, March 23, 2016 through April 30 or when the CDQ allocation is reached.

JUSTIFICATION: By regulation 7.5% of the 2016 GHL is reserved for the CDQ fishery. By regulation the CDQ crab fishery can open anytime during the winter or summer fishery when the CDQ group is ready to harvest the crab. The CDQ crab can only be harvested by permit holders approved by NSEDC and the quota is 38,790 pounds. The CDQ group has notified the department they are ready to harvest crab.

Emergency Order: 3-C-Z-04-16 Effective Date: April 21, 2016

EXPLANATION: This emergency order closes the Norton Sound CDQ fishery at 5 PM April 21, 2016. All pots must be unbaited with doors secured opened by that time and all pots must be removed from the water by April 26, 2016.

JUSTIFICATION: By regulation the CDQ fishery is allowed to take 7.5% of the guideline harvest level. The CDQ portion of the fishery is 38,790 pounds and NSEDC, which has rights to the CDQ allocation, has requested the department to close the fishery because they are nearing their allocation. Any allocation remaining can be taken in the summer fishery.

Emergency Order: 3-C-Z-05-16 Effective Date: June 27, 2016

EXPLANATION: This emergency order opens both the CDQ fishery and the commercial open access crab fishery in Norton Sound from 12:00 noon Monday, June 27 until 12:00 noon Saturday, September 3, or when the CDQ and the open access quotas are reached.

JUSTIFICATION: By regulation the summer open access king crab fishery can open anytime on or after June 15 by emergency order. Currently two land-based processor-buyers are registered and both buyers are ready to purchase open access crab. The GHL for the 2016 Norton Sound summer open access fishery is 92% of the total open access quota, which equates to 440,137 pounds. By regulation the CDQ crab fishery can open anytime the CDQ group is ready to harvest the crab. The CDQ crab can only be harvested by permit holders approved by NSEDC, and 3,583 pounds remain out of the quota of 38,790 pounds. The CDQ group has notified the department they are ready to harvest crab.

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Emergency Order: 3-C-Z-06-16 Effective Date: July 20, 2016

EXPLANATION: This emergency order closes the commercial crab fishery in Norton Sound, and all pots must be removed from the water by Wednesday, July 27, 2016.

JUSTIFICATION: The GHL for the 2016 Norton Sound crab fishery is 440,137 pounds. Through the morning of July 18, there were 353,741 pounds reported harvested. There are currently at least 35 vessels fishing and the GHL is expected to be reached by 6:00 AM Wednesday, July 20.

Emergency Order: 3-C-Z-07-16 Effective Date: July 20, 2016

EXPLANATION: This emergency order extends the delivery time for the commercial open access crab fishery in Norton Sound from 6:00 PM Wednesday, July 20 until 12 midnight Wednesday evening, July 20.

JUSTIFICATION: Approximately 57,000 pounds remain of the open access quota. This extension is granted in order to provide fishermen with additional time to make their deliveries as ocean conditions are currently rough in parts of Norton Sound.

Emergency Order: 3-C-Z-08-16 Effective Date: July 20, 2016

EXPLANATION: This emergency order extends the commercial open access crab fishery in Norton Sound from 6:00 AM Wednesday, July 20 until 6:00 AM Thursday, July 21.

JUSTIFICATION: Approximately 50,000 pounds remain of the open access quota. Half of the fleet has been unable to reach their gear due to rough ocean conditions. This extension is granted in order to provide fishermen with additional time to harvest their catch during a short window of weather opportunity.

HERRING

Emergency Order: 3-H-Z-01-16 Effective Date: May 13, 2016

EXPLANATION: This emergency order opens the Norton Sound District to commercial gillnet fishing for bait herring beginning 12:00 PM Friday, May 13, 2016 until Friday, July 1, 2016, unless superseded by another emergency order.

JUSTIFICATION: NSEDC has established a bait quota of approximately 60 tons of bait herring this season. Processing and buying operations will be limited to Norton Sound Seafood Products processing plant in Unalakleet. The run of herring in Norton Sound is expected to occur even earlier than last year's run which began on May 18. On May 11, NSEDC biologists flew aerial surveys in southern Norton Sound to ascertain ice conditions and attempt to locate any herring. Significant spawning activity was observed near Klikitarik Point. Additionally, ripe and spawned out herring were harvested in subsistence nets near Unalakleet earlier this week. Leaving the fishery open continuously allows the buyer to direct the bulk of the fishing fleet to areas where harvest efficiency can be maximized. To commercial fish for bait herring, permit holders must have a valid 2016 bait or sac roe herring permit. Crew members must have a 2016 crew member license or current year state of Alaska commercial fishery permit. For example, a 2016 Norton Sound king crab or salmon permit can substitute as a crewmember license if one intends to crew on a herring vessel. Permit holders should be in contact with Norton Sound Seafood Products once the fishery is underway to ensure there is a market for their catch. Any herring not purchased by the buyer must be retained for personal or subsistence uses.

Emergency Order: 3-H-Z-2-16 Effective Date: May 17, 2016

EXPLANATION: This emergency order opens the coastal waters from Canal Point Light eastward to Wood Point located east of St. Michael in the Norton Sound District to the commercial harvest of herring spawn on wild kelp from 6:00 PM Tuesday, May 17, 2016 until Tuesday, June 14, 2016, unless superseded by another emergency order.

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JUSTIFICATION: A small number of Norton Sound herring permit holders have notified the department that they have a market for herring spawn on wild kelp. These permit holders have also not participated in the set gillnet bait herring fishery as they can only harvest kelp if they have not participated in the sac roe, bait or pound kelp herring fisheries. Spawning has occurred for nearly a week and the kelp should be of marketable quality in the coming days. Leaving the wild kelp fishery open for a month provides reasonable opportunity for harvesting kelp even if the permit holder experiences delays attributed to inclement weather and/or mechanical problems. Up to 30 metric tons may be taken in the wild kelp fishery. Market demand is expected to be well below this guideline harvest level and should not have adverse impacts on subsistence harvest opportunities or future herring returns.

KOTZEBUE SALMON

Emergency Order: 3-S-X-01-16 Effective Date: July 10, 2016

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from the hours of 10 AMAM until 6 PM Sunday, July 10.

JUSTIFICATION: One buyer has registered to purchase Kotzebue chum salmon this season. Airline schedules will affect the buyer's ability to ship fish out. Regulation allows the season to be open from July 10 through August 31. The buyer has notified the department that they would like to begin purchasing fish on Sunday July 10. This 8 hour opening will serve as a test of earlier run strength.

Emergency Order: 3-S-X-02-16 Effective Date: July 11, 2016

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District daily for 8 hours from the hours of 10 AMAM until 6 PM Monday, July 11.

JUSTIFICATION: One buyer has registered to purchase Kotzebue chum salmon this season. Airline schedules will affect the buyer's ability to ship fish out. Regulation allows the season to be open from July 10 through August 31. The buyer has notified the department that they would like to purchase fish on Monday July 11. The first 8 hour opening on July 10 the buyer reported slow catches because of weather. Having daily 8 hour openings should not jeopardize subsistence or reaching chum salmon escapement.

Emergency Order: 3-S-X-03-16 Effective Date: July 12, 2016

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from the hours of 10 AMAM until 6 PM from July 12 through July 15.

JUSTIFICATION: One buyer has registered to purchase Kotzebue chum salmon this season. Airline schedules will affect the buyer's ability to ship fish out. Regulation allows the season to be open from July 10 through August 31. The buyer has notified the department that they would like to purchase fish during eight hour fishing periods. Because buyer has limited plane capacity out of Kotzebue this fishery will be self-limiting in how much chum salmon can be harvested. Having daily 8 hour openings should not jeopardize subsistence or reaching chum salmon escapement.

Emergency Order: 3-S-X-04-16 Effective Date: July 15, 2016

EXPLANATION: This emergency order extends an originally scheduled commercial salmon fishing in the Kotzebue District for 2 hours from the hours of 6 PM until 8 PM Friday, July 15.

JUSTIFICATION: One buyer has registered to purchase Kotzebue chum salmon this season. The buyer has notified the department that they would like to extend the originally schedule period of 8 hours for an additional 2 hours. Having a 10 hour opening should not jeopardize subsistence or reaching chum salmon escapement.

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Emergency Order: 3-S-X-05-16 Effective Date: July 17, 2016

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours from the hours of 10 AMAM until 6 PM from July 17 through July 22.

JUSTIFICATION: One buyer has registered to purchase Kotzebue chum salmon this season. Airline schedules will affect the buyer's ability to ship fish out. The buyer has notified the department that they would like to purchase fish during eight hour fishing periods. Because buyer has limited plane capacity out of Kotzebue this fishery will be self-limiting in how much chum salmon can be harvested. Having daily 8 hour openings should not jeopardize subsistence or reaching chum salmon escapement.

Emergency Order: 3-S-X-06-16 Effective Date: July 19, 2016

EXPLANATION: This emergency order suspends a commercial salmon fishing opening that was scheduled today in the Kotzebue District.

JUSTIFICATION: The sole buyer has requested that the scheduled commercial fishing period on Tuesday, July 19 be cancelled because the buyer has capacity concerns. Because there is not a buyer for Tuesday's fishing period the department is cancelling the fishing period.

Emergency Order: 3-S-X-07-16 Effective Date: July 22, 2016

EXPLANATION: This emergency order extends an originally scheduled commercial salmon fishing in the Kotzebue District for 2 hours from the hours of 6 PM until 8 PM Friday, July 22.

JUSTIFICATION: One buyer has registered to purchase Kotzebue chum salmon this season. The buyer has notified the department that they would like to extend the originally schedule period of 8 hours for an additional 2 hours. Having a 10 hour opening should not jeopardize subsistence or reaching chum salmon escapement.

Emergency Order: 3-S-X-08-16 Effective Date: July 24, 2016

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours daily from the hours of 10 AMAM until 6 PM from July 24 through July 29.

JUSTIFICATION: The sole buyer has notified the department that they would like to purchase fish during eight hour fishing periods. Because the buyer has limited plane capacity out of Kotzebue this fishery will be self-limiting in how much chum salmon can be harvested. The Fish & Game test net crew has started fishing at Kiana and catches have fallen below average compared to the last several years. However, the three previous years had the three highest years of catches in the 24-year project history. The catch index projection indicates the chum salmon run will be adequate to provide for subsistence needs and escapement.

Emergency Order: 3-S-X-09-16 Effective Date: July 31, 2016

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours daily from the hours of 10 AMAM until 6 PM from July 31 through August 5.

JUSTIFICATION: The sole buyer has notified the department that they would like to purchase fish during eight hour fishing periods. Because the buyer has limited plane capacity out of Kotzebue this fishery will be self-limiting in how much chum salmon can be harvested. The Fish & Game test net chum salmon catch index ranks ninth highest in 24 years of fishing. The catch index projection indicates the chum salmon run will be adequate to provide for subsistence needs and escapement.

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Emergency Order: 3-S-X-10-16 Effective Date: August 1, 2016

EXPLANATION: This emergency order supersedes emergency order 3-S-X-09-16 that allowed fishing from 8 hours daily from the hours of 10 AMAM until 6 PM from July 31 through August 5 and shortens the fishing period for Monday, August 1 to 6 hours 10 AMAM to 4 PM

JUSTIFICATION: The buyer has requested a shorter period for Monday, August 1 because of limited airplane cargo capacity. Fifty permit holders have signed up with the buyer to fish today. Yesterday's 8-hour fishing period had a harvest of nearly 133,000 pounds by 39 permit holders. The buyer has only 120,000 pounds of available airline capacity and with more permit holders fishing today requested a shorter fishing period.

Emergency Order: 3-S-X-11-16 Effective Date: August 7, 2016

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours daily from the hours of 10 AMAM until 6 PM from August 7 through August 12.

JUSTIFICATION: The sole buyer has notified the department that they would like to purchase fish during eight hour fishing periods. Because the buyer has limited plane capacity out of Kotzebue this fishery will be self-limiting in how much chum salmon can be harvested. The Fish & Game test net chum salmon catch index ranks tenth highest in 24 years of fishing. The catch index projection indicates the chum salmon run will be adequate to provide for subsistence needs and escapement.

Emergency Order: 3-S-X-12-16 Effective Date: August 14, 2016

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 8 hours daily from the hours of 10 AMAM until 6 PM from August 14 through August 19.

JUSTIFICATION: The sole buyer has notified the department that they would like to purchase fish during eight hour fishing periods. Because the buyer has limited plane capacity out of Kotzebue this fishery will be self-limiting in how much chum salmon can be harvested. The Fish & Game test net chum salmon catch this week was the highest of the season and the catch index ranks thirteenth highest in 24 years of fishing. The catch index projection indicates the chum salmon run will be adequate to provide for subsistence needs and escapement.

Emergency Order: 3-S-X-13-16 Effective Date: August 16, 2016

EXPLANATION: This emergency order extends an originally scheduled commercial salmon fishing in the Kotzebue District for 2 hours from the hours of 6 PM until 8 PM Tuesday, August 16.

JUSTIFICATION: The major buyer has notified the department that they would like to extend the originally schedule period of 8 hours for an additional 2 hours. Having a 10 hour opening should not jeopardize subsistence or reaching chum salmon escapement.

Emergency Order: 3-S-X-14-16 Effective Date: August 17, 2016

EXPLANATION: This emergency order extends an originally scheduled commercial salmon fishing in the Kotzebue District for 2 hours from the hours of 6 PM until 8 PM Wednesday, August 17.

JUSTIFICATION: The major buyer has notified the department that they would like to extend the originally schedule period of 8 hours for an additional 2 hours. Having a 10 hour opening should not jeopardize subsistence or reaching chum salmon escapement.

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Emergency Order: 3-S-X-15-16 Effective Date: August 18, 2016

EXPLANATION: This emergency order extends an originally scheduled commercial salmon fishing in the Kotzebue District for 2 hours from the hours of 6 PM until 8 PM Thursday, August 18.

JUSTIFICATION: The major buyer has notified the department that they would like to extend the originally schedule period of 8 hours for an additional 2 hours. Having a 10 hour opening should not jeopardize subsistence or reaching chum salmon escapement.

Emergency Order: 3-S-X-16-16 Effective Date: August 19, 2016

EXPLANATION: This emergency order extends an originally scheduled commercial salmon fishing in the Kotzebue District for 2 hours from the hours of 6 PM until 8 PM Friday, August 19.

JUSTIFICATION: The major buyer has notified the department that they would like to extend the originally schedule period of 8 hours for an additional 2 hours. Having a 10 hour opening should not jeopardize subsistence or reaching chum salmon escapement.

Emergency Order: 3-S-X-17-16 Effective Date: August 21, 2016

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 10 hours daily from the hours of 10 AMAM until 8 PM from August 21 through August 26.

JUSTIFICATION: The major buyer has notified the department that they would like to purchase fish during ten hour fishing periods. Because the buyer has limited plane capacity out of Kotzebue this fishery will be self-limiting in how much chum salmon can be harvested. The buyer had been having catch limits on permit holders, but because catches are declining as the chum salmon run comes to end no catch limits are expected this week. The season is scheduled to end after August 31. The Fish & Game test net chum salmon catch this season ranks tenth highest in the 24-year project history. The catch index projection indicates the chum salmon run will be adequate to provide for subsistence needs and escapement.

Emergency Order: 3-S-X-18-16 Effective Date: August 28, 2016

EXPLANATION: This emergency order opens commercial salmon fishing in the Kotzebue District for 12 hours daily from the hours of 9 AMAM until 9 PM from August 28 through August 31.

JUSTIFICATION: The season is scheduled to end by regulation after August 31. The Fish & Game test net chum salmon catch index this season ranked tenth highest in the 24-year project history. The catch index projection indicates the chum salmon run will be adequate to provide for subsistence needs and escapement.

NORTON SOUND SALMON

Emergency Order: 3-S-Z-01-16 Effective Date: June 6, 2016

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 2016 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 fresh water subsistence areas in Subdistrict 1 and Port Clarence District. All catch limits are listed on the permits. Department staff will be flying frequent 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 count salmon escapements. If a river has adequate escapement then catch limits will be relaxed in that location.

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Emergency Order: 3-S-Z-02-16 Effective Date: June 6, 2016

EXPLANATION: This emergency order closes subsistence salmon fishing in all marine waters of Norton Sound Subdistricts 5 and 6, the Shaktoolik and Unalakleet Subdistricts from June 6 through June 30, 2016.

JUSTIFICATION: Shaktoolik and Unalakleet Subdistrict king salmon runs have supported subsistence fisheries since well before statehood, and commercial fisheries since statehood. However, commercial fisheries directed at king salmon have been closed since 2005 and subsistence harvests have been at record low levels for six consecutive years. Escapements of king salmon as indexed by the North River tower have been within the middle to upper end of the SEG range of 1,200–2,600 king salmon since 2014. However, severe restrictions on subsistence fishing time and mesh size were necessary to achieve escapement goals. Nevertheless, king salmon run abundance has improved steadily since 2014 and the 2016 king salmon run is forecasted to meet escapement needs and provide some surplus for subsistence harvest opportunities directed on king salmon. Ground-based escapement data and fishermen reports will be evaluated in season to determine if subsistence restrictions can be relaxed or rescinded earlier without jeopardizing king salmon escapement needs.

Emergency Order: 3-S-Z-03-16 Effective Date: June 6, 2016

EXPLANATION: This emergency order closes subsistence salmon fishing with set gillnets from June 6 through June 30, 2016 in all marine waters from Point Dexter westward to the southern tip of Cape Denbigh, and all marine waters from Black Point south of Unalakleet to Wood Point, east of St. Michael.

JUSTIFICATION: Southern Norton Sound king salmon runs are expected to exhibit early run timing this season but are also expected to have below average run strength. Restrictive measures, including area closures are needed to conserve king salmon bound for eastern Norton Sound drainages that will contribute towards spawning escapements and subsistence harvests in eastern Norton Sound fishing subdistricts. Closing the coastal areas from Point Dexter to Cape Denbigh and from Black Point to Wood Point to subsistence salmon fishing for the month of June is necessary to reduce subsistence harvests of king salmon in order to meet escapement needs.

Emergency Order: 3-S-Z-04-16 Effective Date: June 6, 2016

EXPLANATION: This emergency order closes and immediately reopens all freshwaters of the Inglutalik and Ungalik River drainages and all marine waters of Norton Sound Subdistrict 4, the Norton Bay Subdistrict to subsistence salmon fishing with set gillnets to a schedule of two 48-hour periods per week from June 6 through June 30, 2016. Periods will be from 6:00 PM Mondays to 6:00 PM Wednesdays and from 6:00 PM Fridays to 6:00 PM Sundays. For periods from Mondays to Wednesdays, subsistence salmon fishing is restricted to set gillnets with a stretched mesh size of 6 inches or less. For subsistence salmon fishing periods from Fridays to Sundays, there are no mesh size restrictions. The Koyuk River remains open to subsistence salmon fishing and is not affected by this action.

JUSTIFICATION: Subdistrict 4 (Norton Bay Subdistrict) king salmon runs may constitute the northernmost coastal king salmon populations of significant size in Alaska supporting longstanding subsistence fisheries in Inglutalik River. Like other areas of western Alaska, an early but below average run of king salmon is expected for Norton Bay Subdistrict. However, a modest increase in the amount of harvestable surplus compared to the previous two seasons is expected. This subsistence fishing schedule combined with mesh size restrictions for half the periods should provide sufficient escapement opportunities for king salmon migrating to spawning areas. Inglutalik River tower counts and aerial surveys will be flown to determine if additional subsistence fishing time can be provided without jeopardizing king salmon escapement needs.

Emergency Order: 3-S-Z-05-16 Effective Date: June 6, 2016

EXPLANATION: This emergency order prohibits the retention of king salmon captured in dipnets or cast nets in all freshwaters of Norton Sound Subdistricts 4 (Norton Bay), 5 (Shaktoolik), and 6 (Unalakleet) from 6:00 PM

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Monday, June 6 to midnight Sunday evening, July 31. This emergency order requires that any king salmon incidentally captured in dipnets and castnets to be returned immediately to the water alive and unharmed.

JUSTIFICATION: The Alaska Board of Fisheries recently adopted regulation designating dipnets and cast nets as legal subsistence gear for salmon and other species throughout Norton Sound. Subsistence effort using dipnets and cast nets in eastern Norton Sound is expected to be minimal. These gear types do provide an economic alternative to gillnets and beach seines that could be effective targeting pink and chum salmon. Additionally, dipnets and cast nets could be utilized during gillnet closures to target salmon other than king salmon. Below average runs of king salmon necessitate the requirement to have king salmon released alive and unharmed so that they may contribute to spawning escapements of eastern Norton Sound stocks.

Emergency Order: 3-S-Z-06-16 Effective Date: June 6, 2016

EXPLANATION: This emergency order prohibits the retention of king salmon captured in beach seines in freshwater areas of Norton Sound Subdistricts 4 (Norton Bay). This emergency order requires that any king salmon incidentally captured in beach seines be returned immediately to the water alive and unharmed.

JUSTIFICATION: Beach seining is permitted in the 24 hours a day seven days a week in the Norton Bay Subdistrict. However, a below average run of king salmon underscores the need to conserve king salmon for escapement needs and beach seines can be an extremely effective gear type in areas where groups of king salmon are milling. As a consequence, the department is requiring subsistence users in the Norton Bay Subdistricts to release any king salmon captured in beach seines alive and unharmed back into the water. This gear type does allow subsistence users to target more plentiful chum and pink salmon for subsistence harvest purposes even during gillnet closures without inflicting mortality on king salmon incidentally captured.

Emergency Order: 3-S-Z-07-16 Effective Date: June 6, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-2-16 by reopening all marine waters of Norton Sound Subdistrict 5, the Shaktoolik Subdistrict, from Cape Denbigh to the terminus of Junction Creek, to subsistence salmon fishing with set gillnets for 24 hours from 6:00 PM Monday, June 6 to 6:00 PM Tuesday, June 7.

JUSTIFICATION: As planned, marine subsistence openings will begin this week to allow limited opportunities to target salmon. Shaktoolik residents preferred the department to manage the king salmon run by providing less fishing time but with unrestricted mesh. This opening has been scheduled to coincide with good drying weather and acceptable marine surf conditions. Although some king salmon will be caught during this opening, having the marine waters closed for the remainder of the week should provide more than adequate escapement windows for migrating king salmon as they enter the Shaktoolik River drainage. Previous tagging studies have shown that Shaktoolik and Unalakleet River king salmon stocks co-mingle in coastal waters of both subdistricts.

Emergency Order: 3-S-Z-08-16 Effective Date: June 6, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-2-16 by reopening all marine waters of Norton Sound Subdistrict 6, the Unalakleet Subdistrict, from Junction Creek to Black Point, to subsistence salmon fishing with set gillnets with a stretched mesh size of no greater than 6 inches for 48 hours from 6:00 PM Monday, June 6 to 6:00 PM Wednesday, June 8.

JUSTIFICATION: As planned, marine subsistence openings will begin this week to allow limited opportunities to target salmon. When presented with management options, Unalakleet residents preferred the department to manage the king salmon run by choosing mesh size restrictions with more an increase in fishing time. This opening has been scheduled to coincide with good drying weather and acceptable marine surf conditions. Although some king salmon will be caught during this opening, having the marine waters closed for the remainder of the week and restricting gillnet mesh size should provide more than adequate escapement opportunities for migrating king salmon as they enter the Shaktoolik and Unalakleet River drainages. Previous tagging studies have shown that Shaktoolik and Unalakleet River king salmon stocks co-mingle in coastal waters of both subdistricts.

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Emergency Order: 3-S-Z-09-16 Effective Date: June 14, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-2-16 by reopening all marine waters of Norton Sound Subdistrict 5, the Shaktoolik Subdistrict, from Cape Denbigh to the terminus of Junction Creek, to subsistence salmon fishing with set gillnets for 36 hours from 12:00 PM Tuesday, June 14 to 12:00 AM Thursday, June 16.

JUSTIFICATION: As planned, one 36-hour marine subsistence opening will allow an opportunity to target salmon. Shaktoolik residents preferred the department to manage the king salmon run by providing less fishing time but with unrestricted mesh. This opening has been scheduled to coincide with good drying weather and acceptable marine surf conditions. Although some king salmon will be caught during this opening, having the marine waters closed for the remainder of the week should provide more than adequate escapement windows for migrating king salmon as they enter the Shaktoolik River drainage. As such, this brief opening will allow some utilization of a modest harvest surplus while not jeopardizing escapement needs of king salmon in the Shaktoolik and Unalakleet River drainages.

Emergency Order: 3-S-Z-10-16 Effective Date: June 14, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-2-16 by reopening all marine waters of Norton Sound Subdistrict 6, the Unalakleet Subdistrict, from Junction Creek to Black Point, to subsistence salmon fishing with set gillnets with a stretched mesh size of no greater than 6 inches for two 36 hour fishing periods from 12:00 PM Tuesday, June 14 until 12:00 AM Thursday, June 16 and from 12:00 PM Friday, June 17 until 12:00 AM Sunday, June 19.

JUSTIFICATION: This opening has been scheduled to coincide with good drying weather and acceptable marine surf conditions. Although some king salmon will be caught during this opening, having the marine waters closed for the remainder of the week and restricting gillnet mesh size should provide more than adequate escapement opportunities for migrating king salmon as they enter the Shaktoolik and Unalakleet River drainages. As such, this brief opening will allow some utilization of a modest harvest surplus of king salmon while not jeopardizing escapement needs of king salmon in the Shaktoolik and Unalakleet River drainages. Additionally, this gear type will preferentially target chum salmon as they are more plentiful and can sustain higher harvest rates.

Emergency Order: 3-S-Z-11-16 Effective Date: June 12, 2016

EXPLANATION: This emergency order closes subsistence trout fishing will gillnets from within 500 yards of the mouth of the Unalakleet River to confluence of the North River from midday June 12 through June 30, 2016.

JUSTIFICATION: Small mesh size nets have the ability to ensnare king salmon and the department has received a report of a fisherman using a trout net to capture king salmon just upstream of the Unalakleet River mouth. Salmon gillnet fishing has been closed to protect king salmon, but the department had allowed fishing with small mesh gillnets with a mesh size of four inches or less to target Dolly Varden and whitefish. The department has received a complaint that a local fisherman is using the small mesh exception to the salmon fishing closure to ensnare king salmon. Therefore this closure will prevent any king salmon being harvested by this method. King salmon are a stock of concern and all salmon fishing has been greatly curtailed for several years in order to reach escapement goals.

Emergency Order: 3-S-Z-12-16 Effective Date: June 12, 2016

EXPLANATION: This emergency order closes subsistence salmon fishing in all fresh waters of Norton Sound Subdistricts 5 and 6, the Shaktoolik and Unalakleet Subdistricts from June 6 through June 30, 2016.

JUSTIFICATION: Shaktoolik and Unalakleet Subdistrict king salmon runs have supported subsistence fisheries since well before statehood, and commercial fisheries since statehood. However, commercial fisheries directed at king salmon have been closed since 2005 and subsistence harvests have been at record low levels for six consecutive years. Escapements of king salmon as indexed by the North River tower have been within the middle to upper end of the SEG range of 1,200–2,600 king salmon since 2014. However, severe restrictions on subsistence fishing time and

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mesh size were necessary to achieve escapement goals. Nevertheless, king salmon run abundance has improved steadily since 2014 and the 2016 king salmon run is forecasted to meet escapement needs and provide some surplus for subsistence harvest opportunities directed on king salmon. Ground-based escapement data and fishermen reports will be evaluated in season to determine if subsistence restrictions can be relaxed or rescinded earlier without jeopardizing king salmon escapement needs.

Emergency Order: 3-S-Z-13-16 Effective Date: June 15, 2016

EXPLANATION: This emergency order sets the subsistence salmon gillnet fishing schedule for Subdistrict 1 of the Norton Sound District.

JUSTIFICATION: The department forecast for 2016 is that the chum salmon run will exceed the ANS and Tier II restrictions will not be required in Subdistrict 1. The subsistence salmon set gillnet fishing schedule in Subdistrict 1 marine waters west of Cape Nome and the fresh water subsistence areas allow up to 120 hours of fishing time. Beach seines, dip nets and cast nets can be used when fishing in the subsistence areas in Subdistrict 1 during the schedule.

Emergency Order: 3-S-Z-14-16 Effective Date: June 15, 2016

EXPLANATION: This emergency order reopens set gillnet fishing on the lower Unalakleet River downstream from the confluence of the North River for 24 hours from 8 AM Wednesday, June 15 until 8 AM Thursday, June 16.

JUSTIFICATION: A fisherman has requested a short duration opening to provide fish for his dog team and family. The Unalakleet River downstream of the confluence with the North River has been closed to all gillnet fishing to protect king salmon. Marine waters are presently open to subsistence fishing for two periods this week, but the fisherman has concerns with gas costs and weather on the ocean. Having a 24 hour opening in the river with a mesh size of 4 ½ inches or less should provide fishing opportunity while still protecting king salmon with the small mesh requirement.

Emergency Order: 3-S-Z-15-16 Effective Date: June 16, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-2-16 by reopening all marine waters of Norton Sound Subdistrict 5 and Subdistrict 6 to subsistence salmon fishing for an additional 24 hours.

JUSTIFICATION: To take advantage of favorable weather the department is extending subsistence salmon fishing by 24 hours in the Shaktoolik and Unalakleet Subdistricts. As such, this brief opening will allow some utilization of a modest harvest surplus while not jeopardizing escapement needs of king salmon in the Shaktoolik and Unalakleet River drainages.

Emergency Order: 3-S-Z-16-16 Effective Date: June 20, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-2-16 by reopening the marine waters of Norton Sound Subdistrict 6 to subsistence salmon fishing with set gillnets for 48 hours.

JUSTIFICATION: This brief opening will allow a little harvest of the expected surplus of king salmon while not jeopardizing escapement needs. Based on last year's king salmon run and a somewhat better expected run this year escapement is expected to be sufficient. The North River counting tower and Unalakleet River weir are now operational and providing daily escapement counts.

Emergency Order: 3-S-Z-17-16 Effective Date: June 21, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-2-16 by reopening the marine waters of Norton Sound Subdistrict 5 to subsistence salmon fishing with set gillnets for 24 hours.

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JUSTIFICATION: This brief opening will allow a small harvest of the expected surplus of king salmon while not jeopardizing escapement needs. Based on last year's king salmon run and a somewhat better expected run this year escapement is expected to be sufficient. The Shaktoolik River counting tower is now operational and providing daily escapement counts.

Emergency Order: 3-S-Z-18-16 Effective Date: June 23, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-2-16 by reopening all marine waters of Norton Sound Subdistrict 5 and Subdistrict 6 to subsistence salmon fishing for a 48-hour.

JUSTIFICATION: To take advantage of favorable weather the department is reopening subsistence salmon fishing for 48 hours in the Shaktoolik and Unalakleet Subdistricts. King salmon counts at the Unalakleet River weir and Shaktoolik River counting tower are the highest on record for this date.

Emergency Order: 3-S-Z-19-16 Effective Date: June 26, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-2-16 by reopening the marine waters of Norton Sound Subdistrict 6 to subsistence salmon fishing with set gillnets for 48 hours.

JUSTIFICATION: This brief opening will allow a small harvest of the expected surplus of king salmon while not jeopardizing escapement needs. Based on last year's king salmon run and a somewhat better expected run this year escapement is expected to be sufficient. The North River counting tower and Unalakleet River weir are now operational and providing daily escapement counts. To date the Unalakleet River weir count of 83 king salmon is the highest count in the seven year project history.

Emergency Order: 3-S-Z-20-16 Effective Date: June 27, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-2-16 by reopening the marine waters of Norton Sound Subdistrict 5 to subsistence salmon fishing with set gillnets for 24 hours.

JUSTIFICATION: This brief opening will allow a small harvest of the expected surplus of king salmon while not jeopardizing escapement needs. Based on last year's king salmon run and a somewhat better expected run this year escapement is expected to be sufficient. The Shaktoolik River counting tower escapement of 45 king salmon to date is half the last two year's counts, but the Unalakleet River weir count of 83 king salmon is the highest to date in the seven year project history.

Emergency Order: 3-S-Z-21-16 Effective Date: June 27, 2016

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

JUSTIFICATION: This opening will serve as an index opening to test run strength. At the Subdistrict 2, Fish River counting tower the chum salmon escapement is nearing 6,000 chums and counts have been over 1,000 chums a day for four consecutive days. This year's cumulative count although behind last year's count for this date is over double the cumulative count for this date in 2014 when escapement was determined to be sufficient.

Emergency Order: 3-S-Z-22-16 Effective Date: June 28, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 4 to commercial fishing for 24 hours with nets restricted to 6 inches or less.

JUSTIFICATION: This opening will serve as an index opening to test run strength. At the Subdistrict 4, Inglutalik River counting tower the chum salmon escapement is over 2,300 chums with 1,719 chum salmon counted passed the tower yesterday. The cumulative count for this date is the second highest in the six year project history.

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Emergency Order: 3-S-Z-23-16 Effective Date: June 28, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-2-16 by reopening the marine waters of Norton Sound Subdistrict 5 and 6 to subsistence salmon fishing with set gillnets for 24 hours.

JUSTIFICATION: This brief opening will allow a small harvest of the expected surplus of king salmon while not jeopardizing escapement needs. Based on last year's king salmon run and a somewhat better expected run this year escapement is expected to be sufficient. The Unalakleet River weir crew has counted 200 kings and this is the highest counted in June since the project began in 2010. The North River counting tower crew counted the first kings by the tower yesterday and although a little later than normal the early season projections show the goal should be reached. At Shaktoolik River counting tower the crew has counted 100 kings and the king count is slightly ahead of last year.

Emergency Order: 3-S-Z-24-16 Effective Date: June 28, 2016

EXPLANATION: This emergency order allows beach seining in the Shaktoolik and Unalakleet River drainages for 48 hours.

JUSTIFICATION: Salmon gillnet fishing has been closed to protect king salmon in the fresh waters of Subdistricts 5 and 6. Allowing fishing with beach seines will allow fishermen to target the more abundant chum and pink salmon while still being able to protect king salmon. King salmon are a stock of concern and all salmon fishing has been greatly curtailed for several years in order to reach escapement goals. The commercial season targeting chum salmon is expected to begin on July 1 in Shaktoolik and Unalakleet Subdistricts and because commercial fishermen will be unable to subsistence fish for salmon until July 15 this will allow them to harvest the abundant pink and chum salmon in the rivers.

Emergency Order: 3-S-Z-25-16 Effective Date: June 29, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 3 to commercial fishing for 24 hours with nets restricted to 6 inches or less.

JUSTIFICATION: This opening will serve as an index opening to test run strength. At the Subdistrict 3, Kwiniuk River counting tower the chum salmon escapement is nearing 2,000 chums. Although below average the historical passage at this time is 15% and projections show the escapement goal range of 11,500 to 23,000 chum salmon will be met.

Emergency Order: 3-S-Z-26-16 Effective Date: June 30, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2 and 4 to commercial fishing for two 16-hour fishing periods with nets restricted to 6 inches or less.

JUSTIFICATION: At the Subdistrict 2, Fish River counting tower the chum salmon escapement is 15,000 chums and the highest for this date in three years of counting. At the Subdistrict 4, Inglutalik River counting tower the chum salmon escapement is 3,300 chums and the second highest for this date in six years of counting. Instead of the normal 48-hour fishing opening the buyer has requested two 16-hour fishing periods to improve fish quality.

Emergency Order: 3-S-Z-27-16 Effective Date: July 1, 2016

EXPLANATION: This emergency order sets the freshwater fishing schedule in Subdistricts 5 and 6 of the Norton Sound District and restricts the gillnet mesh size to 4 ½ inches or less.

JUSTIFICATION: Salmon gillnet fishing has been closed to protect king salmon in the fresh waters of Subdistricts 5 and 6. Allowing fishing with smaller mesh gear and beach seines will allow fishermen to target the more abundant chum and pink salmon while still being able to protect king salmon. King salmon are a stock of concern and all salmon fishing has been greatly curtailed for several years in order to reach escapement goals. Chum and pink

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salmon passage at the Unalakleet River weir for June are the highest in the seven year project history. At Shaktoolik River counting tower the pink salmon passage for June is the highest in the three year project history.

Emergency Order: 3-S-Z-28-16 Effective Date: July 1, 2016

EXPLANATION: This emergency order sets the marine water subsistence fishing schedule in Subdistricts 5 and 6 of the Norton Sound District and restricts the gillnet mesh size to 6 inches or less.

JUSTIFICATION: Salmon gillnet fishing has been restricted marine waters and closed in the fresh waters to protect king salmon in Subdistricts 5 and 6. Allowing fishing with smaller mesh gear will allow fishermen to target the more abundant chum and pink salmon while still being able to protect king salmon. King salmon are a stock of concern and all salmon fishing has been greatly curtailed for several years in order to reach escapement goals. Chum and pink salmon passage at the Unalakleet River weir for June are the highest in the seven year project history. At Shaktoolik River counting tower the pink salmon passage for June is the highest in the three year project history.

Emergency Order: 3-S-Z-29-16 Effective Date: July 1, 2016

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

JUSTIFICATION: : Passage at the Unalakleet River weir is over 10,000 chums and over 100,000 pinks for the month of June and this is highest chum and pink salmon passage in the seven year project history. Although the Shaktoolik River counting tower has only been operational since 2014 this year's pink salmon count of over 20,000 fish is nearly double the 2014 count and the chum salmon passage is 50% higher for June compared to last year. Subsistence salmon fishing has been restricted this season to protect king salmon and therefore regulations allow the prohibition of king salmon sales.

Emergency Order: 3-S-Z-30-16 Effective Date: July 2, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3 and 4 to commercial fishing for three 16-hour fishing periods with nets restricted to 6 inches or less.

JUSTIFICATION: At the Subdistrict 2, Fish River counting tower the chum salmon escapement is 25,000 fish and the highest for this date in three years of counting. At the Subdistrict 3, Kwiniuk River counting tower the chum salmon escapement is 4,000 fish and projections show the escapement goal range of 11,500-23,000 chum salmon being reached this season. At the Subdistrict 4, Inglutalik River counting tower the chum salmon escapement is 10,000 fish and the highest for this date in the six year project history. Instead of the normal 48-hour fishing opening the buyer has requested daily 16-hour fishing periods to improve fish quality.

Emergency Order: 3-S-Z-31-16 Effective Date: July 5, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 3 to commercial fishing for three 16-hour fishing periods on July 5, 6 and 8 with nets restricted to 6 inches or less.

JUSTIFICATION: At the Subdistrict 3, Kwiniuk River counting tower the chum salmon escapement is 5,200 fish and projections show the escapement goal range of 11,500-23,000 chum salmon being reached this season. Instead of the normal 48-hour fishing opening the buyer has requested daily 16-hour fishing periods to improve fish quality. The last opening the fishermen caught nearly twice as many pink salmon as chum salmon. Projections show the pink salmon escapement should easily exceed 500,000 pinks.

Emergency Order: 3-S-Z-32-16 Effective Date: July 5, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 4 to commercial fishing for three 16-hour fishing periods on July 5, 7 and 8 with nets restricted to 6 inches or less.

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JUSTIFICATION: At the Subdistrict 4, Inglutalik River counting tower the chum salmon escapement is 16,000 fish and the second highest for this date in the six year project history. Instead of the normal 48-hour fishing opening the buyer has requested daily 16-hour fishing periods to improve fish quality. The last fishing period slightly more pink salmon were caught than chum salmon.

Emergency Order: 3-S-Z-33-16 Effective Date: July 5, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 to commercial fishing for 10 hours with nets restricted to 6 inches or less.

JUSTIFICATION: Passage at the Unalakleet River weir is over 200 kings, 12,000 chums and over 550,000 pinks through July 3 and is the highest salmon passage for all species in the seven year project history. The North River counting tower has had improved king salmon passage the last several days and cumulative king salmon escapement is similar to the last two years for this date when the escapement goal range was reached or exceeded. Although the Shaktoolik River counting tower has only been operational since 2014 this year's pink salmon count of over 100,000 fish is nearly seven times the 2014 count and the chum salmon passage is 50% higher compared to last year for the same date. The king salmon count at Shaktoolik is only half the count in 2014, but is over 25% higher than last year for this date. Subsistence salmon fishing has been restricted this season to protect king salmon and therefore regulations allow the prohibition of king salmon sales.

Emergency Order: 3-S-Z-34-16 Effective Date: July 6, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2 to commercial fishing for three 16-hour fishing periods with nets restricted to 6 inches or less.

JUSTIFICATION: At the Subdistrict 2, Fish River counting tower the chum salmon escapement is 36,000 fish and pink salmon escapement is 61,000 fish and both are the highest for this date in three years of counting. Instead of the normal 48-hour fishing opening the buyer has requested daily 16-hour fishing periods to improve fish quality. During the most recent fishing period there were twice as many pink salmon caught as chum salmon.

Emergency Order: 3-S-Z-35-16 Effective Date: July 6, 2016

EXPLANATION: This emergency order amends Emergency Order 3-S-Z-28-16 by opening the marine waters of Norton Sound Subdistrict 6 to subsistence salmon fishing with set gillnets for 24 hours.

JUSTIFICATION: This brief opening will allow a small harvest of the expected surplus of king salmon while not jeopardizing escapement needs. Based on last year's king salmon run and a somewhat better expected run this year escapement is expected to be sufficient. The Unalakleet River weir crew has counted 221 kings and this is the highest king salmon counted to date since the project began in 2010. The North River counting tower crew has counted 117 kings and although ahead of the 5-year average counts this year's count trails the 10-year average count. Huge numbers of pink salmon have prevented the harvest of king salmon during restricted mesh openings by plugging nets restricted to 6 inches or less. This unrestricted mesh opening should provide a small harvest of king salmon while not jeopardizing escapement.

Emergency Order: 3-S-Z-36-16 Effective Date: July 6, 2016

EXPLANATION: This emergency order sets the catch limits from Cape Rodney to Rocky Point, and Pilgrim and Kuzitrin rivers in the Port Clarence District and all waters draining into the Bering Sea from Cape Prince of Wales to Rocky Point.

JUSTIFICATION: This emergency order extends the subsistence catch limits that are listed for coho salmon on the back of the subsistence fishing permits. Coho salmon are beginning to enter local rivers and the coho salmon runs are much smaller in size than other salmon runs, except for king salmon. Catch limits are needed until there is adequate escapement to ensure continued health of the runs.

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Emergency Order: 3-S-Z-37-16 Effective Date: July 6, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 to commercial fishing for 12 hours on July 6 and July 7 with nets restricted to 6 inches or less.

JUSTIFICATION: Passage at the Unalakleet River weir is over 13,000 chums and over 845,000 pinks through July 5. Chum passage is average and pink passage is a record for this date. The North River counting tower chum passage through July 5 is triple the 5- and 10-year averages and although the pink passage is below even year averages it is the best since 2006. The Shaktoolik River counting tower has only been operational since 2014 and this year's pink salmon count of over 240,000 fish is 2 ½ times the 2014 count and the chum salmon passage is slightly behind last year. During the previous two fishing periods the buyer has tried to target chum salmon, but pink salmon catches have outnumbered chum catches by 13 to 1 and 7 to 1 in the Unalakleet Subdistrict and 3 to 1 and 2 to 1 in Shaktoolik Subdistrict. To protect king salmon no sales are allowed and the most king salmon retained for personal use have been 10.

Emergency Order: 3-S-Z-38-16 Effective Date: July 9, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 to commercial fishing for 8 hours on July 9 and July 10 with nets restricted to 6 inches or less.

JUSTIFICATION: Passage at the Unalakleet River weir is over 15,000 chums and over 1.1 million pinks through July 7. Chum passage is below average and pink passage is a record for this date. The North River counting tower chum passage through July 7 is over double the 5- and 10-year averages and although the pink passage is below even numbered year averages it is the best since 2006. The Shaktoolik River counting tower has only been operational since 2014 and this year's pink salmon count of over 300,000 fish is the highest for this date and the chum salmon passage is average. During the previous fishing periods the buyer has tried to target chum salmon, but pink salmon catches have outnumbered chum catches. To protect king salmon no sales are allowed and the most king salmon retained for personal use during longer duration periods have been 10.

Emergency Order: 3-S-Z-39-16 Effective Date: July 9, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 24 hours with nets restricted to 6 inches or less.

JUSTIFICATION: This opening will serve as an index opening to test run strength. East of Cape Nome the Eldorado weir has already reached the escapement range of 6,000 to 9,200 chum salmon. Through July 7 there have been 7,600 chum salmon past the weir. Historically the average quarter point for chum passage at the weir is July 9. The weirs west of Cape Nome at Nome River and Snake River have had 50 and 350 chums past respectively and are projected to easily reach or exceed the escapement goal ranges.

Emergency Order: 3-S-Z-40-16 Effective Date: July 9, 2016

EXPLANATION: This emergency order allows beach seining in the Shaktoolik and Unalakleet River drainages until August 11.

JUSTIFICATION: Salmon gillnet fishing has been closed for the majority of the season to protect king salmon in the fresh waters of Subdistricts 5 and 6. Allowing fishing with beach seines will allow fishermen to target the more abundant chum and pink salmon while still being able to protect king salmon. King salmon are a stock of concern and all salmon fishing has been greatly curtailed for several years in order to reach escapement goals. Over one million pink salmon have been counted past the Unalakleet River weir and 300,000 pink salmon have been counted past the Shaktoolik River counting tower. To date the chum salmon run has been average compared to previous years.

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Emergency Order: 3-S-Z-41-16 Effective Date: July 12, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 3 to commercial fishing for three 16-hour fishing periods on July 12, 13 and 15 with nets restricted to 6 inches or less.

JUSTIFICATION: At the Subdistrict 3, Kwiniuk River counting tower the chum salmon escapement is 7,000 fish, but chum salmon counts have slowed in recent days and the lower end of escapement goal range of 11,500-23,000 chum salmon being reached. Instead of the normal 48-hour fishing opening the buyer has requested daily 16-hour fishing periods to improve fish quality. The fishermen continue to catch more pink salmon than chum salmon by ratio of at least four to one. Projections show the pink salmon escapement should easily exceed 500,000 pinks.

Emergency Order: 3-S-Z-42-16 Effective Date: July 12, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 4 to commercial fishing for three 16-hour fishing periods on July 12, 14 and 15 with nets restricted to 6 inches or less.

JUSTIFICATION: At the Subdistrict 4, Inglutalik River counting tower the chum salmon escapement is 25,000 fish and the second highest for this date in the six year project history. Instead of the normal 48-hour fishing opening the buyer has requested daily 16-hour fishing periods to improve fish quality. During recent fishing periods over twice as many pinks are being caught as chums.

Emergency Order: 3-S-Z-43-16 Effective Date: July 12, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 to commercial fishing for 6 hours on July 12 with nets restricted to 6 inches or less.

JUSTIFICATION: Passage at the Unalakleet River weir is nearly 18,000 chums and over 1.5 million pinks through July 11. Chum passage is below average and pink passage is a record for this date. The North River counting tower chum passage through July 11 is over double the 5- and 10-year averages and although the pink passage is below even numbered year averages it is the best since 2006. The Shaktoolik River counting tower has only been operational since 2014 and this year's pink salmon count of over 400,000 fish is the highest for this date and the chum salmon passage is average. During the previous fishing periods the buyer has tried to target chum salmon, but pink salmon catches have outnumbered chum catches. To protect king salmon no sales are allowed and the most king salmon retained for personal use during longer duration periods have been 10.

Emergency Order: 3-S-Z-44-16 Effective Date: July 13, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2 to commercial fishing for three 16-hour fishing periods with nets restricted to 6 inches or less.

JUSTIFICATION: At the Subdistrict 2, Fish River counting tower the chum salmon escapement is 50,000 fish and pink salmon escapement is 137,000 fish. The chum salmon escapement is 37,000 fish below last year, but is 20,000 fish ahead of 2014 for this date. The pink salmon passage is similar to the 2014 run. Instead of the normal 48-hour fishing opening the buyer has requested daily 16-hour fishing periods to improve fish quality. During the most recent fishing periods there were twice as many pink salmon caught as chum salmon.

Emergency Order: 3-S-Z-45-16 Effective Date: July 13, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 to commercial fishing for 6 hours on July 13 and for 8 hours on July 14 with nets restricted to 6 inches or less.

JUSTIFICATION: Passage at the Unalakleet River weir is over 20,000 chums and nearly 1.9 million pinks through July 12. Chum passage is below average and pink passage is a record. The North River counting tower chum passage through July 12 is double the 5- and 10-year averages and although the pink passage is below even numbered year averages it is the best since 2006. The Shaktoolik River counting tower has only been operational

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since 2014 and this year's pink salmon count of over 460,000 fish is the highest for this date and the chum salmon passage is average. During the previous fishing periods the buyer has tried to target chum salmon, but pink salmon catches have outnumbered chum catches. To protect king salmon no sales are allowed and the most king salmon retained for personal use during longer duration periods have been 10.

Emergency Order: 3-S-Z-46-16 Effective Date: July 14, 2016

EXPLANATION: This emergency order sets the subsistence salmon gillnet fishing schedule for Subdistrict 1 of the Norton Sound District.

JUSTIFICATION: The chum salmon run will easily exceed the escapement goal range of 23,000 to 35,000 fish in Subdistrict 1 and the Eldorado River has already exceeded its escapement range of 6,000 to 9,200 chum salmon. The Nome and Snake rivers should also easily exceed the escapement goal ranges. Pink salmon are entering Subdistrict 1 in near record numbers. Allowing seven days per week fishing for the rest of the month will not jeopardize escapement needs.

Emergency Order: 3-S-Z-47-16 Effective Date: July 14, 2016

EXPLANATION: This emergency order waives the sockeye salmon subsistence catch limit at Pilgrim River.

JUSTIFICATION: The Pilgrim River weir count for sockeye salmon is 6,997 fish through July 13. This year's sockeye salmon run is tacking ahead of last year by over 1,000 fish for this date and the escapement goal range of 4,000 to 8,000 sockeye salmon in Salmon Lake is nearly at the lower end of the range. The historical average midpoint at the weir in the last 5 and 10 years has been July 19. Waiving the catch limit will lessen the number of sockeye salmon exceeding the high end of the range.

Emergency Order: 3-S-Z-48-16 Effective Date: July 15, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 to commercial fishing for 6 hours on July 15 and July 16 with nets restricted to 6 inches or less.

JUSTIFICATION: Passage at the Unalakleet River weir is over 26,000 chums and below average. Over 1.5 million pinks passed the last two days and the cumulative count of over 3.5 million is a record. The North River counting tower chum passage through July 14 is double the 5- and 10-year averages and with nearly 500,000 pinks passing the last two days the cumulative count of over 725,000 pinks is above the even-numbered year average. The Shaktoolik River counting tower has only been operational since 2014 and chum passage is less than half the 2014 count and just below last year's count for this date. In the last two days nearly 500,000 pinks have passed the tower and cumulative count of just over 1 million is nearly three times higher than the previous high count in 2014. During the previous fishing periods the buyer has tried to target chum salmon, but pink salmon catches have outnumbered chum catches. To protect king salmon no sales are allowed and the most king salmon retained for personal use during longer duration periods have been 10.

Emergency Order: 3-S-Z-49-16 Effective Date: July 16, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 2 to commercial fishing for daily 16-hour fishing periods, except for Tuesday, July 19, with nets restricted to 6 inches or less.

JUSTIFICATION: At the Subdistrict 2, Fish River counting tower the chum salmon escapement is 60,000 fish and pink salmon escapement is 374,000 fish. The chum salmon escapement is 44,000 fish below last year, but is 19,000 fish ahead of 2014 for this date. The pink salmon passage is double the even-numbered year run of 2014. Instead of the normal 48-hour fishing opening the buyer has requested daily 16-hour fishing periods to improve fish quality.

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Emergency Order: 3-S-Z-50-16 Effective Date: July 16, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 3 to commercial fishing for daily 16-hour fishing periods, except for Thursday, July 21, with nets restricted to 6 inches or less.

JUSTIFICATION: At the Subdistrict 3, Kwiniuk River counting tower the chum salmon escapement is 7,400 fish, but chum salmon counts have slowed the past week and the lower end of escapement goal range of 11,500-23,000 chum salmon is not projected to be reached. Pink salmon escapement has surpassed one million fish and commercial catches have had ratios of 4 pinks to 1 chum or higher. After July 6 the department is allowed to target pink salmon by regulation. Instead of the normal 48-hour fishing opening the buyer has requested daily 16-hour fishing periods to improve fish quality. The fishermen continue to catch more pink salmon than chum salmon by ratio of at least four to one. Projections show the pink salmon escapement should exceed 1.5 million pinks.

Emergency Order: 3-S-Z-51-16 Effective Date: July 16, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 4 to commercial fishing for daily 16-hour fishing periods, except for Wednesday, July 20, with nets restricted to 6 inches or less.

JUSTIFICATION: At the Subdistrict 4, Inglutalik River counting tower the chum salmon escapement is 37,000 fish and the second highest for this date in the six year project history. Instead of the normal 48-hour fishing opening the buyer has requested daily 16-hour fishing periods to improve fish quality. During recent fishing periods over twice as many pinks are being caught as chums.

Emergency Order: 3-S-Z-52-16 Effective Date: July 20, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 to commercial fishing for 10 hours on July 20 with nets restricted to 6 inches or less.

JUSTIFICATION: Passage at the Unalakleet River weir is over 29,000 chums and well below average. A record 4.8 million pinks have passed through the weir. The North River counting tower chum passage through July 18 is nearly 16,000 chums and is a record for this date. The Shaktoolik River counting tower has only been operational since 2014 and chum passage is less than half the 2014 count and 13% below last year's count for this date. Over 1.8 million pinks have passed the tower, nearly three times higher than the previous high count in 2014. During the previous fishing periods the buyer has tried to target chum salmon, but pink salmon catches have outnumbered chum catches. To protect king salmon no sales are allowed and the most king salmon retained for personal use during longer duration periods have been 10. Most king salmon have now passed through both subdistricts.

Emergency Order: 3-S-Z-53-16 Effective Date: July 21, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 5 and 6 to commercial fishing for 16 hours on July 21 and July 22 with nets restricted to 6 inches or less.

JUSTIFICATION: Passage at the Unalakleet River weir is over 31,000 chums and below average. Over 4.9 million pinks have passed the weir. The North River counting tower chum passage through July 18 is a record, but counts have been suspended due to high water. The Shaktoolik River counting tower has only been operational since 2014 and chum passage is less than half the 2014 count and just below last year's count for this date, but pink passage has been over 1 million and is a record. Counts have also been suspended on the Shaktoolik River because of high water. Silver counts have been 480 fish. There has only been one fishing period in four days because of weather and these two fishing periods will also likely have limited participation because of weather. The fishing periods will also serve as an early indication of silver salmon run strength.

Emergency Order: 3-S-Z-54-16 Effective Date: July 21, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 48 hours with nets restricted to 6 inches or less.

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JUSTIFICATION: This opening will be the second opening this season for Subdistrict 1. Fishermen decided to take a two week break from fishing to let the majority of the pinks to reach the rivers. All chum salmon escapement goals have been reached or exceeded in Subdistrict 1. Nearly one million pink salmon have been observed by aerial survey or weir counts in Subdistrict 1.

Emergency Order: 3-S-Z-55-16 Effective Date: July 22, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing for two 48-hour fishing periods from 6 PM Friday, July 22 until 6 PM Sunday, July 24 and from 6 PM Tuesday, July 26 until 6 PM Thursday, July 28 with nets restricted to 6 inches or less.

JUSTIFICATION: Pinks continue to outnumber all other salmon species in fishermen's catch throughout Norton Sound. This season's pink salmon run will likely finish as one of the five highest pink salmon runs in Norton Sound history. These openings will allow fishermen to harvest excess pink salmon and also serve as an early indication of silver salmon run strength.

Emergency Order: 3-S-Z-56-16 Effective Date: July 29, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 48 hours with nets restricted to 6 inches or less.

JUSTIFICATION: This opening will be the third opening this season for Subdistrict 1. Only two permit holders have fished because of the huge numbers of pink salmon the other fishermen have decided to wait. All chum salmon escapement goal ranges have been exceeded in Subdistrict 1. Nearly two million pink salmon have been observed by aerial survey or weir counts in Subdistrict 1.

Emergency Order: 3-S-Z-57-16 Effective Date: July 29, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing for two 48-hour fishing periods from 6 PM Friday, July 29 until 6 PM Sunday, July 31 and from 6 PM Monday, August 1 until 6 PM Wednesday, August 3 with nets restricted to 6 inches or less.

JUSTIFICATION: Pinks continue to outnumber all other salmon species in fishermen's catch throughout Norton Sound. This season's pink salmon run will likely finish as one of the three highest pink salmon runs in Norton Sound history. These openings will allow fishermen to harvest excess pink salmon and also serve as an early indication of silver salmon run strength.

Emergency Order: 3-S-Z-58-16 Effective Date: August 5, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 48 hours with nets restricted to 6 inches or less.

JUSTIFICATION: This opening will be the fourth opening this season for Subdistrict 1. No one fished the third opening. Because of the huge numbers of pink salmon other fishermen have decided to wait and only two permit holders have fished this season. All chum and pink salmon escapement goals have been met or exceeded. Coho salmon are now appearing at escapement counting projects. This opening during the early part of the coho salmon run should not jeopardize subsistence or escapement needs.

Emergency Order: 3-S-Z-59-16 Effective Date: August 5, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing for two 48-hour fishing periods with nets restricted to 6 inches or less.

JUSTIFICATION: Coho salmon have finally started to exceed pink salmon in fishermen's catch in southern Norton Sound and with the next openings should do likewise in the other subdistricts. The department will now manage for

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coho salmon. The coho salmon run should continue to increase until mid-August with the midpoint of the harvest the second week of August in the southern Norton Sound subdistricts and the third week of August in the northern Norton Sound subdistricts. If run strength shows to be weaker than expected the department can restrict commercial fishing the second half of the season to ensure that subsistence needs and escapement can be met.

Emergency Order: 3-S-Z-60-16 Effective Date: August 12, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 48 hours with nets restricted to 6 inches or less.

JUSTIFICATION: This opening will be the fifth opening this season for Subdistrict 1. Only one permit holder fished the fourth opening. Because of the huge numbers of pink salmon other fishermen have decided to wait and only two permit holders have fished this season. All chum and pink salmon escapement goals have been met or exceeded. There are few pink salmon still entering the rivers and coho salmon passage has been increasing at escapement counting projects. The historical quarter point for coho salmon passage at the Nome River and Snake River weirs is approximately August 21.

Emergency Order: 3-S-Z-61-16 Effective Date: August 12, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 2, 3, 4, 5 and 6 to commercial fishing for two 48-hour fishing periods with nets restricted to 6 inches or less.

JUSTIFICATION: Coho salmon have exceeded pink salmon in fishermen's catch in all five subdistricts during the recent 48-hour fishing period that ended Wednesday evening. Coho salmon catch greatly increased in Subdistricts 3-6 in the most recent fishing period and would be expected to do the same in Subdistrict 2 during the upcoming fishing periods. The coho salmon run should continue to increase until mid-August with the midpoint of the harvest the second week of August in the southern Norton Sound subdistricts and the third week of August in the northern Norton Sound subdistricts. If run strength shows to be weaker than expected the department can restrict commercial fishing the second half of the season to ensure that subsistence needs and escapement can be met.

Emergency Order: 3-S-Z-62-16 Effective Date: August 20, 2016

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

JUSTIFICATION: This opening will be the sixth opening this season for Subdistrict 1. Only two permit holders have fished this season. The historical quarter point for coho salmon passage at the Nome River and Snake River weirs is approximately August 21. Commercial fishing during the early part of the coho salmon run should not jeopardize subsistence or escapement needs. In Subdistrict 2 most permit holders have left to fish elsewhere because of slow catches. Only one permit holder fished the last opening and the CPUE was average. This opening will serve as a test opening and with the limited fishing effort should not jeopardize subsistence opportunity or escapement. If the catch remains low the department intends to suspend commercial fishing in Subdistrict 2.

Emergency Order: 3-S-Z-63-16 Effective Date: August 20, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistricts 3, 4, 5 and 6 to commercial fishing for two 48-hour fishing periods with nets restricted to 6 inches or less.

JUSTIFICATION: Coho salmon catches have been average in the most recent fishing periods. The coho salmon run should begin to decrease as the historical average midpoint of the harvest has passed. Only one counting project is still operational and coho salmon passage in recent days has been the highest of the season and indicates an average run at this time.

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Emergency Order: 3-S-Z-64-16 Effective Date: August 26, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 1 to commercial fishing for 48 hours with nets restricted to 6 inches or less.

JUSTIFICATION: This opening will be the seventh opening this season for Subdistrict 1. No permit holders participated during the most recent 48-hour fishing period last week because of rough weather. The historical midpoint for coho salmon passage at the Nome River and Snake River weirs is approximately August 31. Commercial fishing during the middle of the coho salmon run should not jeopardize subsistence or escapement needs.

Emergency Order: 3-S-Z-65-16 Effective Date: August 26, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 3, 4, 5 and 6 to commercial fishing for two 48-hour fishing periods with nets restricted to 6 inches or less.

JUSTIFICATION: Coho salmon catches have been above average for the second half of August. Except for the Kwiniuk River counting tower all other escapement counting projects have been flooded out. Through this date the Kwiniuk River tower counts rank sixth highest in the last 10 years. The next two openings will be the last of the season for Subdistrict 3, but Subdistricts 4-6 are able to fish a week later than the northern Norton Sound subdistricts.

Emergency Order: 3-S-Z-66-16 Effective Date: September 2, 2016

EXPLANATION: This emergency order opens Norton Sound Subdistrict 4, 5 and 6 to commercial fishing for two 48-hour fishing periods with nets restricted to 6 inches or less.

JUSTIFICATION: Coho salmon catches have been above average for the second half of August. Southern Norton Sound escapement counting projects were flooded out for most of August with only the North River counting tower resuming operations on August 20. The crew has been able to count for 10 days and the counts are similar to previous years over the same time period. The next two openings will be the last of the season for Subdistricts 4-6.

NORTON SOUND SALMON – SPORT FISH

Emergency Order: 3-KS-05-16 Effective Date: May 9, 2016

EXPLANATION: This emergency order reduces the king salmon bag limit from two to one fish in Unalakleet River drainage. In addition, this emergency order establishes an annual limit of one king salmon in all waters of the Shaktoolik River drainage.

JUSTIFICATION: The 2016 preseason outlook for the Unalakleet River drainage king salmon run is expected to be sufficient to provide for a moderate harvestable surplus. According to the Subdistricts 5 and 6 of the Norton Sound District and the Unalakleet River King Salmon Management Plan, when the inriver subsistence fishery is limited to less than two 36-hour openings or the subsistence fishery in the marine waters of Subdistricts 5 and 6 are restricted to a gillnet mesh size of six inches or less, the sport fish bag, possession, and annual limit for king salmon will be reduced to one fish. At this time, restrictions are planned to limit the Unalakleet River subsistence fishery to a gillnet mesh size of six inches or less.

The Department does not have reliable stock assessment information for the Shaktoolik River, but the king salmon run generally cycles in accordance with the Unalakleet River stocks and warrants similar restrictions to the Shaktoolik River drainage. The department will evaluate inseason run strength and take appropriate management actions to ensure that escapement requirements are met. If inseason stock assessment information indicates that the king salmon escapement goal in the Unalakleet River will be met, restrictions will be relaxed. If it appears that the escapement goal will not be met, the king salmon sport fishery will be closed.

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Emergency Order: 3-KS-06-16 Effective Date: July 9, 2016

EXPLANATION: This emergency order prohibits sport fishing for king salmon in all waters of the Unalakleet and Shaktoolik river drainages and prohibits the use of bait while sport fishing in these rivers.

JUSTIFICATION: Escapement counts of king salmon at the North River tower on the Unalakleet River are below historical averages. As of July 6 only 192 king salmon had passed the counting tower. From 2006 to 2015, an average of 309 king salmon had passed the counting tower by this date. According to the Subdistricts 5 and 6 of the Norton Sound District and the Unalakleet River King Salmon Management Plan when the projected escapement is below the lower end of the escapement goal, all fishing will be closed. Although it is still early in the run, it appears that the escapement goal for king salmon will not be reached in 2016. This action is in alignment with the management plan.

The Department does not have a reliable stock assessment project in the Shaktoolik River, but the king salmon run generally cycles in accordance with Unalakleet River stocks. The elimination of sport harvest of king salmon in the Unalakleet and Shaktoolik rivers will provide protection for returning fish. The prohibition of bait while sport fishing is in accordance with provisions set forth in 5 AAC 75.003 (1)(A). This action should minimize catch-and-release mortality for king salmon caught incidentally while sport fishing for other species.

Emergency Order: 3-PS-10-16 Effective Date: July 22, 2016

EXPLANATION: This emergency order increases the bag and possession limit for pink salmon in the Nome River drainage from 10 to 20 fish, effective 12:01 AM Friday, July 22, 2016.

JUSTIFICATION: In the Nome River, over 263,000 pink salmon have passed the weir as of July 17, with many more pink salmon observed in the lower river. The sustainable escapement goal (SEG) for pink salmon in the Nome River is 13,000 fish. Due to the projected final escapement goal of pink salmon in the Nome River drainage in excess of the escapement goal, an increase in the sport fish bag and possession limit for pink salmon from 10 to 20 fish is warranted.

APPENDIX H: ARCTIC FISHERIES

Appendix H1.–Commercial freshwater finfish harvest and sales, Colville River, Arctic Area, 1990–2007.

	Number of fish harvested intended for commercial sale [a]					Estimated commercial sales based on fish tickets	
Year	Broad whitefish	Humpback whitefish	Least Cisco (herring)	Arctic Cisco ("kaktok")	Total harvest	Arctic Cisco	Whitefish species [b]
1990	0	5,694	21,003	19,374	46,071	12,571 [c]	14,249 [c]
1991	0	1,240	5,697	13,805	20,742	1,970 [d]	3,307 [d]
1992	126	5,209	6,962	20,939	33,236	[e]	10,200 [f]
1993	20	5,339	6,037	31,310	42,706	11,291 [d]	6,170 [d]
1994	ND	6,056 [g]	10,176	8,958	25,190	7,434 [d]	4,121 [d]
1995	ND	33,794 [h]	ND	ND	33,794	13,921	6,000
1996	ND	6,425 [g]	7,796	21,817	36,038	9,076	4,127
1997	ND	1,721 [g]	10,754	9,403	21,878	9,403	4,760
1998	ND	4,881 [g]	9,936	7,019	21,836	5,648	7,105
1999	ND	6,875 [g]	7,430	8,832	23,137	7,095	6,170
2000	ND	3,706 [g]	5,758	2,619	12,083	2,809	6,569
2001	ND	6,078 [g]	2,839	1,740	10,657	1,779	7,306
2002	ND	4,183 [g]	5,503	3,935	13,621	899	4,093
2003	ND	6,463 [g]	4,777	5,627	16,867	0	1,292
2004	ND	1,145 [g]	3,061	3,061	7,267	2,412 [f]	476
2005	ND	490 [g]	2,870	9,343	12,703	2,975 [f]	2,170
2006	ND	1,188 [g]	4,995	3,293	9,476	1,482 [f]	3,655
2007	ND	462 [g]	2,265	390	3,117	[e]	[e]
2002-2006 Average	ND	2,694	4,241	5,052	11,987	1,554	2,337

Note: ND is no data.

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