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Management of Salmon Stocks in the Copper River, Report to the Alaska Board of Fisheries: December 1-5, 2017, Valdez, Alaska

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

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

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ABSTRACT

This report presents background information relative to the management of the Copper River commercial, personal use, subsistence, and sport salmon fisheries and summarizes the performance of those fisheries and management actions taken through the 2017 season. King salmon *Oncorhynchus tshawytscha*, sockeye salmon *O. nerka*, and coho salmon *O. kisutch*, are the targeted salmon species within the Copper River fisheries and are fished from mid-May through the end of September. From 2007 to 2016, salmon harvest averaged 1.69 million fish in the Copper River District commercial fishery, 3,367 fish in the Copper River District subsistence fishery, 144,785 fish in the Chitina Subdistrict personal use dip net fishery, 86,767 fish in the Glennallen Subdistrict subsistence fishery, 120 fish in the Batzulnetas subsistence fishery, and 17,335 fish in the Upper Copper River sport fisheries. Sockeye salmon account for over 70% of the commercial harvest, over 97% of the personal use and subsistence harvests, and 90% of the sport harvest. Inriver run of salmon in 2015 was the highest run since the sonar was installed at Miles Lake. The 2016 king salmon run was the lowest on record and the 2015 and 2017 runs were below the 15-year average of 64,000 fish. Escapement goals for king salmon have been met in 7 of the last 10 years and there are no stocks of concern in the Copper River drainage.

Key words: Copper River, Klutina River, Gulkana River, commercial, personal use, subsistence, sport fishery, Alaska Board of Fisheries, Cordova, management, king salmon *Oncorhynchus tshawytscha*, sockeye salmon *O. nerka*, coho salmon *O. kisutch*, rainbow trout *O. mykiss*, Arctic grayling *Thymallus arcticus*

INTRODUCTION

This report summarizes the most recent fishing seasons and management actions that occurred in the Copper River commercial, subsistence, personal use, and sport salmon fisheries during those years, in addition to briefly summarizing recent research activities. Harvest and participation data specific to the 2017 subsistence, personal use, and sport fisheries is collected postseason, and therefore only data through the 2016 season is presented in this report.

AREA DESCRIPTION

The Copper River drainage and estuary encompasses approximately 24,000 square miles and is Alaska's fifth largest river system (Figure 1). The river drains large portions of Interior Alaska. The drainage includes the communities of Glennallen, Gulkana, Gakona, Chitina, McCarthy, Kenny Lake, Copper Center, Paxson, Mentasta, and Slana. Adjacent to the outlet of the Copper River is the community of Cordova. The state's major highways, together with secondary roads and trails, in conjunction with the Copper River itself, provide relatively good access to most of the area's major fisheries. Principle land managers in the Copper River drainage are the National Park Service (NPS), U.S. Forest Service, Bureau of Land Management, Ahtna Native Corporation, Chitina Native Corporation, Chugach Native Corporation, Eyak Native Corporation, and the Alaska Department of Natural Resources.

CURRENT MANAGEMENT TOOLS AND STRATEGIES

COPPER RIVER DISTRICT SALMON MANAGEMENT PLAN

During the 1980 Board of Fisheries (board) meeting the *Copper River District Salmon Management Plan* (5 AAC 24.360) was adopted. The original intent of the management plan was to allow limited king salmon harvest in years of sockeye salmon conservation. At the 1996 board meeting, the plan was rewritten as an umbrella management plan for Copper River salmon fisheries. The intent of the plan was to direct the department to manage the Copper River District commercial salmon fishery to achieve 1) annual sockeye salmon and "other salmon" escapement goals and 2) an annual inriver goal for salmon. The initial sockeye salmon escapement goal was

a biological escapement goal of 300,000 fish. Currently, sockeye salmon stocks in the Upper Copper River are managed to achieve a sustainable escapement goal (SEG) of 360,000–750,000 fish. The present inriver salmon goal—which includes the Upper Copper River sockeye salmon SEG lower bound, spawning escapement of other salmon, hatchery sockeye salmon brood and surplus, subsistence, personal use, and sport harvest components—is measured at the Miles Lake sonar and is established annually (Table 1). The sockeye salmon SEG and allocations are fixed in regulation, whereas the hatchery brood stock and hatchery surplus components are determined annually.

There is one proposal currently before the board that concerns sockeye salmon escapement goals for the Copper River: "Proposal 10–Establish an optimum escapement goal (OEG) of 700,000–1,200,000 sockeye salmon for the Copper River."

COPPER RIVER KING SALMON MANAGEMENT PLAN

During the 1996 board meeting, the *Copper River King Salmon Management Plan* (5 AAC 24.361) was adopted. The original purpose of this plan was to ensure that escapement of king salmon into the Copper River drainage was provided for at or above historic levels by reducing the harvest potential of the commercial, sport, and personal use fisheries by 5%. This was done by allowing inside statistical area closures in the commercial fishery during statistical weeks 20 and 21, reducing the annual bag limit of king salmon from 5 to 4 in the personal use fishery, and implementing a sport fish guiding closure on Tuesdays in the sport fishery. In 1999, the board amended the plan to direct the department to manage the commercial, personal use, and sport fisheries to achieve a spawning escapement range of 28,000–55,000 king salmon. Additional means were provided for the department to manage the commercial and sport fisheries beyond the 5% reduction to achieve this spawning escapement range. The sport fish guiding restriction was replaced with a sport fish annual limit reduction from 5 to 4 king salmon. The portion of the plan directed at the personal use fishery was also removed, following the reclassification of the Chitina Subdistrict personal use fishery to a subsistence fishery. In 2003, the management plan was again revised and the department was directed to manage the commercial and sport fisheries to achieve a sustainable escapement goal of 24,000 king salmon or more. In 2006, the management plan was revised directing the commissioner to open no more than one fishing period during statistical weeks 20 and 21 within the inside closure area of the Copper River District. In 2011, the management plan was further revised to restrict the commercial fishery to a single 12-hour period within the inside closure area during the combined statistical weeks 20 and 21. Language was also added providing management guidance of the Chitina Subdistrict personal use fishery and the Glennallen Subdistrict subsistence fishery if the commissioner determined that additional conservation measures were necessary to achieve the escapement goal. In addition, the *Copper River Personal Use Dip Net Salmon Fishery Management Plan* was revised to delay the opening dates for the Chitina Subdistrict personal use dip net salmon fishery from no sooner than June 1 but before June 7, to no sooner than June 7 but before June 15. The management plan was last revised in 2014 to provide additional management authority to establish and, if necessary, reduce bag limits for king salmon taken by fish wheel and dip net, to prohibit retention of king salmon taken by fish wheel and dip net, and to modify methods and means within the Glennallen Subdistrict subsistence salmon fishery.

RUN TIMING

Several stocks of sockeye salmon with different run timing characteristics migrate through the Copper River commercial fishery (Figure 2). Most king salmon that migrate through the district spawn in tributaries of the Upper Copper River. Three major stock components of sockeye salmon return to the Copper River. The most abundant sockeye salmon component, referred to as the Upper Copper River wild stock, has both early and late runs that spawn in Copper River tributaries above Miles Lake. The second component is an enhanced sockeye salmon run that is produced at the Gulkana Hatchery (GH). This enhanced run has a run timing that overlaps the late wild stock component. The Gulkana Hatchery has been producing sockeye salmon since the early 1970s and has produced enhanced runs of up to 1.1 million fish. The third group, referred to as the lower delta stock, spawns in systems below the Chugach Mountains between Eyak Lake and the Katalla River. Finally, there are two stocks of coho salmon *O. kisutch* that return to the management area. A small upriver stock of coho salmon shares a run timing with a much larger stock that returns to streams along the Copper River Delta (CRD) below Miles Lake.

King salmon returning to the Copper River drainage begin passing through the CRD and entering the Copper River in early May. Most of the run (85%) enters the river from mid-May through mid-June and the run is essentially complete by July 1. Sockeye salmon run timing in the Copper River District begins in mid-May and ends in mid- to late August. The early-timed Upper Copper River wild stocks are in the commercial fishing district from mid-May to mid-June. The late-timed Upper Copper River wild stocks and hatchery stock sockeye salmon enter the commercial fishing district from mid- to late-June and are in the fishery through August. Some components of the Lower CRD wild stock run timing begin in mid-May, but a majority of the delta run is not abundant until mid-June. Coho salmon return to the Copper River District from mid-August through October.

ESCAPEMENT ENUMERATION

Enumerating the number of fish that escape the various fisheries and make it to the spawning grounds is an essential component of managing salmon for sustained yield. In 1992, the department adopted the *Policy for statewide salmon escapement goals*, which was subsequently put into regulation (5 AAC 39.223) in 2001 that formalized the procedure for establishing escapement goals. Various terms relating to escapement goals were adopted as part of the *Policy for management of sustainable salmon fisheries* (5 AAC 39.222) in 2000. The sockeye salmon stocks in the Upper Copper River are managed to achieve a sustainable escapement goal (SEG) of 360,000–750,000 spawners. Copper River king salmon are managed to meet an SEG of 24,000 or more spawners. The CRD sockeye salmon stock SEG is 55,000–130,000 spawners, and the delta coho salmon SEG is 32,000–67,000. Delta escapements are estimated using aerial surveys.

The three methods used to estimate salmon that return to the Copper River District are the DIDSON sonar at Miles Lake, aerial surveys of the Upper Copper River tributaries and Lower CRD streams, and a mark–recapture study to assess king salmon.

Miles Lake Sonar

The sonar project operates from mid-May to the end of July. Although king salmon and coho salmon pass the sonar site, they constitute a minor portion of the total count. Species apportionment is currently not possible. Sonar passage information, therefore, includes all

salmon species and is primarily used for inseason sockeye salmon management and estimating sockeye salmon run strength. Daily escapement projections, based on average run timing and the projected total salmon run, are compared to actual daily counts to evaluate the salmon run's timing and abundance. Temporal achievement of the inriver goal should ensure adequate escapement for all upriver sockeye salmon components. Sonar is the primary commercial fisheries management tool until mid-June, at which point aerial surveys are used to estimate escapement into the delta systems. The Miles Lake sonar is also the primary management tool for the Chitina Subdistrict personal use fishery through the end of August, because it is used to set the fishery opening duration based on estimated weekly salmon abundance. For the month of September the personal use fishery remains open by regulation.

The Miles Lake sonar project began in 1978 with a single Bendix side scan sonar unit on the south bank of the Copper River. In 1979, an additional unit was placed on the north bank. From 2003–2007, Dual Frequency Identification Sonar (DIDSON) units were deployed in close proximity to Bendix sonar devices with both technologies operating simultaneously. Resultant upriver escapement counts were then compared, with little variation observed between the two systems. Bendix sonar counters at Miles Lake were replaced by a new DIDSON acoustical lensing sonar system in 2008. Miles Lake sonar enumeration has been improved with the DIDSON system due to target tracking, digital capture and archiving of acoustic data, and the ability to conduct real-time data processing and interpretation. DIDSON is also able to distinguish the direction of fish migrations, and identify specific individual targets within complex groups. These features are highly useful for distinguishing directional movement of fish, and for detecting false counts frequently created by glacial ice and debris moving downstream through the ensonified zone at Miles Lake. Additionally, this technology is being aggressively developed for a variety of industries, increasing the likelihood that future improvements in DIDSON technology will provide greater information regarding salmon as they pass the counting station at Miles Lake. Starting with the 2017 field season, Adaptive Resolution Imaging Sonar (ARIS) units (next generation of DIDSON) began to be phased in on the Miles Lake sonar project. No salmon enumeration conversion is necessary between ARIS and DIDSON. In addition, the higher resolution capability of the ARIS units has allowed a species apportionment feasibility study to be initiated.

Aerial Surveys

Aerial surveys of delta streams are conducted weekly from mid-June through mid-October. These surveys are used in conjunction with inriver counts at the Miles Lake sonar to adjust commercial fishery periods in order to assure adequate escapement of sockeye and coho salmon into the Lower CRD streams. Due to the large number of spawning systems on the Lower CRD, total escapement enumeration cannot be obtained. Instead, an escapement index is estimated from aerial surveys of selected streams. The observed weekly escapement indices are compared to anticipated weekly escapement indices that are averages of past years' (1971–2016) escapement observations. The SEG range for the CRD (55,000–130,000 sockeye salmon) is compared to the combined total of the peak count for each index stream.

King salmon are broadly distributed throughout the Copper River basin, having been observed in approximately 40 tributaries. Aerial surveys have been conducted for 35 of these systems. However, only nine of these streams were surveyed consistently from 1966–2004. In 2005, the number of surveyed spawning streams was reduced to four (Gulkana River, East Fork Chistochina River, and Manker and St. Anne Creek in the Klutina River drainage), because data

gathered from the king salmon radiotelemetry study indicated only a minor component of the king salmon run actually spawned in the clear water tributaries of the glacial rivers (such as the Tazlina and Tonsina rivers). Assessment of king salmon spawning escapements through aerial surveys of key index areas does not provide an estimate of the total spawning population. The current four index streams provide a postseason index of run strength for the major sport fisheries and for Upper Copper River king salmon stocks.

NVE King Salmon Escapement Monitoring

King salmon spawning escapement has been estimated by the mark–recapture fish wheel study conducted by the Native Village of Eyak (NVE) since 2003. The objectives of the study are to estimate the annual drainagewide inriver passage of king salmon in the Copper River, and to further develop an ongoing, long-term monitoring program to ensure continued involvement of NVE in the active management of Copper River fisheries. The estimates are germane to the number of king salmon passing Baird Canyon (just upriver from Miles Lake and before any inriver fisheries) and are generated using two event mark–recapture techniques such that the estimates are within 25% of the actual inriver abundance, 95% of the time.

NVE has overcome many challenges associated with this study, which has proved to be a success. The study has generated unbiased and reasonably precise inriver abundance estimates for 2003–2016 (Table 2), and it is expected that the 2017 results will also satisfy the established objective criteria.

Estimates of total king salmon escapement were determined by subtracting the subsistence, personal use, and sport harvests from the inriver abundance estimates. The resulting escapement estimates were 24,158 in 2014, 32,306 in 2015, and 16,009 in 2016 (Table 3).

OVERVIEW OF COPPER RIVER SALMON FISHERIES

Salmon fisheries in the Copper River District primarily harvest king, sockeye, and coho salmon. These salmon stocks are harvested in four fisheries: (1) a commercial gillnet fishery at the mouth of the Copper River; (2) a subsistence gillnet fishery at the mouth of the Copper River, a subsistence dip net and fish wheel fishery in the Copper River between Chitina and the Slana River confluence, and a subsistence fish wheel, dip net, and spear fishery in Tanada Creek and the Copper River near the traditional village site of Batzulnetas; (3) a personal use dip net fishery in the Copper River near Chitina; and (4) sport fisheries that occur in various tributaries (Table 4). In addition, since 1999 federal subsistence fisheries have occurred in the Glennallen and Chitina subdistricts and in the Batzulnetas area. Prior to 1999, participants in these subsistence fisheries took part in the state fisheries and overall participation has not increased as a result of the federal fisheries. Since 1984, total harvest (state and federal subsistence harvests combined since 2002, with all harvest reported on state permits prior to 2002) has ranged as follows: (1) for king salmon, from 14,200 in 2013 to more than 87,300 salmon in 1998 (Figure 3); (2) for sockeye salmon, from 479,700 in 2009 to 3.20 million in 1997 (Figure 4); and (3) for coho salmon, from less than 23,600 in 1997 to nearly 684,000 in 1994.

The 2015 Copper River sockeye salmon total run was 3.21 million fish, with 1.75 million (53.9%) commercially harvested, 334,000 (10.3%) harvested by upriver subsistence and personal use fishermen, and an estimated 9,500 (0.3%) harvested by upriver sport fishermen. Harvest distributions between other harvest categories were consistent with past years. Upriver and Copper River Delta wild sockeye salmon escapement was 1.09 million (33.5%) fish, and 40,100 (1.2%)

fish returned to the GH sites (Table 4). Overall, 2.68 million (83.6%) of the sockeye salmon originated from upriver wild stock systems, 311,000 (9.68%) from Copper River Delta wild stock systems, and 217,000 (6.8%) came from the GH.

The 2015 king salmon total run was 56,200 fish with 22,500 (40.1%) commercially harvested, 217 (0.4%) harvested through educational and subsistence permits in the Copper River District, and 1,145 (2.0%) retained by commercial permit holders as homepack. A total of 4,200 (7.5%) were harvested by upriver personal use and subsistence users, an estimated 1,300 (2.7%) were harvested by sport fishermen, and the remaining 26,764 (47.6%) represent spawning escapement (Table 3). Spawning escapement was above the lower bound SEG of 24,000 for Copper River king salmon.

The 2016 Copper River sockeye salmon total run was 2.07 million fish; 1.18 million (56.6%) commercially harvested and sold, 232,000 (11.2%) harvested by upriver subsistence and personal use fishermen, and an estimated 7,500 (0.4%) harvested by upriver sport fishermen. Harvest distributions among other harvest categories were consistent with past years. Upriver and Copper River Delta wild sockeye salmon escapement was 606,000 (29.2%) fish, and 32,300 (1.6%) fish returned to the GH sites (Table 4). Overall, 1.58 million (76.3%) of the sockeye salmon originated from upriver wild stock systems, 259,000 (12.5%) from Copper River Delta wild stock systems, and 233,000 (11.2%) came from the GH.

The 2016 king salmon total run was 29,200 fish; 12,300 (40.6%) were commercially harvested and sold, 159 (0.5%) were harvested through educational and subsistence permits in the Copper River District, and 727 (2.5%) were retained by commercial permit holders as homepack. A total of 3,200 (10.9%) were harvested by upriver personal use and subsistence users, an estimated 327 (1.1%) were harvested by sport fishermen, and the remaining 12,500 (42.8%) represent spawning escapement. Spawning escapement was approximately half the lower bound SEG of 24,000 for Copper River king salmon (Table 3).

COMMERCIAL FISHERIES

Copper River Management Area includes waters of the Gulf of Alaska between Hook Point and Cape Suckling and is composed of two fishing districts, Copper River District and Bering River District (Figure 2). The seaward boundary of the Copper River Management Area is a line 3 miles due south of a line from Cape Suckling the southernmost tip of Pinnacle Rock on Kayak Island to the tip of Hook Point on Hinchinbrook Island. The inshore boundary line for the Copper River District is from Government Rock to a point 500 yards seaward of the junction of Mountain Slough, Center Slough, and Eyak River, then east within a line bounded by coordinates located approximately two miles seaward of the grass banks and in Boswell Bay. The inshore boundary line for the northern portion of Bering River District is from Point Hey to a point on the northeast shore of Kanak Island, and from a point on the southeasternmost shore of Kanak Island to Okalee Spit by way of 2 offshore coordinates. Waters south of Kayak Island and Oklee Spit are closed to commercial fishing. The inshore boundary lines have remained in effect since the 1964 earthquake when the delta area rose two meters. Before the earthquake, the inshore boundary was within 500 yards of the grass banks. After the earthquake, the inshore boundary was moved seaward to protect rivers and sloughs from gillnets closing off the entire channel during low water sets. With the loss of fishing area inside the islands, many fishermen moved outside the islands. This move outside the barrier islands lessened some of the congestion in the inside waters.

Copper River District is managed using 3 primary tools: 1) escapement enumeration at the Miles Lake sonar site; 2) aerial escapement surveys of lower delta systems, and to a lesser extent 3) weekly anticipated harvest estimates (forecasts) with environmental conditions such as river height taken into account (Figures 5–7). The anticipated catch is based on the current year midpoint harvest forecast and the 1998–2007 harvest timing. The objective is to have a fishing schedule of 2 evenly spaced periods per week. Fishing schedules are adjusted inseason to account for variations in river flow, run timing, run strength, fishing effort, and other factors. In early to mid-August the department's priority switches to coho salmon management.

Average 10-year commercial harvest from the Copper River District for the years 2007–2016 was 15,379 king, 1,424,838 sockeye, and 196,770 coho salmon (Tables 3, 4, and 5). The 25 year average for the years from 1992–2016 was 33,379 king, 1,436,181 sockeye and 272,058 coho salmon. Preliminary 2017 harvest was 13,139 king, 569,321 sockeye, and 303,394 coho salmon. Annual commercial sockeye salmon harvests in 2015, 2016, and 2017 were the 7th, 23rd, and 85th largest harvests, respectively, since 1889. King salmon commercial harvest over the last three years ranked 37th, 72nd, and 70th highest, respectively, since 1889. Miles Lake sonar inriver passage counts in 2015, 2016, and 2017 were 1st, 17th, and 20th highest, respectively, since the initiation of the program in 1978.

In addition, commercial fishermen may withhold a portion of their catch as home pack. Any commercially caught finfish not sold must be reported on a fish ticket. From 2007–2016 an average of 329 permit holders per year have reported retaining three king salmon on average from their commercial harvest (Table 6).

There are five proposals currently before the board that concern commercial fisheries in the Copper River and Bering River districts specifically:

Copper River King Salmon Management Plan (4 proposals)

- Proposal 28–Repeal mandatory inside-waters closure.
- Proposal 32–Close commercial salmon fishing in the Copper River District until the first week of June in years when the preseason Copper River king salmon forecast is below the 20-year average or below 35,000 fish
- Proposal 33–Prohibit the commercial sale of king salmon from the Copper River District if any subsistence restrictions are in place on the stock.
- Proposal 34–Prohibit commercial salmon fishing in the Copper River District until it has been documented that a single salmon has passed the Miles Lake sonar.

Closed waters (3 proposals)

- Proposal 29–Extend the inside closure area to ¼ mile off the southern shores of all barrier islands.
- Proposal 30–Reduce closed waters to the grass banks of the Copper River Delta.
- Proposal 37–Reinstate waters of eastern Kayak Island in the Bering River District commercial salmon fishery.

Gillnet specifications (1 proposal)

- Proposal 31–Reduce the maximum depth of commercial gillnets to 29 meshes through the start of Week 24 (end of May).

Fishing seasons (1 proposal)

- Proposal 35–Open commercial gillnet fishing on the Copper River on the Monday or Thursday closest to May 1.

Weekly fishing periods (1 proposal)

- Proposal 36–Open the Copper River commercial salmon fishery for a minimum of two 12-hour periods per week from the commencement of the fishing season.

2015 Season Summary

The 2015 commercial harvestable surplus forecast for the Copper River District was 5,580 king, 2.20 million sockeye, and 214,000 coho salmon. Gulkana Hatchery was expected to contribute 196,000 sockeye salmon to the commercial common property fishery (CCPF) harvest. The commercial salmon fishing season in the Copper River District began on Thursday, May 14. Due to a poor king salmon forecast inside waters as described in 5 AAC 24.350(1)(B) were closed for all or a portion of the first 10 periods. Actual king salmon harvest was above inseason harvest projections throughout the season, but remained below levels that would indicate an above average run. This contrast with low preseason projections prompted the department to open the inside waters for portions of fishing periods starting May 28.

A total of 515 drift gillnet permits were active in the Copper River District in 2015 out of 536 total permits. Fishing effort peaked on May 18 when 485 permits were fished. Peak salmon harvest occurred during the May 25 fishing period when 3,002 king and 159,782 sockeye salmon were harvested. Peak fishing effort and harvest for the coho salmon occurred August 31 when 179 permit holders delivered 27,000 coho salmon. The Copper River commercial common property sockeye salmon harvest of 1.75 million was 20.5% below the projected 2.20 million and 23.2% above the previous 10-year average of 1.42 million sockeye salmon. The overall commercial sockeye salmon harvest from the Copper River District was the seventh largest harvest in the history of the fishery. Harvest composition was 1.58 million (90.5%) wild, 137,414 (7.8%) Gulkana Hatchery, and 29,747 (1.7%) Main Bay Hatchery (MBH) sockeye salmon. The commercial harvest of 22,500 king salmon was 22.3% above the previous 10-year average of 18,400 fish. The coho salmon commercial harvest of 137,000 fish was below the previous 10-year (2005–2014) average harvest of 214,000 coho salmon. The inriver goal for salmon passing the Miles Lake sonar site was 759,000–1.15 million salmon. The 2015 preliminary sonar escapement estimate was 1.35 million salmon (Table 2). Spawning escapement to Copper River delta systems based on aerial survey indices was 66,700 sockeye salmon, and was within the SEG range of 55,000–130,000 fish. Coho salmon spawning escapement to the Copper River delta based on aerial survey indices was 42,200 and was within the SEG range of 32,000–67,000 fish.

The Bering River District was initially closed to commercial sockeye salmon harvest until escapement levels were close to or within the anticipated weekly escapement index due to the ongoing trend in annual (2006–2014) aerial survey escapement estimates being below or near the lower end of the escapement goal. To provide some information with minimal potential for a large harvest, the district was opened for the season June 25 for a 12-hour period. Subsequent aerial survey counts were within the weekly anticipated index and the district remained open for the remainder of the season concurrent with the Copper River District fishery. The aerial escapement index of 21,700 sockeye salmon was within the new SEG range of 15,000–33,000

fish. No fishing effort was reported in the district until the beginning of the coho salmon fishery in mid-August. The coho salmon commercial harvest of 12,100 was the smallest since 2007 and was nearly 80% less than the 10-year average. Aerial surveys of coho salmon produced an escapement index of 15,600 fish, which was within the SEG range of 13,000–33,000 fish.

2016 Season Summary

The 2016 commercial harvest forecast for the Copper River District was 21,000 king, 1.62 million sockeye, and 201,000 coho salmon. Gulkana Hatchery was expected to contribute 115,000 sockeye salmon to the CCPF harvest. The commercial salmon fishing season in the Copper River District began on Thursday, May 16. Due to the combination of a below average king salmon forecast and lower than anticipated inseason harvest, inside waters as described in 5 AAC 24.350(1)(B) were closed for all or a portion of the first 12 periods, ending with the fishing period beginning June 20. This closure covered the majority of historical king salmon run entry timing and was nine fishing periods beyond the regulatory requirement in 5 AAC 24.361(b). Starting the third fishing period, the inside closure area was expanded to include waters inside the bar at Softuk and Little Softuk. This reduction in channelized shallow water fishing area was intended to reduce king salmon harvest potential while allowing for a more aggressive sockeye salmon fishery in outside waters.

A total of 520 of 536 drift gillnet permits were active in the Copper River District in 2016. Fishing effort peaked May 19 when 473 permits were fished. Peak harvest did not occur for king salmon until the third fishing period when 2,900 fish were harvested, and for sockeye salmon until the 14th period when 92,000 fish were harvested. The sockeye salmon harvest of 1.18 million fish was 27.2% below the projected 1.62 million and 19.2% below the previous 10-year average of 1.46 million sockeye salmon. The harvest composition was 1.00 million (85.2%) wild, 157,000 (13.4%) Gulkana Hatchery, and 17,400 (1.5%) MBH sockeye salmon. The commercial harvest of 12,300 king salmon was 28.1% below the previous 10-year average of 17,200 fish. The coho salmon commercial harvest of 368,000 fish was below the previous 10-year (2006–2015) average harvest of 201,000 coho salmon. The inriver goal for salmon passing the Miles Lake sonar site was 712,000–1.10 million salmon. The 2016 sonar escapement estimate was 802,000 salmon (Figure 3). Spawning escapement to Copper River delta systems based on aerial surveys was 51,600 sockeye salmon, and was below the SEG range of 55,000–130,000 fish. Pilot availability and poor survey conditions contributed to the lower counts and it is likely that the goal was achieved. Coho salmon spawning escapement to the Copper River Delta based on aerial surveys was 72,600 and was within the SEG range of 32,000–67,000 fish.

The Bering River District was initially opened only along the western edge of the district to reduce enforcement concerns with the Copper River District eastern line fishery. Initially there was no directed commercial sockeye salmon harvest due to the recent trend in poor annual escapement. To provide some information with minimal potential for a large harvest, the open area in the district was expanded east starting June 6. The first aerial survey of the Bering River District was flown during the week ending June 11. The total index count from this survey was 6,090 sockeye salmon, within the anticipated range of 3,250–7,150 sockeye salmon for this date. Because the escapement count was above anticipated levels, the fishery remained open on the western edge of the district. The sockeye salmon commercial harvest of 1,380 was below the previous 10-year (2006–2015) harvest average of 6,420 sockeye salmon. The aerial escapement index of 16,300 sockeye salmon was within the SEG range of 15,000–33,000 fish. A total of 149 permits fished during the 2016 season, and effort peaked at 85 permits by September 5,

harvesting 17,100 coho salmon. Peak harvest occurred during the September 1 fishing period when 25,200 coho salmon were sold by 64 permit holders. Aerial surveys of coho salmon produced an escapement index of 26,200 fish, which was within the SEG range of 13,000–33,000 fish.

2017 Season Summary

The 2017 harvestable surplus forecast for the Copper River District was 5,000 king, 889,000 sockeye, and 207,000 coho salmon. Gulkana Hatchery was expected to contribute 173,000 sockeye salmon to the CCPF harvest. The commercial salmon fishing season in the Copper River District began on Thursday, May 18. Due to the extremely poor king salmon forecast, closed waters described in 5 AAC 24.350(1)(B) were expanded to include inside waters west of Grass Island Bar and east of Kokinhenik Bar, essentially closing all waters inside barrier islands across the entire district. These closures were maintained through June 18, affecting the first nine fishing periods, seven fishing periods beyond the regulatory requirement in 5 AAC 24.361(b). In addition, fishing period frequency was limited to two per week and duration was maintained at 12 or fewer hours per period through late June. Through the end of July, the commercial fishery was open 403 hours, 264 hours less than the recent 10-year average.

A total of 518 of 536 drift gillnet permits were active in the Copper River District in 2017. Fishing effort in 2017 peaked May 29 with 454 permits fished during a 12-hour opening peak king and sockeye salmon harvest occurred June 1 when 2,180 king and 57,100 sockeye salmon were harvested. Peak fishing effort during the coho salmon season occurred when 219 permit holders participated in the 24-hour fishing period that started Thursday, August 31. Peak coho salmon harvest (45,400 fish) occurred during the 36-hour fishing period that started Thursday, September 14. The Copper River sockeye salmon harvest of 570,000 fish was 40% less than the previous 10-year (2007–2016) harvest average of 1.43 million sockeye salmon. The number of wild sockeye salmon in the Copper River District CCPF harvest was 529,500, or 93%. Gulkana Hatchery contribution to the sockeye salmon commercial harvest was 29,300, or 5% of the Copper River harvest, and was 89.5% below forecast. Main Bay Hatchery contributed 10,500 fish, or 2% of the Copper River harvest. The CCPF harvest of 13,100 king salmon was below the previous 10-year (2007–2016) average harvest of 15,400. The current season total coho salmon commercial harvest of 288,000 fish is well above the previous 10-year (2007–2016) average harvest of 206,000 coho salmon. The 2017 preliminary sonar estimate was 723,426 salmon and was within the 712,000–1,100,000 inriver goal range (Table 2). Spawning escapement to Copper River delta systems based on aerial survey indices was 57,000 sockeye salmon, and was within the (SEG) range of 55,000–130,000 fish. Copper River Delta coho salmon spawning escapement monitoring is ongoing, but escapement is anticipated to end up within the SEG range of 32,000–67,000 fish. Preliminary estimates of inriver king salmon abundance indicate that spawning escapement was above the lower bound SEG of 24,000 fish.

The Bering River District was initially opened, concurrent with the Copper River District, only along the western edge of the district to reduce enforcement concerns with the Copper River District eastern line fishery. Initially there was no directed commercial sockeye salmon harvest due to the recent trend in poor annual escapement. Inseason aerial survey escapement estimates trended near or below the anticipated inseason weekly index and the fishery remain restricted through the end of June. Starting June 29, as a result of improving escapement and the likelihood of minimal participation in the fishery, the department elected to keep the Bering River District open to commercial harvest on a twice-weekly basis until the start of coho salmon season in mid-

August. The sockeye salmon commercial harvest of 2,600 fish was 30% below the previous 10-year (2007–2016) harvest average of 3,700 fish. The aerial escapement index of 18,800 sockeye salmon was within the SEG range of 15,000–33,000 fish. The coho salmon commercial harvest of 111,000 was 122% above the previous 10-year (2007–2016) harvest average of 47,900 fish. Commercial fishing effort in the coho salmon fisheries was high due to productive fishing in the eastern portion of the Copper River Delta. Bering River District coho salmon spawning escapement monitoring is ongoing, but escapement is anticipated to be within the SEG range of 13,000–33,000 fish.

GULKANA HATCHERY

Gulkana Hatchery is located on the Gulkana River approximately six miles north of Paxson Lake. The hatchery was built in 1973 and was initially operated by the department. In 1992, the hatchery was transferred to Prince William Sound Aquaculture Corporation (PWSAC). The donor stock for the facility was the local wild stock at the hatchery site on the Gulkana River. The Gulkana Hatchery was expanded to two facilities in 1986. The two facilities combined have produced an average of 21.6 million fry annually over the last 10 years. Gulkana Hatchery produces sockeye salmon for the common property fisheries, which include commercial, personal use, subsistence, and sport fisheries. In addition to the common property harvest, hatchery runs meet brood stock needs and also create an additional surplus of enhanced sockeye salmon at the hatchery and the Crosswind Lake remote release site. Since the run timing of hatchery stocks coincides with that of CRD wild and late upriver wild stocks, the harvest rate in the commercial fishery is determined by the strength of the wild stock escapement. Enhanced runs are therefore harvested at the rate that can be sustained by wild stocks. This is generally expected to be between 50% and 60% for wild stocks. This wild stock priority creates surpluses of enhanced sockeye salmon when hatchery runs are large and wild stocks are weak or less plentiful. These unharvested enhanced runs are designated as the hatchery surplus component of the inriver escapement goal in the *Copper River District Salmon Management Plan*. For planning purposes, the department annually projects the hatchery surplus in the preseason forecast, but the actual surplus will depend upon the actual run strength of the wild and enhanced stocks. Recently, because of increased survivals of sockeye salmon released in Crosswind Lake, the forecasted hatchery surplus has ranged from 44,096 fish in 2007 to 136,036 fish in 2010 (Table 1). In 2014, the forecasted hatchery surplus component was 69,000 sockeye salmon. Gulkana Hatchery stocks are intermixed with other sockeye salmon stocks and with other salmon species to the extent that no targeted harvest can occur within either the commercial or inriver fisheries. Gulkana Hatchery brood stock needs are estimated annually and included in the Copper River inriver escapement goal. From 1986 through 2017, the brood stock escapement component within the inriver goal has been 20,000 sockeye salmon. Adequate fish should be available for brood stock needs at Gulkana Hatchery if the Copper River inriver escapement goal is attained at the Miles Lake sonar.

Until 1997, PWSAC had only harvested sockeye salmon for brood stock and facility operating and capital costs have been met through a 2% fishermen's assessment and through corporate revenues from the sale of Wally Noerenberg Hatchery and Main Bay Hatchery salmon. In an effort to avoid excess fish entering Crosswind Lake, a special harvest area (SHA) has been designated to allow the hatchery operator the opportunity to harvest returning adult surplus to Crosswind Lake for fertilization needs.

The Crosswind Lake SHA consists of the waters of Dog Creek west of approximately 145°52.83′ W long, downstream to a weir located at approximately 62°34.70′ N lat, 145°53.7′ W long. PWSAC is allowed to construct a weir or series of weirs to conduct a cost-recovery harvest. Seines or dip nets may be used to harvest cost recovery fish in the SHA. PWSAC, or its contractor, harvests sockeye salmon during periods established by emergency order (EO). All other species must be allowed free upstream or downstream passage. In order to provide state residents with the opportunity to use excess production from Crosswind Lake, PWSAC, or its contractor, may at their discretion, issue a permit for up to 30 sockeye salmon per household to residents who come to the site and request the fish. Less than three household permits per year have been issued and total harvests have been less than 100 fish annually. The average actual sockeye salmon run to Crosswind Lake from 2007–2016 is 36,540 fish.

When PWSAC is unable to harvest surplus hatchery sockeye in the SHA, they will, under authority of the department, destroy all sockeye salmon in excess of escapement needs. Destruction of these fish is undesirable; however, allowing them to escape into Crosswind Lake is also of concern to local landowners. At a public meeting conducted by PWSAC during the winter of 1995/96, Crosswind Lake area landowners indicated that the increased escapement into the lake in recent years was unacceptable and that it would create a public nuisance if large numbers of fish continued to be allowed into the lake.

The intent for developing the SHA was to limit the run of surplus enhanced sockeye salmon into Crosswind Lake, provide local economic opportunity, and provide state residents with a source of salmon. There is negligible spawning habitat at Crosswind Lake and no natural production escapement goal has been established. This SHA prevents most of the returning sockeye salmon from migrating into the system while providing benefits to both PWSAC and state residents.

The department and PWSAC created a *Basic Management Plan* (BMP) for Gulkana Hatchery that reduced historic release numbers and revised release strategies so that the size of the hatchery's adult returns will be within the ability of the department to manage the mixed stock fishery for sustained yield of wild stocks. The production goal outlined in the BMP is for an annual average run of 300,000 adult sockeye salmon. Determining run strength and correctly managing for the escapements of both CRD and upriver wild sockeye salmon stocks is an ongoing challenge. Recent large hatchery surpluses are the combined result of high survival rates and conservative management to protect run entry of June king salmon and June through mid-July sockeye salmon through the commercial fishery. Annual runs over the previous 10 years have averaged 307,000 sockeye salmon and 5 out of 10 of these years exceeded the 300,000 fish goal.

Mass marking of enhanced stocks using strontium chloride began in the spring of 2000 as part of a cooperative effort between the department and PWSAC. The ability to more accurately estimate the enhanced sockeye salmon contributions to the various fisheries in the Copper River will further support the department's efforts to manage for the wild stock priority while efficiently utilizing the enhanced sockeye salmon component of the run. A near-term reduction in Gulkana Hatchery production is considered by the department to be an important step towards addressing the mixed stock management difficulties created by the success of the enhancement program.

PERSONAL USE FISHERY

There is only one personal use salmon fishery in the Upper Copper River. This occurs in the Chitina Subdistrict of the Upper Copper River District. The Chitina Subdistrict personal use dip net salmon fishery is managed under the *Copper River Personal Use Salmon Fishery Management Plan* (5 AAC 77.591). Only Alaska residents may participate in the Copper River personal use salmon fishery. The entire mainstem Copper River between the downstream edge of the Chitina-McCarthy bridge and a department marker located about 200 yards upstream of Haley Creek (in Wood Canyon) is open to personal use fishing (Figure 8). Only dip nets may be used to harvest salmon. This fishery is opened weekly by EO. Both a valid Alaska sport fishing license and a special permit are required to participate in the personal use fishery. Participants must record their harvest on their permit before leaving the fishing site and return the permit upon completion of fishing for the season. The board has mandated that Alaskans may participate in either the subsistence or personal use fishery in the Upper Copper River drainage, but not both.

There are four proposals currently before the board that concern personal use fisheries in the Copper River drainage:

- Proposal 15–Prohibit the use of monofilament or gillnet mesh in dip nets.
- Proposal 16–Require log books for all charters operating in personal use and subsistence fisheries.
- Proposal 17–Extend the lower boundary of the Chitina Subdistrict downstream to the Uranatina River.
- Proposal 18–Repeal the reduction in maximum harvest level in the Chitina Subdistrict Personal Use fishery when the Copper River commercial fishery is closed 13 or more consecutive days.

Prior to 1998, the annual limit for a personal use salmon fishing permit was 15 salmon for a household of one person and 30 salmon for a household of two or more persons, of which no more than four may be king salmon. In 1998, the board passed a proposal that allows permit holders who have filled their original limit to take 10 additional sockeye salmon under a supplemental permit in weeks when a harvestable surplus of 50,000 salmon or greater will be available in the Chitina Subdistrict. In addition the board added language to the *Copper River District Salmon Management Plan* that required the maximum harvest level for the Chitina Subdistrict to be reduced to 50,000 salmon if the Copper River District commercial salmon fishery was closed for 13 or more consecutive days. In 2000, when the board made a positive customary and traditional (C&T) determination for the Chitina Subdistrict, making it a subsistence fishery rather than personal use, it reduced the king salmon component of the annual limit to one king salmon and retained this one fish limit when they reversed the C&T determination prior to the 2003 season. In 2015, the board changed the total annual limit for each personal use salmon fishing permit to 25 salmon for the head of household and 10 salmon for each dependent of the permit holder, except that only one king salmon may be retained per household. The board also removed the supplemental permits for additional sockeye salmon during weeks of surplus salmon passage.

Prior to 1997, the maximum harvest for the personal use fishery was 60,000 salmon, as established in the Copper River Salmon Management Plan (5 AAC 24.360) as part of the inriver goal the department is mandated to manage the commercial fishery for each season. From 1997 to 1999, maximum harvest level for the personal use fishery was 100,000 salmon, excluding fish in excess of the inriver goal and not including any salmon harvested after August 31. From 2000 to 2002, as a subsistence fishery, the Chitina Subdistrict had a maximum harvest level of 100,000–150,000 salmon, not including any salmon in excess of the inriver goal or salmon taken after August 31. This harvest range has remained in place, following the change of the Chitina Subdistrict back to a personal use fishery in 2003 and includes the caveat that, if the Copper River District commercial fishery is closed for 13 or more consecutive days, the maximum harvest level for the Chitina Subdistrict shall be reduced to 50,000 salmon.

Each year, a tentative fishing schedule is established by emergency order and is based on the preseason apportionment of salmon to the fishery within the inriver goal. The management plan requires that the harvest be distributed throughout the season, based upon the projected sonar counts. Weekly fishing periods are determined using the projected weekly sonar passage and applying the recent 5-year average catch per hour to the weekly harvest apportionment. The first opening can occur no sooner than June 7 and must occur before June 15. Inriver returns are estimated by the sonar unit located at Miles Lake. Based upon previous migration studies, a 2-week travel period from the Miles Lake sonar to Wood Canyon is used for management purposes from June through mid-July and a 3-week travel period for mid-July until the sonar is removed. Weekly fishing periods are adjusted in season, by emergency order, based upon actual sonar counts. When weekly sonar passage falls below the projected passage, fishing time is reduced. When weekly sonar passage exceeds the projected passage, fishing time is increased, with a maximum of 168 hours per week. The preseason and actual fishing schedules for 2015–2017 are shown in Tables 7–9.

Harvests in the Chitina Subdistrict personal use fishery prior to 2000 were estimated weekly from permits, which were to be returned after each fishing trip. Permits were only issued from the department office in Chitina. Beginning in 2000, permits were available from department offices in Anchorage, Fairbanks, Glennallen, and Palmer to provide additional service to the dipnetting public, reduce fishery operating costs, and prevent excessive delays (up to three hours) at the Chitina department office for participants to receive permits. This was expanded in 2001 to include over 40 license vendors that issued permits throughout the Southcentral and Interior regions. Beginning in 2016, Chitina Subdistrict permits could also be obtained online. Expanding the availability of permits has prevented the inseason estimation of weekly harvest and participation since 2000. However, since the fishery is managed using the abundance of salmon passing the Miles Lake sonar lack of inseason harvest data has not influenced inseason management decisions.

Harvest data have been collected since the fishery was established in 1984. Harvest in the Chitina Subdistrict personal use dip net fishery has steadily risen over the last 15 years (Figure 9). Over this period harvest has ranged from a low of 86,301 salmon in 2003 to a high of 229,213 salmon in 2015 and averaged about 133,000 salmon from 2002–2016. Annual fluctuations in the harvest result from changes in participation, abundance of fish, and river flow conditions. Dipnetters have learned to watch the Miles Lake sonar counts and effort increases in the fishery when large numbers of salmon are counted past the sonar. Record inriver returns of over 1.2 million salmon from 2012–2015 resulted in record numbers of permits issued in those

years and the highest ever recorded harvests as well. Personal use permits with completed harvest information are required to be returned to the department by October 15 of each year. As a result, this report contains no Chitina Personal Use fishery harvest data for 2017.

Sockeye salmon make up 96 percent of the Chitina Subdistrict harvest on average (Figure 9) and dominate the harvest until the second week in September. Sockeye salmon harvests typically peak in the second and third week of June with a smaller Gulkana Hatchery generated peak in the second to third week of July. King salmon make up about 2.2 percent of the Chitina Subdistrict harvest, peaking around the second week of June and continuing in small numbers through August. King salmon annual harvests declined from an average of about 5,000 fish to approximately 2,500 fish, due to the bag limit reduction to one king salmon in 2000. Since 2009, king salmon returns have been below average and the retention of king salmon in the Chitina Subdistrict has been prohibited during part of the personal use season in all years since, with the exception of 2015. Average king salmon harvest in the personal use fishery has been 800 fish since 2009. Coho salmon make up about 1.6 percent of the Chitina Subdistrict harvest and appear in the fishery in late August and dominate the catch by the second week of September. Coho salmon harvests have averaged about 2,000 fish since 1997 with a range of 805–3,657 fish annually.

Annual harvest fluctuates directly with the number of permits issued each year and inriver fish passage numbers (Figure 9). Increased participation usually reflects strong sockeye salmon returns and media coverage of the fishery. Participation is also influenced by changes in access to the fishery either due to river level fluctuations, landslides affecting access along the Copper River railroad right-of-way, and the level of conflict with private property owners. Since 1997, the number of permits issued for the Chitina Subdistrict personal use fishery has ranged from 6,441 permits in 2003 to 12,635 permits in 2015, with the top years occurring from 2012–2016.

The 2015 Chitina Subdistrict personal use fishery opened, by EO, on June 7 (Table 7). Salmon passage by the Miles Lake sonar was 64,058 salmon above projected. Strong passage past the Miles Lake sonar allowed the fishery to remain open continuously for the remainder of the season. Based on consistent commercial harvest, good capture rates at the NVE sample wheels, and good counts at the Gulkana River king salmon counting tower personal use dip netters were allowed to harvest king salmon during the entire season.

The 2016 Chitina Subdistrict personal use fishery opened, by EO, on June 7 (Table 8). Strong salmon passage past the Miles Lake sonar allowed the fishery to remain open during the next 6 weekly periods through July 24. However, the king salmon run to the Copper River was weaker than the preseason forecast of 64,000 king salmon with run timing earlier than average. The cumulative commercial harvest, as of June 12, was approximately 10,554 king salmon. This was below the expected level, and was the 7th lowest cumulative harvest through this date since 1980. Based on these data, retention of king salmon in the Chitina Subdistrict personal use dip net fishery was prohibited for the remainder of the season effective June 20. Salmon passage numbers at Miles Lake sonar were above the projected counts during the week of July 4–10, resulting in the dipnet fishery being open for 160 hours during week 8, and were below projected counts during the weeks of July 11 and July 18, resulting in reduced fishing time for weeks 9 and 10. Passage at Miles Lake after the week of July 18 was sufficient to allow for the fishery to be open continuously from August 15 through the end of the season.

In 2017, the Chitina Subdistrict personal use fishery season was opened by EO on June 7, and continued strong salmon passage past the Miles Lake sonar allowed the fishery to remain open during the next 3 weekly periods through July 2. Passage past the Miles Lake sonar through July 30 resulted in some weeks in which fishing time was increased from the preseason schedule, and some weeks in which fishing time was decreased from the preseason schedule, but all weeks had some hours of closure (Table 9). Passage past Miles Lake after the week of July 31 was sufficient to allow for the fishery to be open continuously from August 21 through the end of the season.

SUBSISTENCE SALMON FISHERIES

Subsistence fishing is restricted to three areas on the Copper River: 1) the Copper River District; 2) the Upper Copper River District (Glennallen Subdistrict); and, 3) the Batzulnetas area (Figure 10). Of the three subsistence areas, the Upper Copper River District has the highest effort and harvest. The U.S. Fish and Wildlife Service also manages subsistence fisheries in the Copper River drainage through the U.S. Forest Service Chugach National Forest (Copper River District) and the National Park Service (NPS) Wrangell St. Elias National Park (Chitina and Glennallen subdistricts and Batzulnetas area).

UPPER COPPER RIVER DISTRICT SUBSISTENCE FISHERIES

Under State of Alaska regulations there are two subsistence fisheries in the Upper Copper River District. The Glennallen Subdistrict subsistence fishery is managed by the department under the *Copper River Subsistence Salmon Fisheries Management Plan* (5 AAC 01.647). All Alaskans are eligible to participate in this subsistence fishery based on the McDowell decision in 1989. Harvest permits are required for this fishery, which must be returned to the department following the end of the fishing season. Alaskans may participate in either the Glennallen Subdistrict subsistence fishery or the Chitina Subdistrict personal use fishery, but not both. There is a second subsistence fishery upstream of the Upper Copper River District that occurs near the traditional Native village site of Batzulnetas at the confluence of Tanada Creek and the Copper River. A household can only receive one Upper Copper River District subsistence salmon fishing permit per year; therefore, a household cannot participate in both the Batzulnetas and Glennallen Subdistrict subsistence fisheries in the same year.

There are five proposals currently before the board that concern subsistence fisheries in the Upper Copper River drainage:

- Proposal 12–Require operators of fish wheels without live boxes to be present when fishing in the Glennallen Subdistrict subsistence fishery.
- Proposal 13–Prohibit using a dip net from a boat to harvest salmon in the Glennallen Subdistrict.
- Proposal 14–Modify the season dates for the Glennallen Subdistrict subsistence salmon fishery based on the preseason king salmon harvest projection.
- Proposal 15–Prohibit the use of monofilament or gillnet mesh in dip nets.
- Proposal 16–Require log books for all charters operating in personal use and subsistence fisheries.

Glennallen Subdistrict Subsistence Fishery

The Glennallen Subdistrict of the Upper Copper River District opens June 1 through September 30 for continuous subsistence fishing in all waters of the mainstem Copper River upstream of the Chitina-McCarthy Bridge to the mouth of the Slana River (Figure 10). During the 2005 board meeting, the *Copper River District Salmon Fishery Management Plan* was modified and established a range of 61,000–82,500 subsistence salmon to accommodate the combined amounts reasonably necessary for subsistence (ANS) in three subareas of the Glennallen Subdistrict. An ANS of 25,500–39,000 salmon was set for that portion of the Glennallen Subdistrict from the downstream edge of the Chitina-McCarthy Bridge to the mouth of the Tonsina River; 23,500–31,000 salmon for that portion between the mouth of the Tonsina River to the mouth of the Gakona River; and 12,000–12,500 salmon for that portion upstream of the mouth of the Gakona River to the mouth of the Slana River. The ANS amounts were developed from the three high years of reported harvest amounts from each subarea between 2000 and 2004.

Fish wheels and dip nets are legal gear, only one of which may be specified on the permit for the season. Participants are allowed one permit per household and the permit identifies the gear type to be used. The limits are 30 salmon for a household of 1, 60 salmon for a household of 2, and 10 salmon for each additional person in a household of more than 2 people. Individuals may request additional salmon up to a maximum of 200 salmon and households may request up to 500 salmon. For participants using dip nets, only five of the salmon may be king salmon. In 2017, a limit of 2 king salmon taken by fish wheel was established and the limit for king salmon taken by dip net was reduced to 2 fish prior to July 15 by EO prior to the start of the subsistence season due to a king salmon return forecast of 29,000 fish. These restrictions were rescinded 3 days after the start of the season when inseason abundance indices showed a stronger than expected return allowing for a sustainable harvest surplus in the subsistence fishery. Glennallen Subdistrict subsistence users must record their harvest and clip both tips of the tail fin from all salmon that are harvested before leaving the fishing site. Harvest reports must be returned to the department by October 31 each year. As a result, this report contains no Glennallen Subdistrict subsistence fishery harvest data for 2017.

Harvests in the Upper Copper River subsistence fisheries have been estimated since 1965. Through 2011, total harvest in the Glennallen Subdistrict subsistence fishery was less than 90,000 fish annually (Table 10). However, due to record inriver entry of sockeye salmon to the Copper River, total harvest significantly increased from 2012–2015 peaking at 111,689 salmon in 2015. In 2016 total inriver run entry (802,000 salmon) was consistent with the long term average and total harvest was again below 90,000 salmon despite a record number of 2,089 permits issued in the fishery. Sockeye salmon are the primary species harvested in this fishery comprising an average of 96% of the harvest over the last 10 years (2007–2016; Figure 11).

The number of fish wheel permits issued in the Glennallen Subdistrict exceeded the number of subsistence dip net permits through 2011 (Table 10). The number of households obtaining subsistence dip net permits began to rise in 2010 and exceeded the number of fish wheel permits issued beginning in 2012. The number of issued dip net permits has continued to rise while the number of fish wheel permits has continued to decline to a low of 344 permits in 2017. This trend may be explained by a decrease in access to fish wheels due to a channel shift of the Kotsina River preventing most fish wheel owners from deploying a fish wheel in this traditional public area. Additionally, the number of federal permits for this fishery have risen over the last

three years, so some local residents may have shifted from state to federal permits. Secondly, large sockeye salmon returns and king salmon restrictions in the Chitina Subdistrict have led to a surge of subsistence dip net permits.

In 1999, federal regulations were adopted for Copper River subsistence fishing, but since federal and state regulations were identical, both federal and state subsistence users participated in the fisheries under the state subsistence permit in 1999–2001. In 2001, as a result of Federal Subsistence Board (FSB) actions, federally-qualified subsistence users were able to begin fishing on May 15 in the Glennallen Subdistrict, and since federal subsistence limits remained identical to state limits, federal subsistence users still fished under state subsistence permits.

In 2002, the FSB established a federal subsistence fishery in the Chitina Subdistrict with a cumulative limit of 200 salmon for a household of 1 and 500 salmon for a household of 2 or more for both the Chitina and Glennallen subdistricts. Federal subsistence users were able to participate in both fisheries, while state subsistence users must select either the Chitina Subdistrict or Glennallen Subdistrict in which to participate. The NPS issued separate federal subsistence fishing permits to federal subsistence users beginning in 2002. Harvest under federal permits accounts for about 22% of the overall subsistence harvest each year.

In 2005, the National Park Service–Wrangell-St. Elias National Park and Preserve (WRST-NPS) enforced NPS regulation 36 CFR 2.3 that allows fishing to be conducted within national park boundaries only with closely attended rod and reel. Part 13 of the NPS regulations does allow subsistence uses by rural resident zone community residents within national park boundaries. Enforcement of these regulations prohibited subsistence fishing by nonrural residents in that portion of the Copper River upstream of Indian River (which includes approximately 15 river miles of the Glennallen Subdistrict and the Batzulnetas fishery) and required a federal subsistence fishing permit to use a fish wheel or dip net within the boundaries of WRST-NPS. As a result, no state subsistence fishing permits have been issued for this portion of the Glennallen Subdistrict since 2004. Only those rural residents that qualified for federal subsistence salmon harvest in the Glennallen Subdistrict were issued permits to fish in this area. This action excluded approximately 10 Alaska resident households, which were not federally qualified, from using fish wheels in this area and required these households to use fish wheels elsewhere in the Glennallen Subdistrict.

Batzulnetas Subsistence Fishery

A second state subsistence fishery is also allowed in a portion of Tanada Creek, near the traditional Native fishing site of Batzulnetas, with spears and dip nets, and with fish wheels and dip nets 1/2-mile downstream of the mouth of Tanada Creek in the Copper River. The Batzulnetas fishery encompasses all waters from the regulatory markers near the mouth of Tanada Creek and approximately 1/2-mile downstream from the mouth and in Tanada Creek between the department regulatory markers identifying the open water of the creek. The fishery may begin after June 1. Fishing periods during the month of June are one 48-hour period per week. Beginning in July, fishing periods are 84 hours per week until September 1 when the fishery closes. There is one proposal affecting the Batzulnetas area subsistence fishery:

- Proposal 11–Remove the requirement to open the Batzulnetas subsistence fishery by emergency order.

No state permits have been issued for the Batzulnetas fishery since 2000. No state permits were requested from 2001–2004, and since 2005 none have been issued due to WRST-NPS

enforcement of NPS regulation 36 CFR 2.3. Harvest in this fishery fluctuates widely from year to year depending on effort (which is usually less than four permits), water levels, and abundance of fish. Since 2001 harvest under federal permits has averaged 114 sockeye salmon with a maximum of 867 sockeye salmon in 2013 and harvests of less than 10 sockeye salmon in 2005–2009 (0–1 salmon), 2011(9 salmon), and 2015 (0 salmon) and 2016 (0 salmon). Federal harvest reports are due by October 31 each year. As a result, this report contains no Batzulnetas Area subsistence fishery harvest data for 2017.

COPPER RIVER DISTRICT SUBSISTENCE FISHERIES

Boundary lines for Copper River District subsistence fishing are the same as for the commercial gillnet fishery. Subsistence fishing is allowed from May 15 until September 30. From May 15 until two days before the commercial opening of Copper River District, subsistence fishing is allowed seven days per week. Once the commercial season has commenced, subsistence fishing is allowed only during commercial fishing periods or by EO. Within Copper River District, drift gillnets are the only legal gear and may have a maximum length of 50 fathoms with a maximum mesh size of 6 inches prior to July 15. The board has found that, in a year when there is a harvestable surplus that allows for a commercial fishery 3,000–5,000 salmon are reasonably necessary for subsistence. In a year when there is no commercial fishery, the board has found that 19,000–32,000 salmon are reasonably necessary for subsistence (5 AAC 01.616(b)(2)). The legal limit for salmon is 15 for a household of 1, 30 for a household of 2 or more, and 10 salmon for each additional household member; however, the limit for king salmon is no more than five per household (5 AAC 01.645(b)). From 2007 to 2016 an average of 353 subsistence permit holders have reported an average harvest of one king salmon per year per permit (Table 6).

Currently there are two proposals before the board that concern subsistence fisheries in the Copper River District:

- Proposal 19–Establish subsistence fishing season from May 1 through November 30 and remove the connection between subsistence and commercial fisheries.
- Proposal 20–Establish a subsistence fishing season in the Copper River District from April 20 through October 15 and remove the connection between subsistence and commercial fisheries

SPORT FISHERIES

Sport fisheries targeting salmon in the Upper Copper River drainage occur mainly on tributaries of the Copper River (Figure 12). Sport harvest and effort has been estimated annually since 1977 by a mail survey. The survey does not separate effort by species, but most effort in the major tributaries is likely directed at salmon. From 2012–2016, sport anglers expended an average of 29,642 angler-days in the Upper Copper River drainage. Recreational angler effort was relatively stable until 1991 when it began to increase and peaked in 1995 when 102,951 angler-days were expended. Since 2000, angler effort has declined to a low of 25,843 angler-days during 2016 in the Upper Copper River drainage. The majority of salmon fishing effort is believed to be directed towards salmon in the Gulkana, Klutina, and Tonsina rivers.

There are three proposals currently before the board that concern sport fisheries in the Copper River drainage:

- Proposal 23–Prohibit catch-and-release sport fishing in the Upper Copper River and Upper Susitna River drainages.
- Proposal 24–Amend sockeye salmon regulations in the Gulkana River drainage.
- Proposal 25–Remove the unbaited, single-hook, artificial lure restriction in the flowing waters of the Upper Susitna River drainage.

Sport fisheries for salmon in the Copper River target primarily king and sockeye salmon. The fisheries occur in various tributaries to the Copper River with the largest harvest occurring in the Gulkana and Klutina rivers (Figures 13, 14, 15). The king salmon fishery was traditionally the most important recreational salmon fishery in the Copper River in terms of effort and economic value. However, while king salmon runs have declined and sockeye salmon runs have increased, area sockeye salmon fisheries have gained in economic importance and angling effort, particularly in the Klutina River. Sport harvest of king salmon from the Upper Copper River drainage increased through 1996 when the harvest peaked at 9,116 king salmon (Figure 13). Since 1996, sport harvest of king salmon from the Upper Copper River drainage has declined with an average harvest of 684 king salmon from 2012–2016. Sport fishery restriction such as reduced annual limits, no retention, and full closures have contributed to low king salmon harvest rates from 2009–2016. Approximately 95% of the estimated sport harvest of king salmon taken from the Upper Copper River drainage comes from the Gulkana and Klutina river drainages.

Since 1970, sport harvest of king salmon over 20 inches in length in upper Copper River drainage sport fisheries has been increasingly regulated and restricted to ensure sustainable escapements. Regulations imposing daily and annual bag limits have been implemented and the annual bag limit reduced from 5 to 4 king salmon. Various tributaries of the Copper River and streams and lakes in the drainage have been closed over the years by regulation to either bolster escapements of stocks that had showed declines or to protect discreet stocks from over exploitation. Currently, Fish, Indian, Bernard, Ahtell and Natat creeks, and the Little Tonsina River Manker Creek; Klutina Lake and all flowing waters entering Klutina Lake; all tributaries to the Tonsina River; Tonsina Lake and all flowing waters entering Tonsina Lake; the Chokosna and Gilahina rivers and all clearwater tributaries of the Gakona River; Tazlina Lake and all flowing waters entering Tazlina Lake except a quarter mile radius around the mouth of Kaina Creek; the Slana River drainage; and Sinona Creek have all been closed to sport fishing for king salmon. In addition to these closed waters, the Gulkana River below the Richardson Highway bridge is restricted to single-hook, artificial flies, with the gap between point and shank ¾ inches or less from June 1–July 31, and in the mainstem river upstream of a department marker 7.5 miles above the West Fork confluence bait is prohibited year round to protect king salmon migrating through highly accessible waters and in upper spawning areas of the river. Finally, in 2008, the board altered the king salmon season in the Klutina, Tonsina, and Copper River drainage below the Klutina River to July 1–August 10 with specific earlier closures in the Klutina River above mile 19.2 of the Klutina Lake Road (July 19), and above mile 13 (July 31) and in the Tonsina River above the Alyeska pipeline bridge (July 19) to protect spawning king salmon.

GULKANA RIVER KING SALMON FISHERY

The Gulkana River drainage has historically supported the largest sport fishery for king salmon in the Copper River drainage. King salmon begin entering the Gulkana River in early June and

the sport fishery typically peaks during late June through early July, but limited fishing for king salmon continues until the season closes on July 20.

The Gulkana River is open to sport fishing for king salmon from January 1 through July 19. The closure is intended to offer protection to spawning fish (spawning begins in mid-July and continues through late August). The Gulkana River downstream of the Richardson Highway Bridge to the confluence of the Copper River is designated as single-hook, artificial flies only from June 1 to July 31. In all waters downstream of a marker 7.5 miles upstream from the West Fork confluence methods and means are liberalized to allow bait and treble hooks during the king salmon season.

The 1993 harvest of 5,892 king salmon was the largest on record from the Gulkana River and accounted for 72% of the sport harvest of king salmon in the Copper River drainage that year. Sport harvest of king salmon in the Gulkana River peaked during the late 1990s with annual harvests often exceeding 4,000 fish. Harvests have steadily declined since (Figure 13). Due to low king salmon run numbers the Gulkana River sport fishery has been restricted through reduced annual limits, catch-and-release fishing only, or complete closure each year from 2009 through 2017 with the exception of 2015 when no restrictions were placed on this sport fishery. As a result of these restrictions, sport fishing effort has declined from over 30,000 angler-days per year in the late 1990s to 9,177 angler-days in 2016. Sport harvest of king salmon in the Gulkana River averaged 396 fish from 2012–2016 (Figure 13).

KLUTINA RIVER KING SALMON FISHERY

The Klutina River supports the second largest sport fishery for king salmon in the UCUSMA. The fast water of the Klutina River limits the number of resting pools for king salmon; therefore there are less than two dozen good fishing sites in the lower portion of the river accessible to most anglers.

King salmon typically begin entering the Klutina River in late June, with the run continuing well into August. The sport fishery typically peaks during the third week of July; however, fishing for king salmon continues until the season closes on August 11. Peak spawning occurs from late July through August. The king salmon season is open from July 1 to July 19 upstream of Mile 19.2 of the Klutina River Road, from July 1 to 31 upstream of Mile 13 of the Klutina Lake Road, and July 1 to August 10 downstream from this point. The upper reaches have shorter seasons to protect spawning fish.

As with the Gulkana River, sport harvest of king salmon in the Klutina River peaked during the late 1990s at 3,489 fish in 1999 (Figure 13). From 2000 through 2008 harvests ranged from approximately 1,100–1,800 king salmon. Due to poor overall king salmon runs to the Copper River drainage, the Klutina River sport fishery has been restricted through reductions in the annual limit, catch-and-release fishing only, and complete closure from 2009 through 2017, with the exception of 2015 when no restrictions were implemented on the Klutina River fishery. From 2012–2016, king salmon harvest from the Klutina River has averaged 286 fish.

Although the Statewide Harvest Survey (SWHS) does not differentiate angler effort between species, effort on specific river systems is often driven by a single species. On the tributary fisheries of the Copper River, effort directed at king salmon has traditionally driven overall effort on those systems. However, sockeye salmon returns to the Klutina River increased greatly in the late 2000s while king salmon runs declined. As a result, angler effort on the Klutina River has

not shown the same trends as on the Gulkana River and even increased despite restrictions in the king salmon fishery. Sport fishing effort on the Klutina River averaged 14,531 angler-days from 2007–2016 compared to a long term average of less than 10,000 angler days prior to 2007.

OTHER COPPER RIVER KING SALMON FISHERIES

Less than 10% of the harvest of king salmon in the UCUSMA occurs in systems other than the Gulkana and Klutina rivers (Figure 13). The majority of this harvest occurs in the Tonsina River. King salmon run timing to the Tonsina River drainage is from late June through August, similar to that of the Klutina River.

Regulations allow sport fishing for king salmon in the Tonsina River from July 1 to 19 upstream of the Alyeska pipeline bridge and from July 1 through August 10 downstream of this point. The July 20 closure date allows king salmon to spawn undisturbed. The Little Tonsina River, Bernard Creek, and all flowing waters within a quarter mile radius of their confluence with the Tonsina River are closed to king salmon fishing to protect spawning fish. The bag limit for king salmon over 20 inches in this drainage is one, and is included in the annual limit of four for the Copper River drainage. Harvest of king salmon from the Tonsina River has not exceeded 230 fish since 1998 (Figure 13) and has averaged only 18 fish from 2007–2016.

COPPER RIVER SOCKEYE AND COHO SALMON FISHERIES

Sockeye salmon sport harvests in the Copper River have generally increased since 1977. A significant increase in sport harvests occurred during the late 1990s coinciding with increased angler effort during the years of king salmon abundance in the Gulkana and Klutina rivers (Figure 14). From 2001–2005, sockeye salmon harvests declined and averaged about 7,500 sockeye salmon. Sockeye salmon harvest numbers doubled in 2006 and have remained high since with an average harvest of 13,897 fish from 2007–2016. Sockeye salmon harvest from the Klutina River has accounted for over 90% of the area harvest since 2006, but recent harvest trends in 2015, 2016, and anecdotal data from 2017 suggest sockeye salmon abundance is declining to more traditional levels in the Klutina River. Sockeye salmon counts past the Gulkana River counting tower also suggest a similar decline on the Gulkana River.

The sport fisheries for coho salmon in the Upper Copper River are very small compared with other area fisheries and coho salmon fisheries elsewhere in the state. Average annual coho salmon harvest from 2012–2016 was 21 fish (Figure 15) with only 89 coho salmon harvested in 2014 and 16 fish in 2015. The majority of the coho salmon harvest occurs in the Tonsina River drainage.

Bag limits for sockeye and coho salmon are three salmon for all drainages in the Upper Copper River drainage. The only exception to this is in the West Fork of the Gulkana River upstream of a department marker where the bag limit increases to six sockeye salmon from August 1 to December 31. This higher bag limit for sockeye salmon in the West Fork allows for a higher exploitation of Gulkana Hatchery-produced fish. However, due to the late timing of this run and the relative remoteness of the West Fork, few anglers take advantage of these more liberal bag limits.

In 2012, 2013, 2014, and 2015 passage of salmon at the Miles Lake sonar indicated, inseason, that the upper bound of the Copper River sockeye salmon SEG would be exceeded. In response,

the bag and possession limit for sockeye salmon in the Copper River was increased in 2013, 2014, and 2015 from 3 to 6 per day by EO in late June or early July.

UPPER COPPER RIVER ESCAPEMENT AND RESEARCH

Gulkana River Counting Tower

Since 2002, the department and the Bureau of Land Management have jointly operated a counting tower on the Gulkana River above the West Fork to estimate the escapement of king salmon. Counts at this location do not provide an enumeration of total inriver escapement, but do provide a reliable estimate of escapement to the area upstream of the counting tower. Counts are conducted from late May to mid-August for 10 minutes of each hour every day. The 10 minute counts are expanded to provide an estimate of passage for each hour. Based on the 2002–2004 drainagewide radiotelemetry study on king salmon distribution and run timing in the Copper River drainage, it was estimated that 70% of all Gulkana River king salmon spawned above the counting tower. However, a 2013–2016 radiotelemetry study conducted specifically on Gulkana River king salmon indicated that 50% of king salmon spawned upstream of the counting tower during those years.

Annual estimates of king salmon escapement upstream of the counting tower have generally declined from 2002 (6,355 fish) through 2017 (3,336 fish; Figure 16). The lowest estimate occurred in 2016 (1,044 king salmon). From 2002–2017, the average estimate was 3,608 king salmon. This average includes years (2005, 2009–2014, 2016, and 2017) in which management actions were taken to restrict the Gulkana River king salmon fishery.

SOCKEYE SALMON RESEARCH

In 2005–2009, a radiotelemetry study was conducted by the NVE to determine spawning distribution, and define migratory timing patterns of sockeye salmon in the Copper River (Table 11). Spawning distribution of sockeye salmon in the major drainages was highest in the Klutina River in all 5 years and averaged 40.2% of the overall proportion of radiotagged sockeye salmon (Figure 17).

Stock-specific run timing varied among stocks in each of the years 2005–2009, but showed a consistent pattern of upriver stocks, such as the Upper Copper River drainage and Gulkana River stocks, entering first and lower river stocks, such as the Klutina and Tonsina River stocks, entering last (Table 12).

Gulkana Hatchery Contribution Monitoring

The department and PWSAC continue to monitor the contribution of sockeye salmon produced at the Gulkana River Hatchery to the Upper Copper River fisheries. This project has been ongoing in the Chitina Subdistrict personal use dip net fishery since 1984 and was expanded from 2013–2015 to include the Glennallen Subdistrict subsistence fishery. The project began by sampling the fishery for sockeye salmon tagged with coded wire tags and now samples a specific number of sockeye salmon per week from each fishery, removing the otoliths and examining the otoliths for a strontium mark applied by the hatchery prior to out stocking the fry. Hatchery contribution to the personal use fishery averaged 20% over the last 5 years (2008–2012) and 16.4% over the past 10 years (2003–2012). Contribution rates were similar in the Glennallen Subdistrict subsistence fishery but varied greatly over the three years of monitoring, to such an extent that additional years of monitoring will be needed to better define the Gulkana Hatchery contribution to the subsistence fishery.

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TABLES AND FIGURES

Table 1.–Apportionment of the inriver sockeye salmon escapement goal for the Copper River, 2007–2017.

Category	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Sockeye spawning escapement	300,000	300,000	300,000	300,000	300,000	360,000	360,000	360,000	360,000	360,000	360,000
Other salmon spawning escapement	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500
Glennallen subsistence harvest	70,000	75,710	70,365	70,747	72,407	71,000	82,500	82,500	82,500	82,500	77,900
Chitina personal use harvest	82,500	122,825	110,948	108,295	112,950	120,000	133,000	132,500	150,000	150,000	130,300
Sport harvest	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
Hatchery brood stock	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Hatchery surplus	44,096	63,570	58,238	136,036	84,524	80,500	100,300	120,400	114,000	66,550	69,000
Minimum inriver goal	549,096	614,605	592,000	668,000	622,000	684,000	728,000	748,000	759,000	712,000	690,000

Table 2.–Estimates of inriver abundance for king and sockeye salmon in the Copper River, 2004–2016.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
King (ADF&G)[a]	33,793	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Standard error	11,038	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
King (M-R)[b]	**40,564**	**30,333**	**67,789**	**46,349**	**41,343**	**32,400**	**22,323**	**33,889**	**31,452**	**32,581**	**24,158**	**32,306**	**16,009**	**ND**
Standard error	4,650	1,529	4,779	3,391	2,166	2,365	2,492	3,329	5,242	4,425	2,100	3,977	1,193	ND
Sockeye (sonar)[c]	**669,514**	**855,125**	**959,706**	**919,600**	**718,344**	**709,749**	**923,811**	**914,231**	**1,294,400**	**1,267,060**	**1,218,418**	**1,346,100**	**801,593**	**723,426**
Standard error	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sockeye (M-R)[c]	ND	ND	ND	1,259,00	739,833	ND	ND	ND	ND	ND	ND	ND	ND	ND
Standard error	ND	ND	ND	90,648	32,962	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: Numbers in bold designate final estimates used for management purposes. ND = No data.

[a] Estimates from ADF&G radiotelemetry mark–recapture project.

[b] Estimates from Native Village of Eyak Petersen mark–recapture project.

[c] Sonar counts represent all salmon passing sonar site without differentiation between species.

Table 3.–Total disposition of king salmon runs to the Copper River, 2007–2016.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	10-year Average
Commercial harvest[a]	39,095	11,437	9,457	9,645	18,500	11,764	8,826	10,207	22,506	12,348	15,379
Commercial, home pack[a]	1,019	537	876	906	1,282	853	564	768	1,145	727	868
Educational [b]	70	47	50	31	6	6	55	36	50	86	44
Subsistence (Cordova, drift gillnet)[b]	1,145	470	212	276	212	237	854	153	167	73	380
Subsistence (Batzulnetas)[c]	0	0	0	0	0	0	0	0	0	0	0
Subsistence (Glennallen Subdistrict)[d]	3,276	2,381	2,493	2,099	2,319	2,095	2,148	1,365	2,212	2,075	2,246
Federal subsistence (Glennallen subdistrict)[c]	663	837	549	325.9	744	415	374	420	402	396	513
Personal use harvests (Chitina Subdistrict)[d]	2,694	1,999	214	700	1,067	567	744	719	1,570	711	1,099
Federal subsistence (Chitna subdistrict)[c]	28	23	9	18	13	5	18	14	15	15	16
Sport harvest	5,123	3,618	1,355	2,409	1,753	459	285	931	1,343	327	1,760
Upriver spawning escapement[e]	34,565	32,485	27,781	16,771	27,993	27,911	29,012	20,709	26,764	12,485	25,648
Total estimated king salmon run size	87,678	53,838	42,996	33,181	53,889	44,312	42,880	35,322	56,174	29,243	47,951

[a] Numbers are from fish ticket data; commercial harvests that have been donated are included in commercial harvests.

[b] Data represent reported state permit harvests.

[c] Data are reported harvest from federal permits from 2002 to 2004 and expanded federal harvests from 2005 to 2013.

[d] Data represent expanded state permit harvests.

[e] Spawning escapements were determined by subtracting Glennallen Subdistrict subsistence, Chitina Subdistrict personal use, and Upper Copper River sport harvests from the estimated inriver abundance of King salmon.

Table 4.–Total disposition of sockeye salmon runs to the Copper River, 2007–2016.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	10-year Average
Commercial harvest[a]	1,901,773	320,815	896,621	636,214	2,052,432	1,866,541	1,608,117	2,050,007	1,750,762	1,175,100	1,425,838
Commercial, homepack[a]	2,023	2,172	6,528	7,064	9,070	7,985	9,448	12,072	10,590	9,598	7,655
Commercial, donated[a]	180	80	47	0	0	0	0	0	0	0	31
Educational drift gillnet permit[a]	62	29	8	61	23	200	152	186	91	203	102
Subsistence (Cordova, drift gillnet)[b]	6,148	3,969	1,764	1,980	1,783	4,270	5,639	1,675	1,403	1,075	2,971
Federal subsistence (PWS/Chugach Nat'l Forest, dip net, spear, rod and reel)[b]	36	32	46	36	35	64	102	76	152	110	69
Subsistence (Batzulnetas, dip net, fish wheel or spear)[b]	1	1	0	106	9	101	867	116	0	0	120
Subsistence (Glennallen Subdistrict, dip net, fish wheel or spear)[c]	65,714	43,157	46,849	70,719	59,622	76,305	73,728	75,501	81,800	62,474	65,587
Federal subsistence (Glennallen subdistrict, dip net, fish wheel or spear)[d]	15,225	11,347	11,822	14,134	15,753	16,487	17,060	23,034	26,896	19,365	17,112
Personal use reported (Chitina Subdistrict, dip net)[c]	125,126	81,359	90,035	138,487	128,052	127,143	180,663	157,215	223,080	148,982	140,014
Federal subsistence (Chitina Subdistrict, dip net)[d]	929	789	817	2,324	1,933	915	2,252	1,664	2,345	1,321	1,529
Upriver sport harvest[e]	23,028	11,431	13,415	14,743	7,727	23,404	26,711	18,005	9,489	7,538	15,549
Delta sport harvest[e]	1,704	1,225	959	1,342	838	764	386	87	130	201	764
Upriver spawning escapement[f]	612,065	480,597	468,724	502,995	607,657	953,245	860,829	864,988	930,095	503,033	678,423
Delta spawning escapement[g]	176,570	135,900	138,584	167,810	153,014	133,700	151,410	128,410	132,390	103,100	142,089
Hatchery broodstock/excess	28,648	45,022	43,409	157,980	59,589	65,348	72,369	53,737	40,123	32,341	59,857
Total estimated sockeye salmon run size	2,959,232	1,137,925	1,719,628	1,715,995	3,097,537	3,276,472	3,009,733	3,386,773	3,209,346	2,064,441	2,557,708

[a] Numbers are from fish ticket data.

[b] Data are reported harvest from returned state and federal subsistence permits.

[c] Data are expanded harvest from returned state and federal subsistence permits.

[d] Data are reported harvest (2002–2004) and expanded harvest (2005–2014) from returned state and federal subsistence permits.

[e] Upriver and Copper River Delta sport harvest data are from statewide sport fish harvest surveys.

[f] Beginning in 1999, sockeye salmon spawning escapement was based on the total number of fish past the Miles Lake sonar minus the king salmon inriver midpoint abundance estimate, upriver subsistence, personal use, sport, hatchery broodstock, and onsite hatchery surplus. Prior to 1999, upriver spawning escapement was based on the Miles Lake sonar passage (sockeye salmon only) minus upriver subsistence, personal use, sport, hatchery broodstock, and onsite hatchery surplus. The number of sockeye salmon past the Miles Lake sonar was determined by multiplying the total number of fish past the sonar by the percentage of sockeye salmon in the total upriver subsistence and personal use fisheries.

[g] Delta spawning escapement estimated by doubling the peak aerial survey index.

Table 5.–Total disposition of coho salmon runs to the Copper River, 2007–2016.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	10-year Average
Commercial harvest[a]	117,182	202,415	207,776	117,182	127,511	130,261	244,985	315,776	136,981	367,630	196,770
Commercial, home pack[a]	340	423	767	1,026	543	1,037	249	1,146	1,423	1,353	831
Subsistence (Cordova, drift gillnet)[b]	15	53	22	27	34	0	1	0	10	2	16
Federal subsistence (PWS/Copper River)	68	119	185	68	581	392	310	630	878	606	384
Subsistence (Batzulnetas)[c]	0	0	0	0	0	0	0	0	0	0	0
Subsistence (Glennallen Subdistrict)[d]	238	493	228	293	372	335	143	233	77	45	246
Federal subsistence (Glennallen subdistrict)[c]	57	229	34	81	223	173	21	29	78	11	94
Personal use (Chitina Subdistrict)[d]	1,742	2,711	1,712	2,013	1,702	1,385	797	1,129	841	1,182	1,521
Federal subsistence (Chitina subdistrict)[c]	41	100	11	30	10	8	8	69	14	11	30
Delta sport harvest	6,656	7,072	13,623	15,405	13,889	15.063	17,053	16,137	24,515	19,235	13,360
Upriver sport harvest	0	56	36	51	21	0	0	89	16	0	27
Upriver spawning escapement	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delta spawning escapement[e]	107,640	153,784	82,588	112,934	76,290	74,020	69,360	86,020	83,330	152,400	99,837
Total estimated coho salmon run size	237,449	367,975	307,449	337,114	221,570	222,841	332,927	421,258	248,163	542,475	323,922

Note: ND = No data.

[a] Numbers are from fish ticket data; commercial harvests that have been donated are included in commercial harvests.

[b] Data represent reported state permit harvests.

[c] Data are reported harvest from federal permits.

[d] Data represent expanded state permit harvests.

[e] Delta spawning escapement estimated by doubling the peak aerial survey index.

Table 6.–King salmon reported harvest and effort in the Copper River District subsistence drift gillnet fishery, and reported harvest of home pack king salmon from the Copper River commercial drift gillnet fishery, 2007–2016.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	10-year average
Number of subsistence permits fished	295	248	128	139	113	204	321	101	97	77	172
Number of subsistence king salmon harvested	1,145	470	212	276	212	237	854	153	167	73	380
Average number of king salmon harvested per subsistence permit	3.9	1.9	1.7	2.0	1.7	1.1	2.4	1.5	1.7	0.9	2
Number of commercial permit holders reporting home pack harvests	280	223	328	333	336	378	331	386	359	340	329
Number of king salmon retained for home pack	1,019	537	876	906	1,282	853	564	768	1,145	727	868
Average number of king salmon harvested for home pack per permit holder reporting retention	3.6	2.4	2.7	2.7	3.8	2.3	1.7	2.0	3.2	2.1	3
Combined lower Copper River subsistence and home pack harvests	2,164	1,007	1,088	1,182	1,494	1,090	1,418	921	1,312	800	1,248

Table 7.–2015 Chitina Subdistrict fishing schedule.

Week ending	PU week	Preseason opening schedule	Hours	Actual opening schedule	Hours
07 Jun	1	Sunday, June 07, 12:01 AM - Sunday, June 07, 11:59 PM	24	Sunday, June 07, 12:01 AM - Sunday, June 07, 11:59 PM	96
14 Jun	2	Monday, June 08, 12:01 AM - Sunday, June 14, 11:59 PM	168	Monday, June 08, 12:01 AM - Sunday, June 14, 11:59 PM	168
21 Jun	3	Monday, June 15, 12:01 AM - Sunday, June 21, 11:59 PM	168	Monday, June 15, 12:01 AM - Sunday, June 21, 11:59 PM	168
28 Jun	4	Monday, June 22, 12:01 AM - Sunday, June 28, 11:59 PM	168	Monday, June 22, 12:01 AM - Sunday, June 28, 11:59 PM	168
05 Jul	5	Monday, June 29, 12:01 AM - Sunday, July 05, 11:59 PM	168	Monday, June 29, 12:01 AM - Sunday, July 05, 11:59 PM	168
12 Jul	6	Tuesday, July 07, 12:00 PM - Sunday, July 12, 11:59 PM	132	Monday, July 06, 12:01 AM - Sunday, July 12, 11:59 PM	168
19 Jul	7	Tuesday, July 14, 12:00 PM - Sunday, July 19, 11:59 PM	132	Monday, July 13, 12:01 AM - Sunday, July 19, 11:59 PM	168
26 Jul	8	Thursday, July 23, 8:00 AM - Sunday, July 26, 11:59 PM	88	Monday, July 20, 12:01 AM - Sunday, July 26, 11:59 PM	168
02 Aug	9	Tuesday, July 28, 12:00 PM - Sunday, August 02, 11:59 PM	132	Monday, July 27, 12:00 AM - Sunday, August 02, 11:59 PM	168
09 Aug	10	Monday, August 03, 12:01 AM - Sunday, August 09, 11:59 PM	168	continuous	168
16 Aug	11	continuous	168	continuous	168
23 Aug	12	continuous	168	continuous	168
30 Aug	13	continuous	168	continuous	168

Table 8.–2016 Chitina Subdistrict fishing schedule.

Week ending	PU week	Preseason opening schedule	Hours	Actual opening schedule	Hours
12 Jun	1	Tuesday, June 07, 12:01 AM - Sunday, June 12, 11:59 PM	144	Tuesday, June 07, 12:01 AM - Sunday, June 12, 11:59 PM	144
19 Jun	2	Monday, June 13, 12:01 AM - Sunday, June 19, 11:59 PM	168	Monday, June 13, 12:01 AM - Sunday, June 19, 11:59 PM	168
26 Jun	3	Monday, June 20, 12:01 AM - Sunday, June 26, 11:59 PM	168	Monday, June 20, 12:01 AM - Sunday, June 26, 11:59 PM	168
03 Jul	4	Monday, June 27, 12:01 AM - Sunday, July 03, 11:59 PM	168	Monday, June 27, 12:01 AM - Sunday, July 03, 11:59 PM	168
10 Jul	5	Tuesday, July 05, 6:00 PM - Sunday, July 10, 11:59 PM	126	Monday, July 04, 12:01 AM - Sunday, July 10, 11:59 PM	168
17 Jul	6	Wednesday, July 13, 12:01 AM - Sunday, July 17, 11:59 PM	120	Monday, July 11, 12:01 AM - Sunday, July 17, 11:59 PM	168
24 Jul	7	Wednesday, July 20, 6:00 PM - Sunday, July 24, 11:59 PM	102	Monday, July 18, 12:01 AM - Sunday, July 24, 11:59 PM	168
31 Jul	8	Thursday, July 28, 8:00 AM - Sunday, July 31, 11:59 PM	88	Monday, July 25, 8:00 AM - Sunday, July 31, 11:59 PM	160
07 Aug	9	Tuesday, August 02, 6:00 PM - Sunday, August 07, 11:59 PM	126	Wednesday, August 03, 12:01 AM - Sunday, August 07, 10:00 PM	118
14 Aug	10	Tuesday, August 09, 8:00 AM - Sunday, August 14, 11:59 PM	136	Thursday, August 11, 6:00 PM - Sunday, August 14, 11:59 PM	78
21 Aug	11	Continuous	168	Continuous	168
28 Aug	12	Continuous	168	Continuous	168
04 Sept	13	Continuous	168	Continuous	168

Table 9.–2017 Chitina Subdistrict fishing schedule.

Week ending	PU week	Preseason opening schedule	Hours	Actual opening schedule	Hours
11 Jun	1	Thursday, June 08, 12:01 AM - Sunday, June 11, 11:59 PM	96	Wednesday, June 07, 12:01 AM - Sunday, June 11, 11:59 PM	120
18 Jun	2	Monday, June 12, 12:01 AM - Sunday, June 18, 11:59 PM	168	Monday, June 12, 12:01 AM - Sunday, June 18, 11:59 PM	168
25 Jun	3	Monday, June 19, 12:01 AM - Sunday, June 25, 11:59 PM	168	Monday, June 19, 12:01 AM - Sunday, June 25, 11:59 PM	168
02 Jul	4	Monday, June 26, 12:01 AM - Sunday, July 02, 11:59 PM	168	Monday, June 26, 12:01 AM - Sunday, July 02, 11:59 PM	168
09 Jul	5	Monday, July 03, 12:01 AM - Tuesday, July 04, 11:59 PM	48	Monday, July 03, 12:01 AM - Sunday, July 09, 8:00 AM	152
09 Jul	5	Friday, July 07, 6:00 AM - Sunday, July 09, 11:59 PM	66		
16 Jul	6	Tuesday, July 11, 6:00 PM - Sunday, July 16, 11:59 PM	126	Tuesday, July 11, 12:01 AM - Sunday, July 16, 11:59 PM	144
23 Jul	7	Tuesday, July 18, 6:00 PM - Sunday, July 23, 11:59 PM	126	Tuesday, July 18, 8:00 PM - Sunday, July 23, 11:59 PM	124
30 Jul	8	Wednesday, July 26, 6:00 PM - Sunday, July 30, 11:59 PM	102	Monday, July 24, 12:00 PM - Sunday, July 30, 11:59 PM	156
06 Aug	9	Wednesday, August 02, 6:00 AM - Sunday, August 06, 11:59 PM	114	Wednesday, August 02, 5:00 PM - Sunday, August 06, 11:59 PM	103
13 Aug	10	Monday, August 07, 6:00 PM - Sunday, August 13, 11:59 PM	150	Wednesday, August 09, 6:00 AM - Sunday, August 13, 11:59 PM	114
20 Aug	11	Continuous	168	Tuesday, August 15, 12:00 PM - Sunday, August 20, 11:59 PM	132
27 Aug	12	Continuous	168	Continuous	168
03 Sep	13	Continuous	96	Continuous	96

Table 10.–Number of permits issued and salmon harvested in the Glennallen Subdistrict subsistence salmon fishery, 2003–2016 (includes federal subsistence permits and harvest).

	Number permits issued				Estimated salmon
Year	Total	Dip net	Fish wheel	Federal[a]	harvest[b]
2003	1,233	399	613	221	64,382
2004	1,218	330	626	262	78,001
2005	1,236	363	598	275	89,123
2006	1,238	338	646	254	79,694
2007	1,455	467	707	281	87,759
2008	1,456	536	650	270	61,725
2009	1,364	469	621	274	64,017
2010	1,590	620	701	269	87,908
2011	1,583	617	689	277	79,518
2012	1,798	867	660	271	96,074
2013	1,613	808	531	274	93,594
2014	1,971	1,148	508	315	100,683
2015	1,956	1,128	503	325	111,689
2016	2,089	1,300	469	320	84,764
2011–2015	1,785	914	578	293	96,312
2006–2015	1,603	700	622	281	86,265

Note: ND = No data.

[a] Federal permits are not limited to a single gear type and allow use of fish wheel, dip net, or rod and reel.

[b] Expanded state harvest data plus federal reported harvest from 2002 to 2004 and federal expanded harvest after 2004.

Table 11.–Run timing statistics past the tagging site at Baird Canyon for major sockeye salmon spawning stocks in the Copper River, 2005–2008.

	Duration[a]				Mean date of passage[b]			
Stocking group	2005	2006	2007	2008	2005	2006	2007	2008
Lower Copper	46	61	63	44	6 Jul	28 Jun	24 Jun	3 Jul
Chitina	68	63	45	51	30 Jun	13 Jul	19 Jun	13 Jun
Tonsina	56	54	46	23	13 Jul	17 Jul	22 Jul	19 Jul
Klutina	75	60	69	45	13 Jun	20 Jun	16 Jun	15 Jun
Tazlina	52	64	70	43	31 May	11 Jun	5 Jun	5 Jun
Gulkana	73	65	62	58	4 Jul	7 Jul	2 Jul	29 Jun
Upper Copper	51	28	40	54	2 Jun	7 Jun	11 Jun	12 Jun

[a] Duration refers to the average number of days it took radiotagged fish to travel to their upriver destinations following the tagging event near Baird Canyon.

[b] Mean date of passage is germane to the capture site near Baird Canyon.

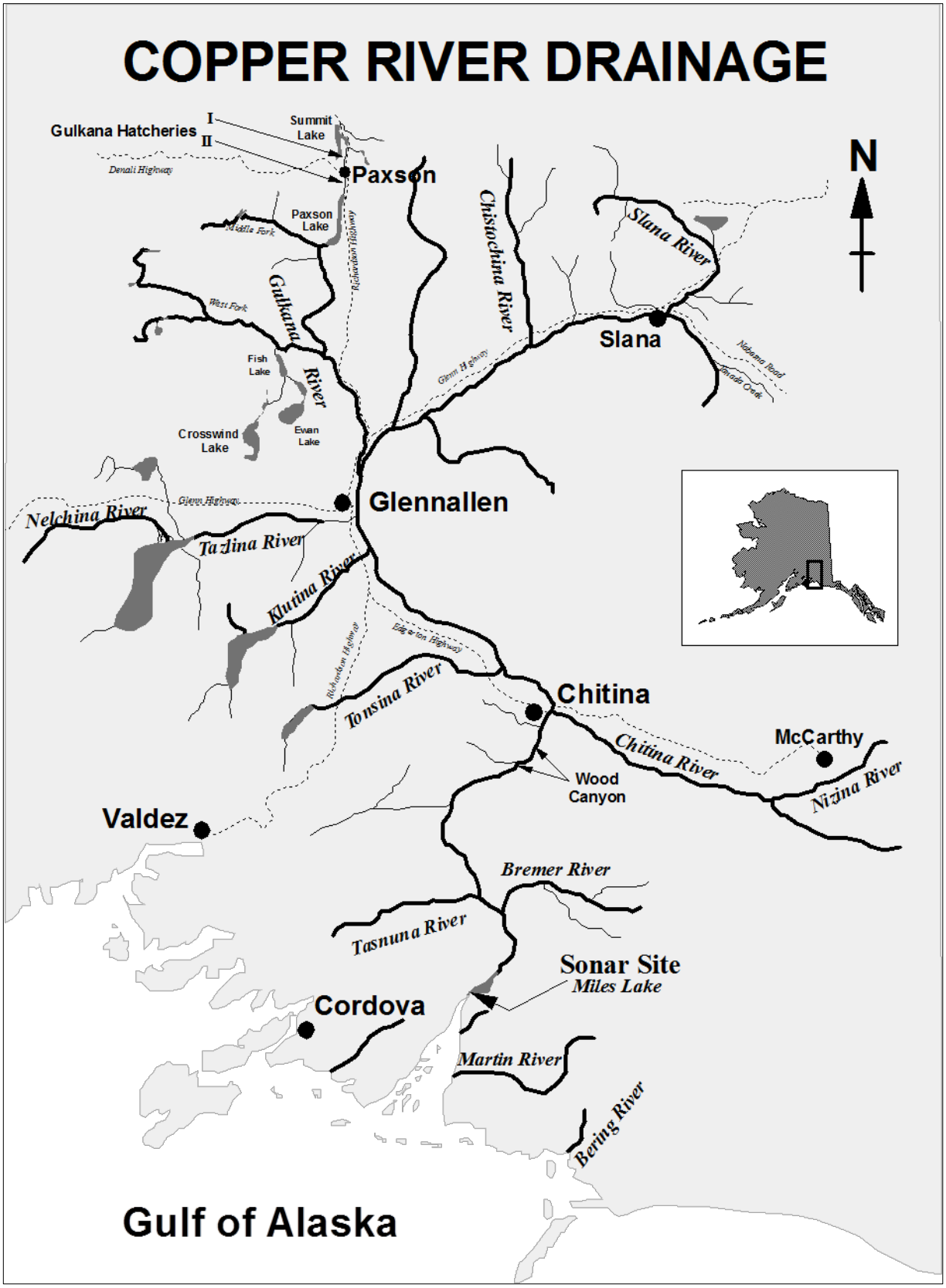


Figure 1.–The Copper River and Copper River Delta area.

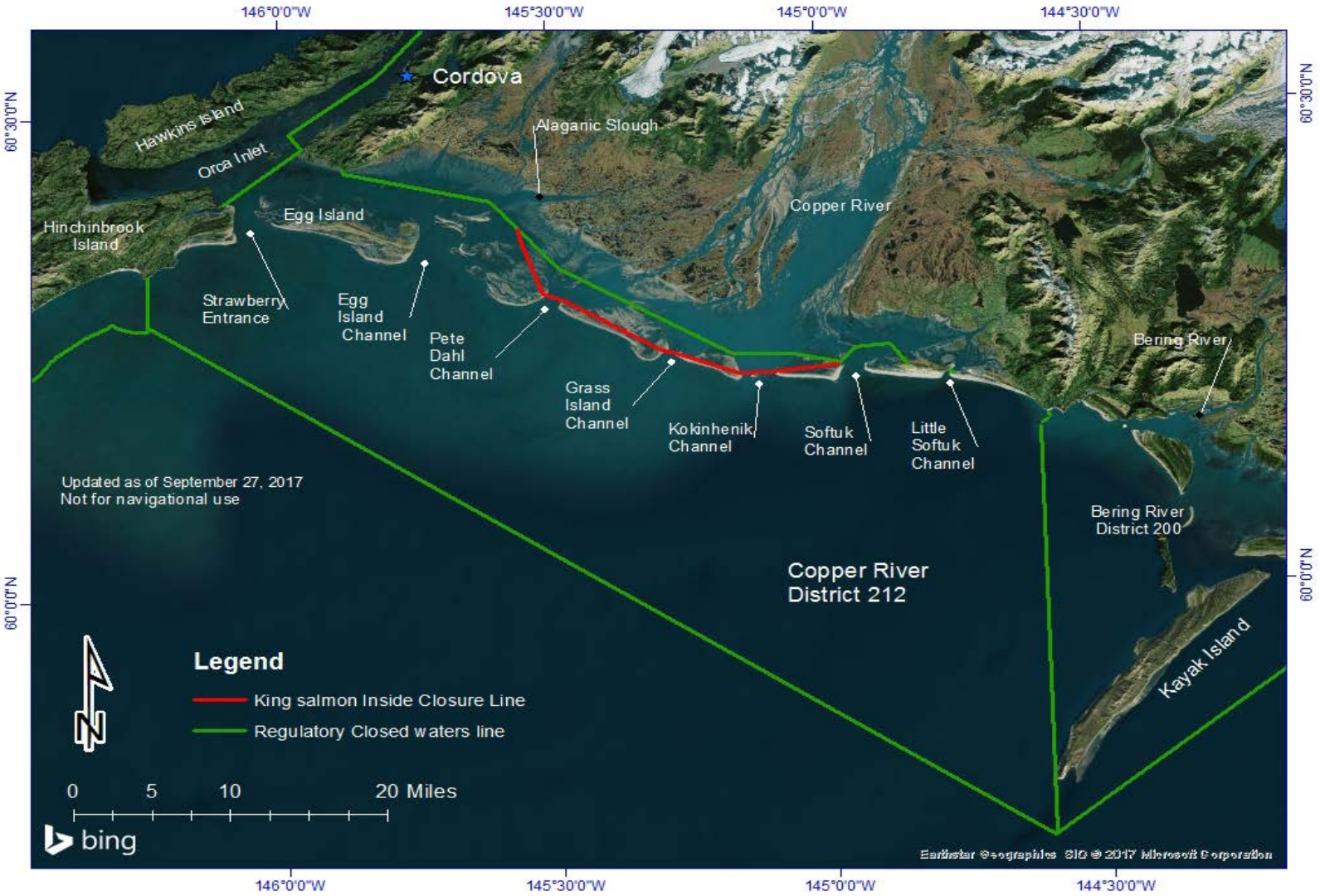
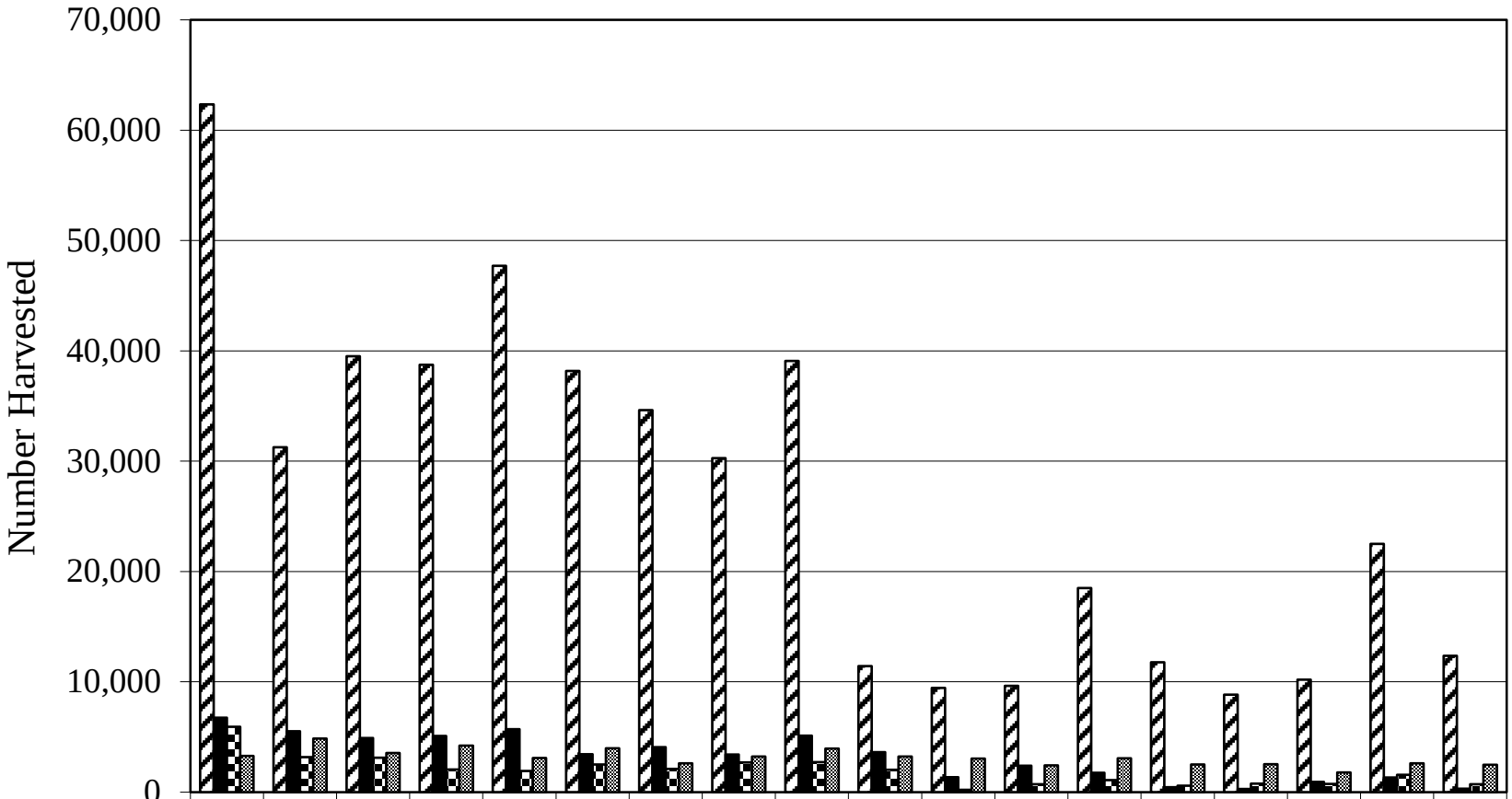
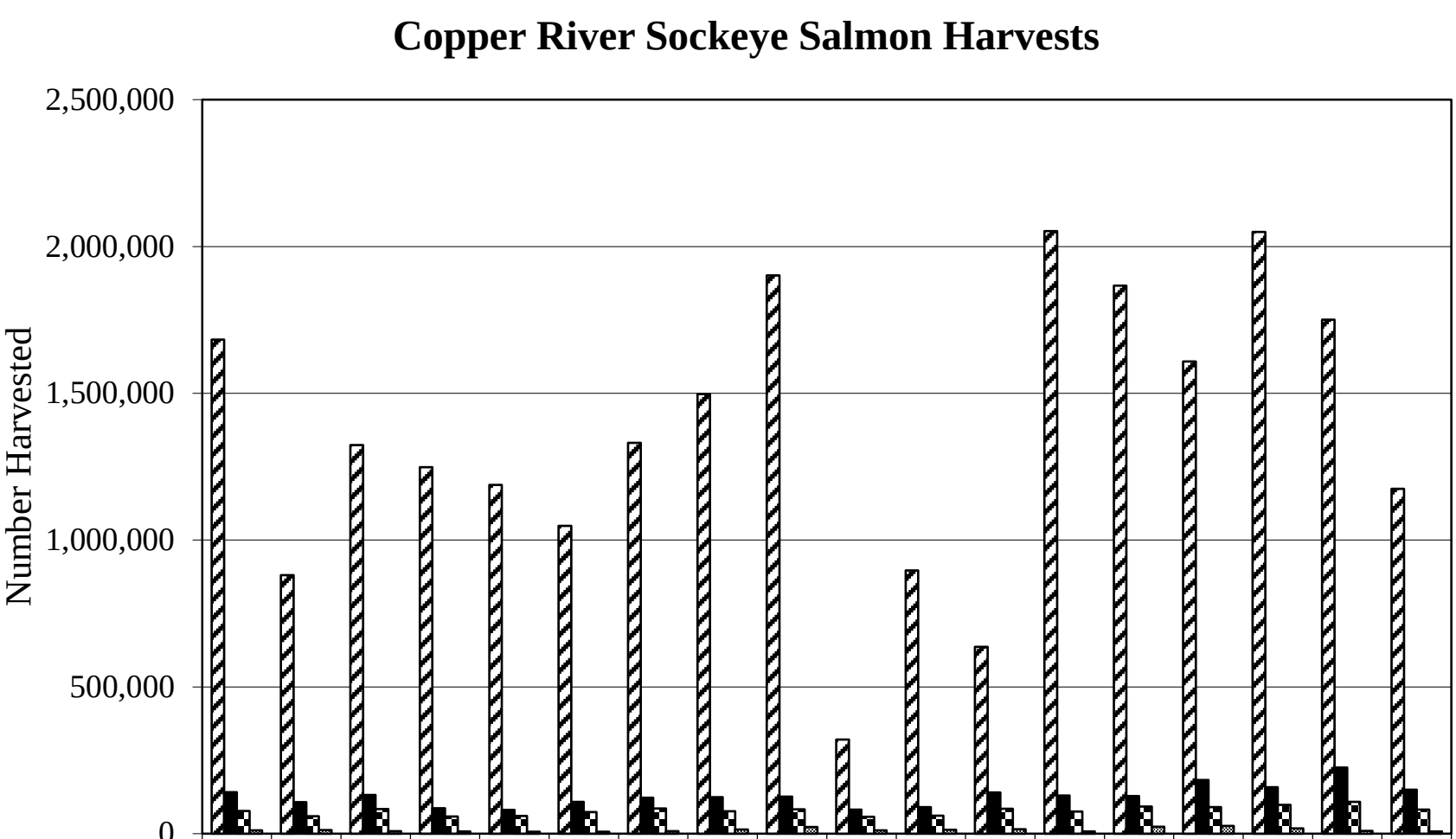


Figure 2.–Map of Copper River and Bering River districts showing inside closure area.



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Commercial	62,337	31,259	39,524	38,734	47,721	38,191	34,624	30,278	39,095	11,437	9,457	9,645	18,500	11,764	8,826	10,207	22,506	12,348
Sport	6,742	5,531	4,904	5,098	5,717	3,435	4,093	3,425	5,123	3,618	1,355	2,409	1,753	459	285	931	1,343	327
Chitina Subdistrict	5,913	3,168	3,113	2,056	1,921	2,502	2,094	2,681	2,722	2,022	223	718	1,080	572	762	733	1,585	726
Glennallen Subdistrict	3,278	4,856	3,553	4,217	3,092	3,982	2,618	3,229	3,939	3,218	3,042	2,425	3,063	2,510	2,522	1,785	2,614	2,471

Figure 3.–King salmon harvest in the Copper River by fishery, 1999–2016.



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Commercial Fishery	1,682,559	880,334	1,323,577	1,248,503	1,188,052	1,048,004	1,331,664	1,496,754	1,901,773	320,815	896,621	636,214	2,052,432	1,866,541	1,608,117	2,050,007	1,750,762	1,175,100
Chitina Subdistrict	141,658	107,856	132,108	86,543	81,513	108,527	122,463	124,810	126,154	82,318	90,917	140,811	129,985	128,058	182,915	158,879	225,425	150,303
Glennallen Subdistrict	77,369	59,497	83,787	58,800	60,623	73,214	86,139	76,058	83,356	57,632	60,882	84,853	75,375	92,792	90,788	98,535	108,696	81,839
Sport Fishery	11,101	12,361	8,169	7,761	7,108	6,464	8,135	14,297	23,028	11,431	13,415	14,743	7,727	23,404	26,611	18,005	9,489	7,538

Figure 4.–Sockeye salmon harvest in the Copper River by fishery, 1999–2016.

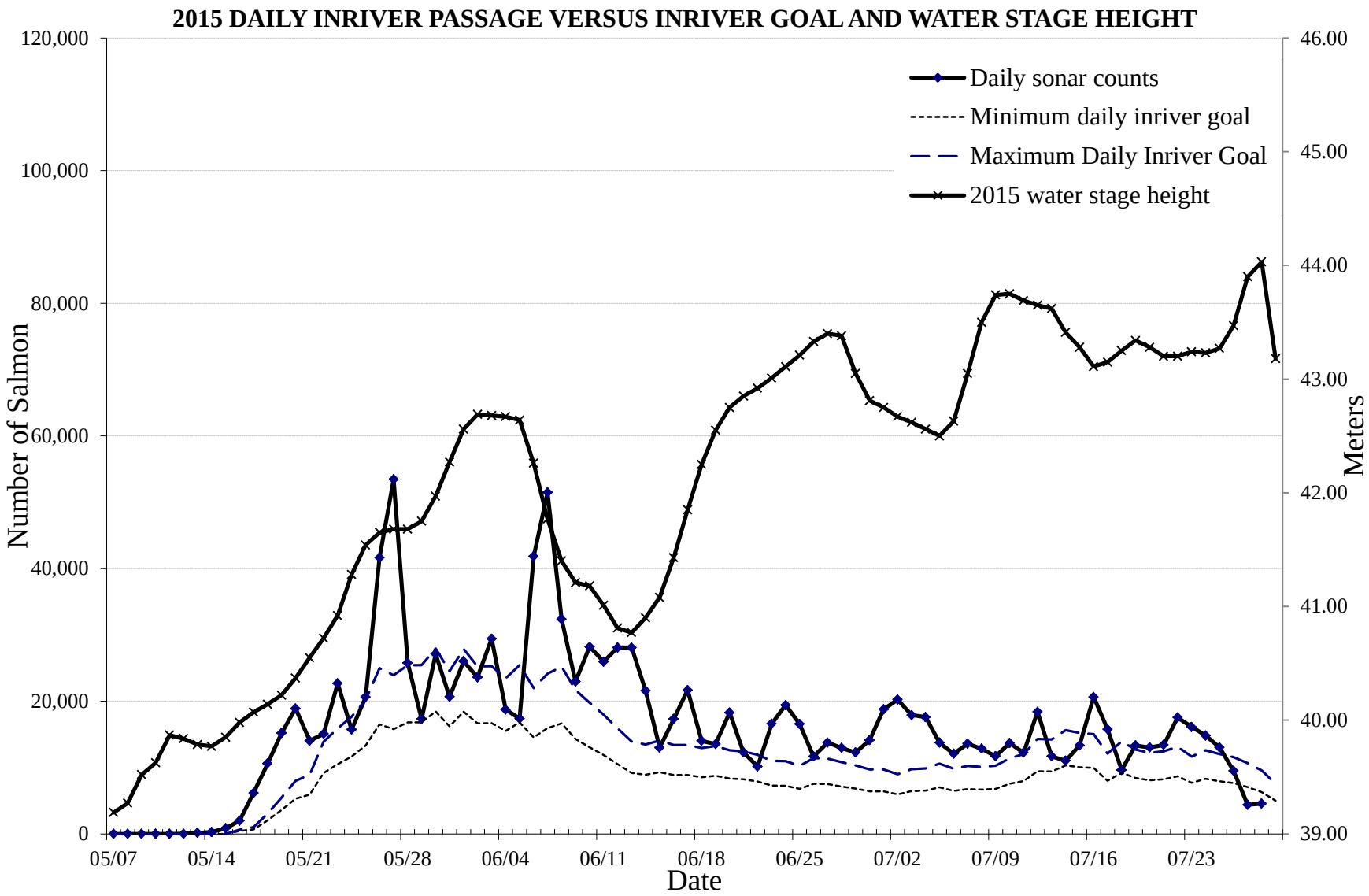


Figure 5.–Daily Copper River inriver passage versus inriver goal and water stage height at the Miles Lake sonar, 2015.

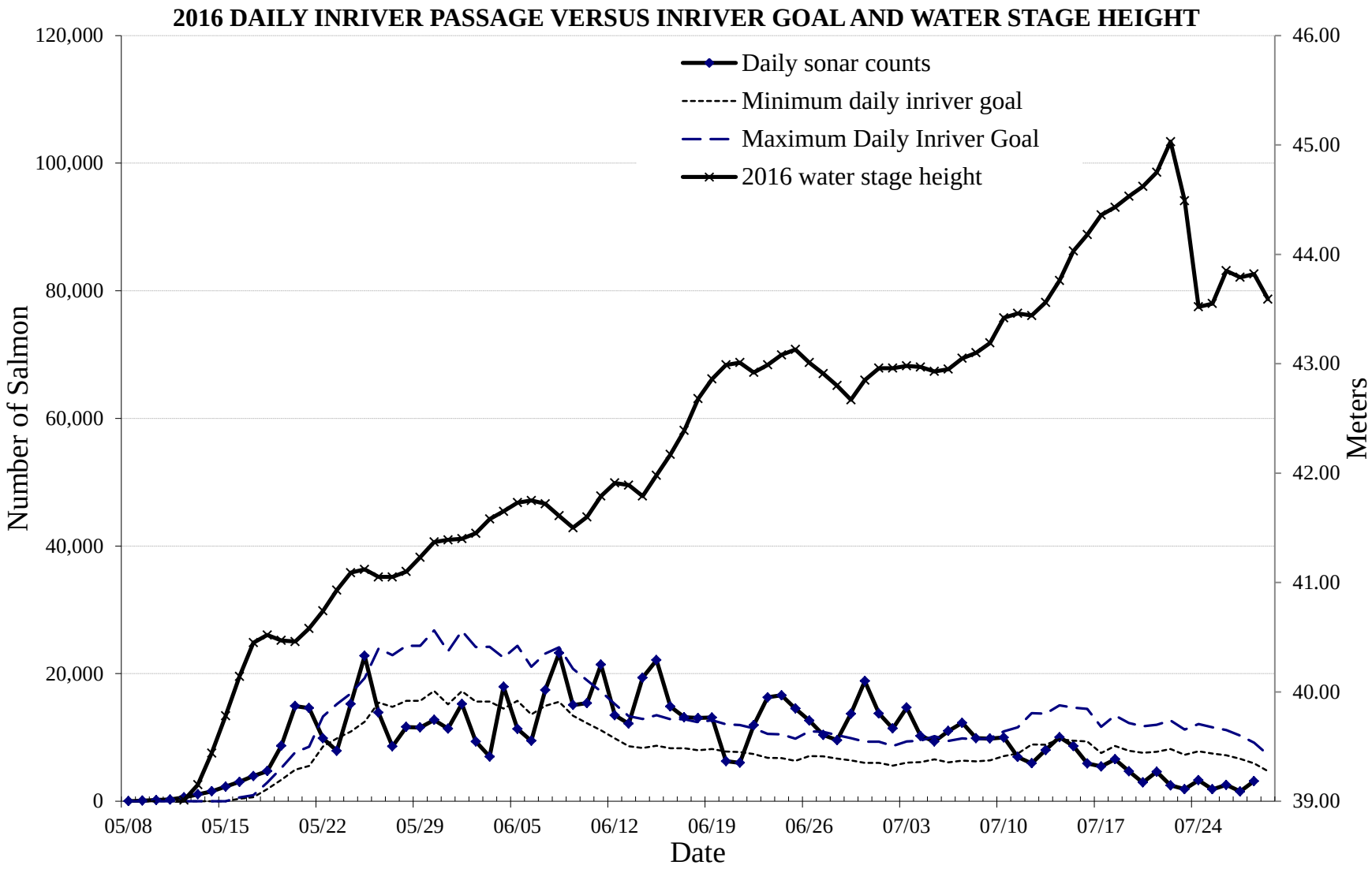


Figure 6.–Daily Copper River inriver passage versus inriver goal and water stage height at the Miles Lake sonar, 2016.

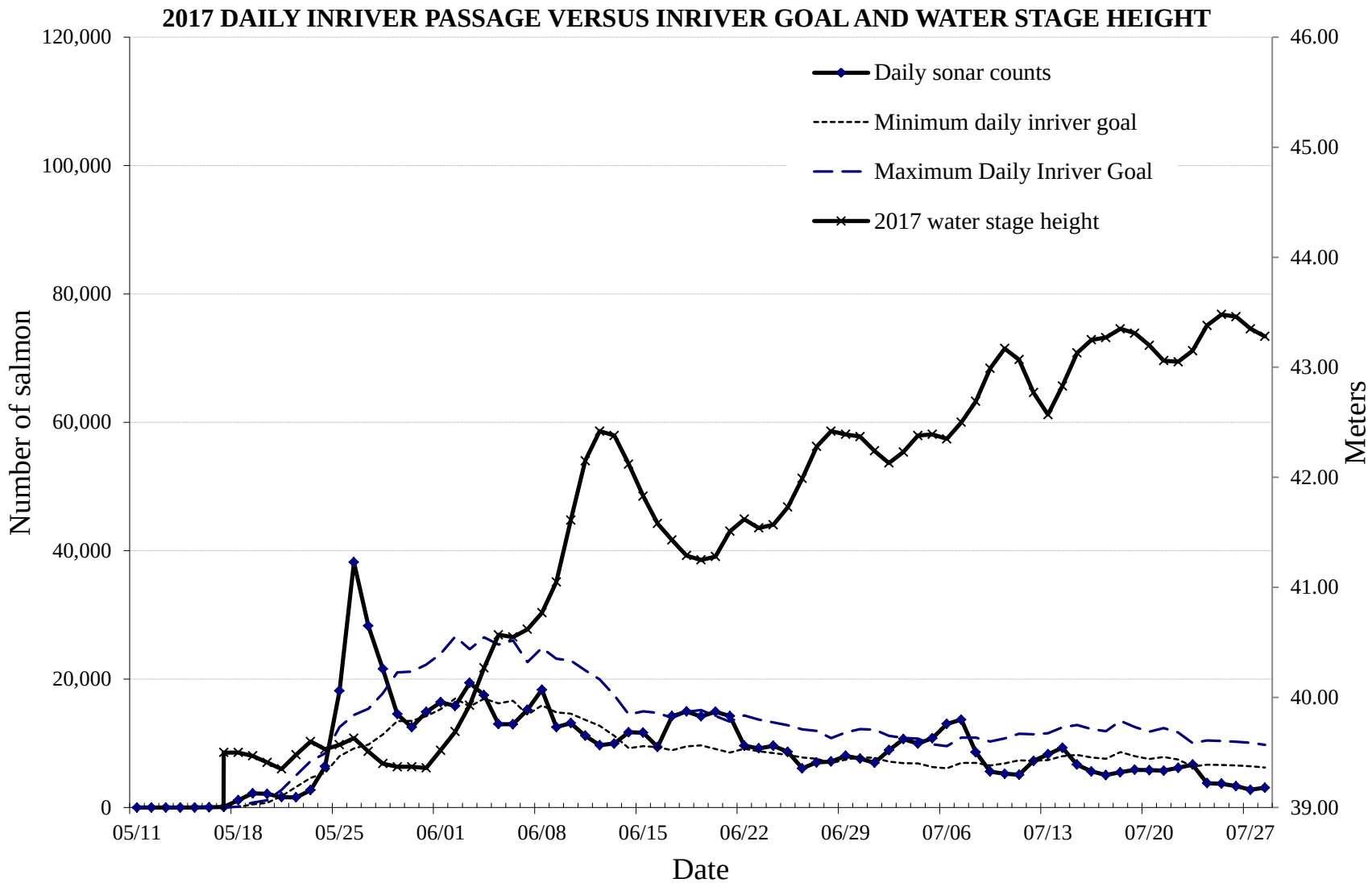


Figure 7.–Daily Copper River inriver passage versus inriver goal and water stage height at the Miles Lake sonar, 2017.

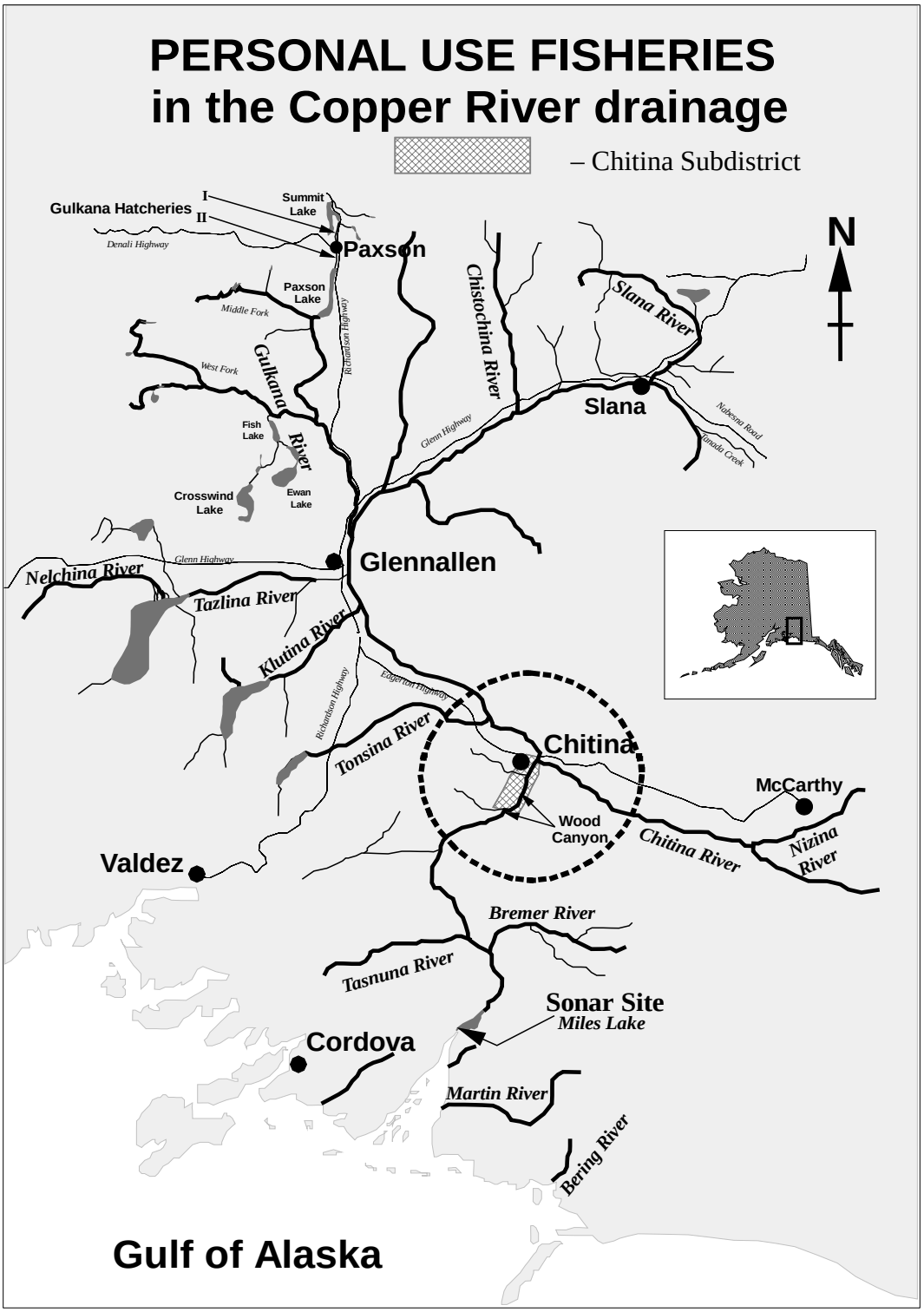
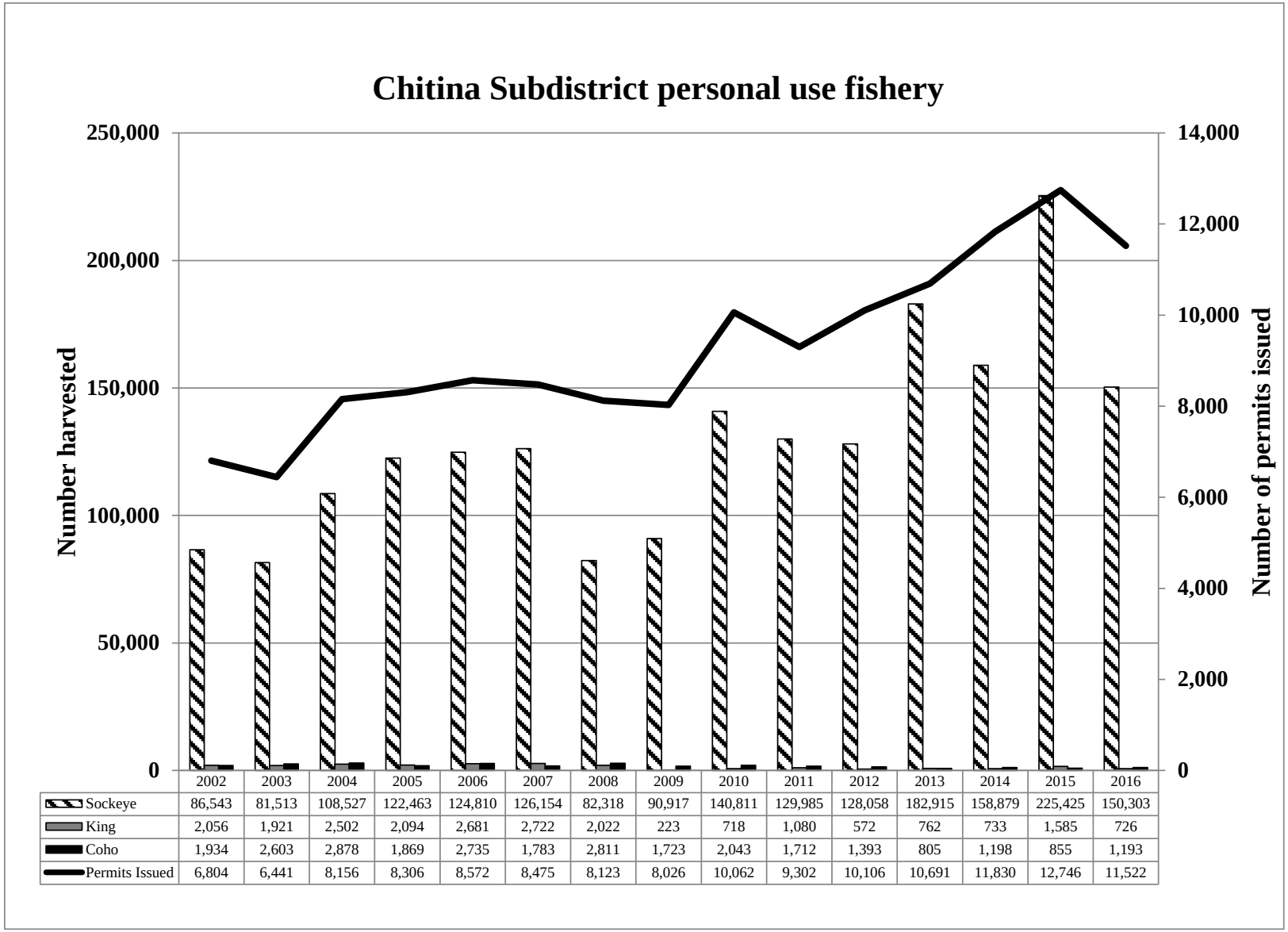


Figure 8.–Map of the personal use salmon fisheries on the Copper River.



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sockeye	86,543	81,513	108,527	122,463	124,810	126,154	82,318	90,917	140,811	129,985	128,058	182,915	158,879	225,425	150,303
King	2,056	1,921	2,502	2,094	2,681	2,722	2,022	223	718	1,080	572	762	733	1,585	726
Coho	1,934	2,603	2,878	1,869	2,735	1,783	2,811	1,723	2,043	1,712	1,393	805	1,198	855	1,193
Permits Issued	6,804	6,441	8,156	8,306	8,572	8,475	8,123	8,026	10,062	9,302	10,106	10,691	11,830	12,746	11,522

Figure 9.–Chitina Subdistrict personal use salmon harvest by species, 2002–2016.

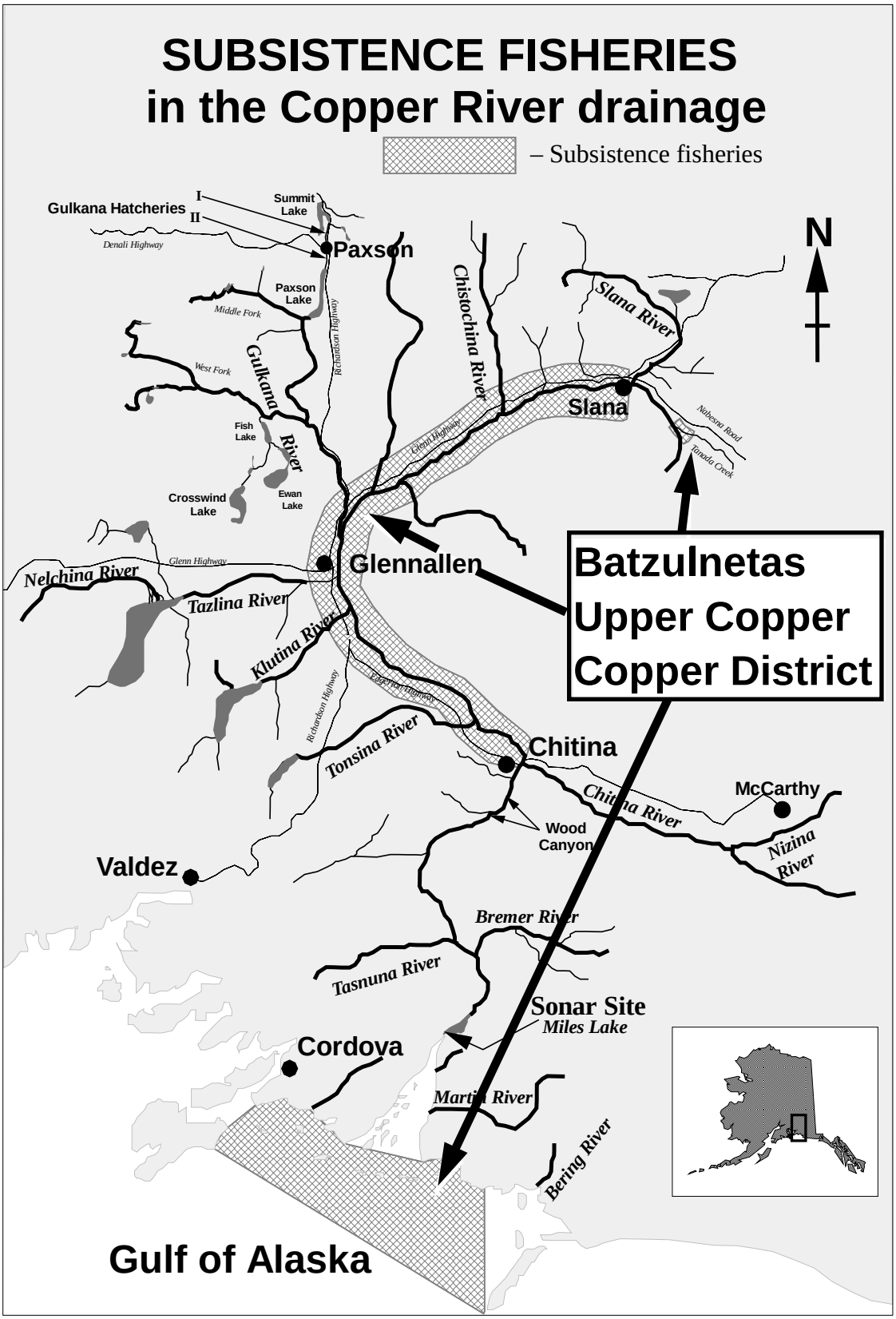
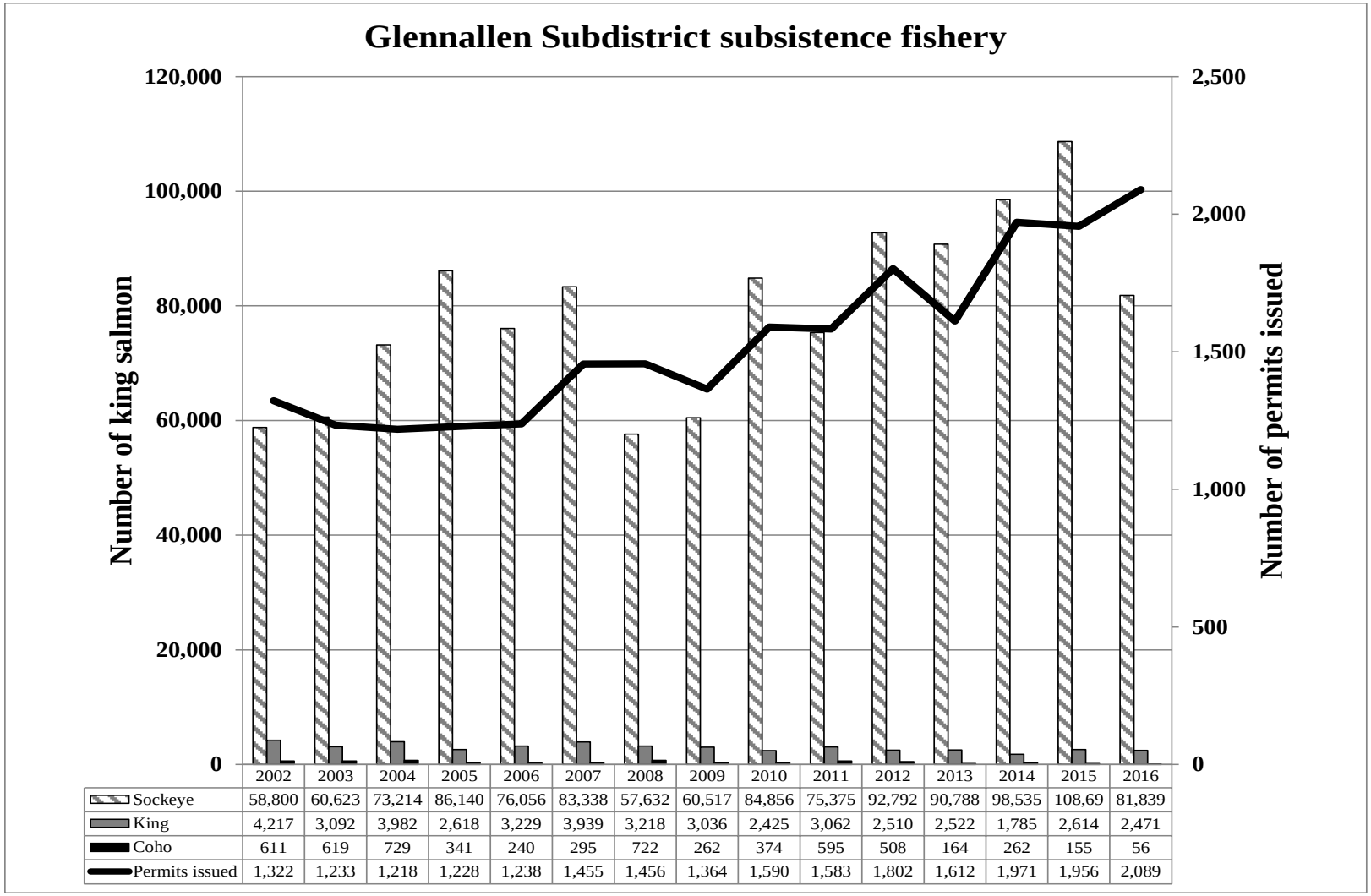


Figure 10.–Map of the subsistence salmon fisheries on the Copper River.



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sockeye	58,800	60,623	73,214	86,140	76,056	83,338	57,632	60,517	84,856	75,375	92,792	90,788	98,535	108,69	81,839
King	4,217	3,092	3,982	2,618	3,229	3,939	3,218	3,036	2,425	3,062	2,510	2,522	1,785	2,614	2,471
Coho	611	619	729	341	240	295	722	262	374	595	508	164	262	155	56
Permits issued	1,322	1,233	1,218	1,228	1,238	1,455	1,456	1,364	1,590	1,583	1,802	1,612	1,971	1,956	2,089

Figure 11.–Glennallen Subdistrict salmon harvest by species [state estimated and federal reported (2002–2004) and federal estimated (2005–2010) harvest], 2002–2016.

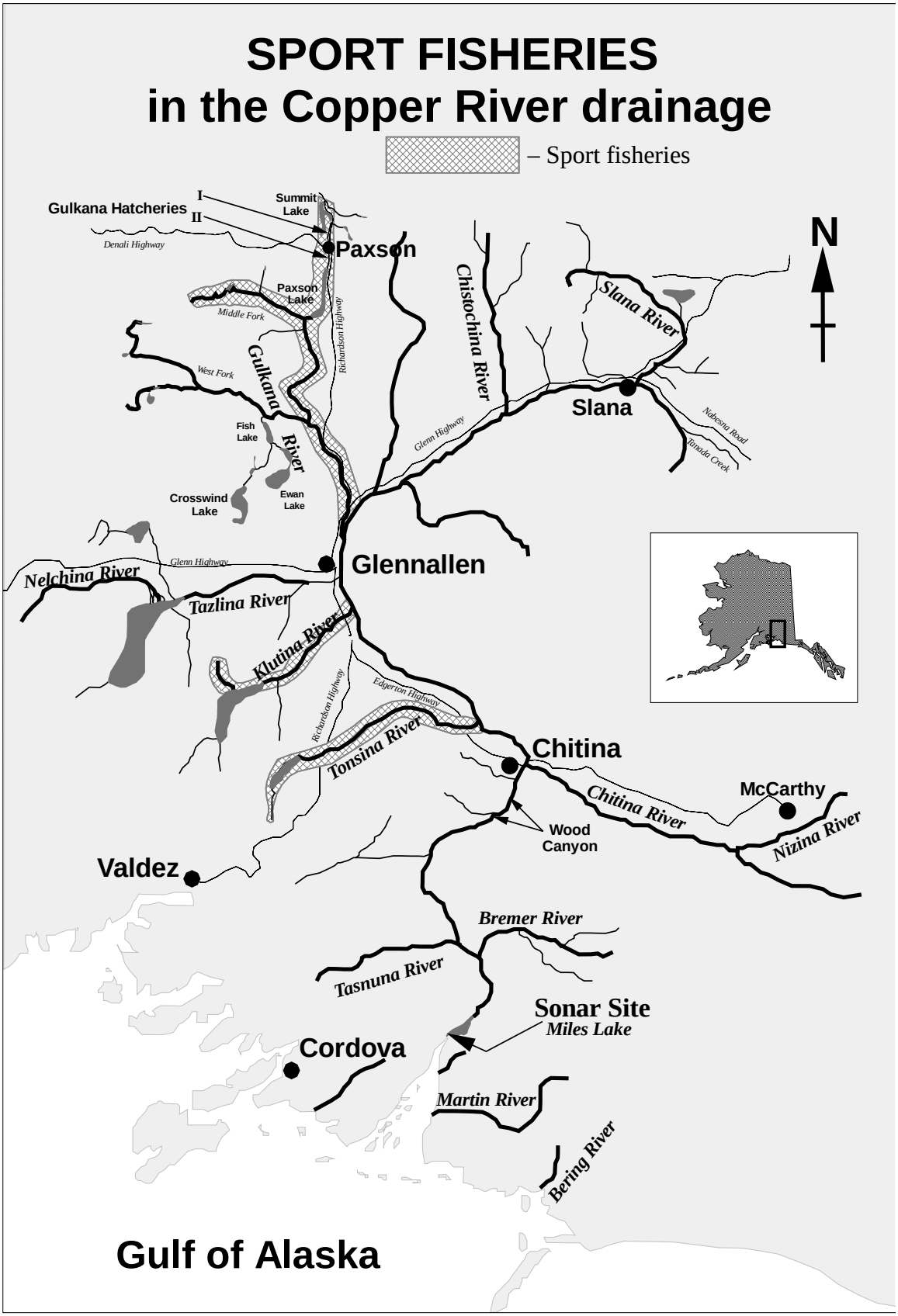
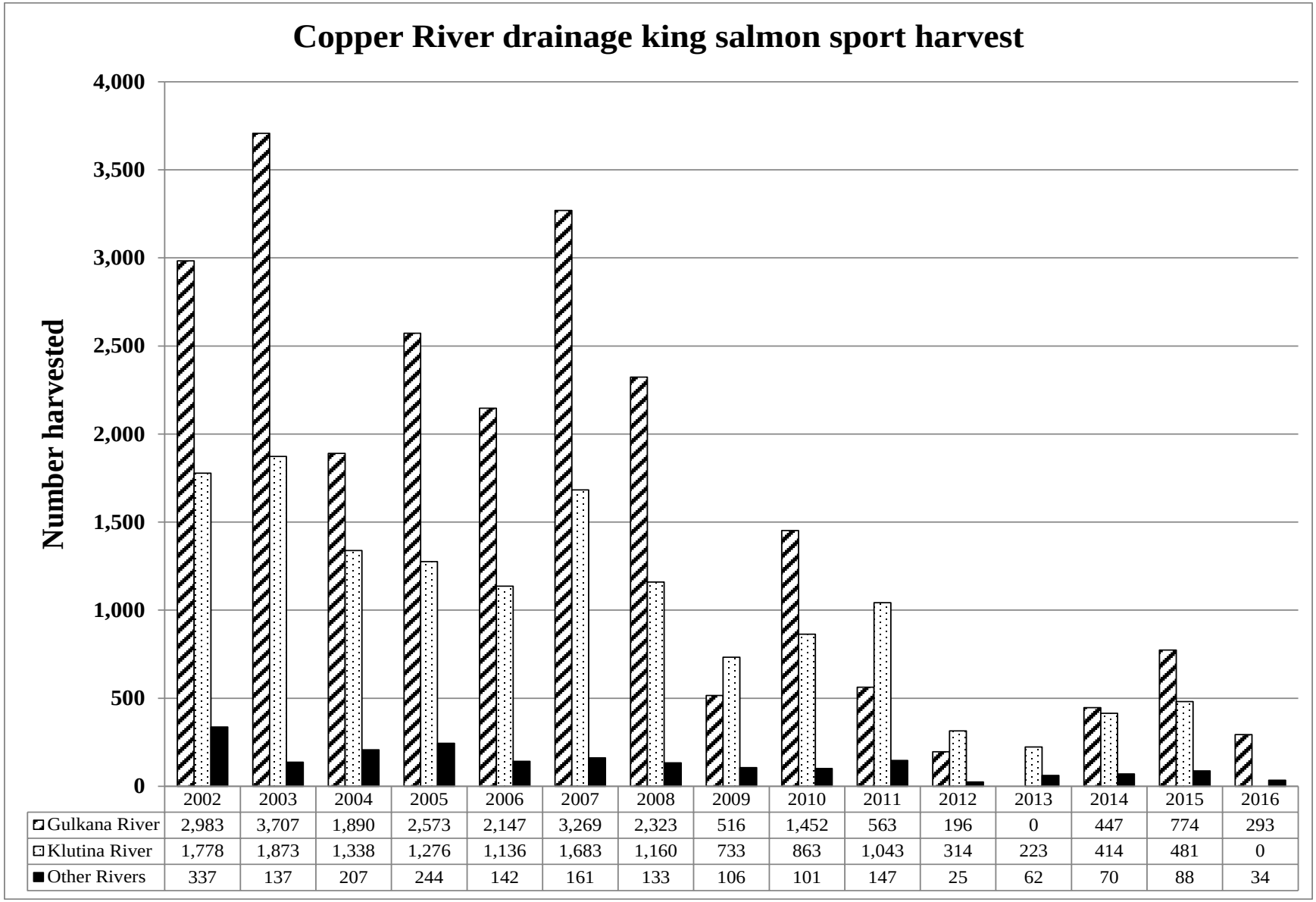
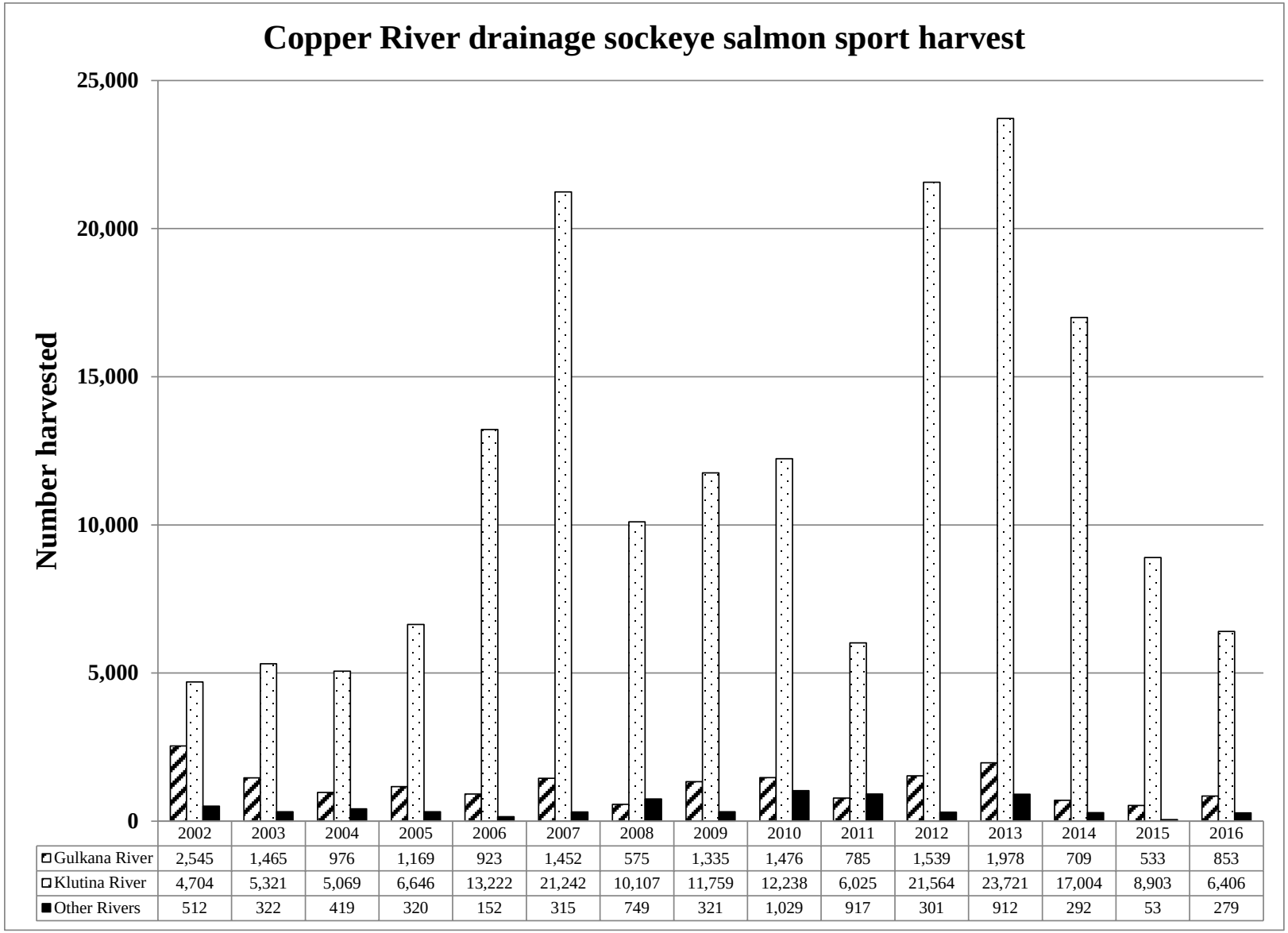


Figure 12.–Map of the sport salmon fisheries on the Copper River.



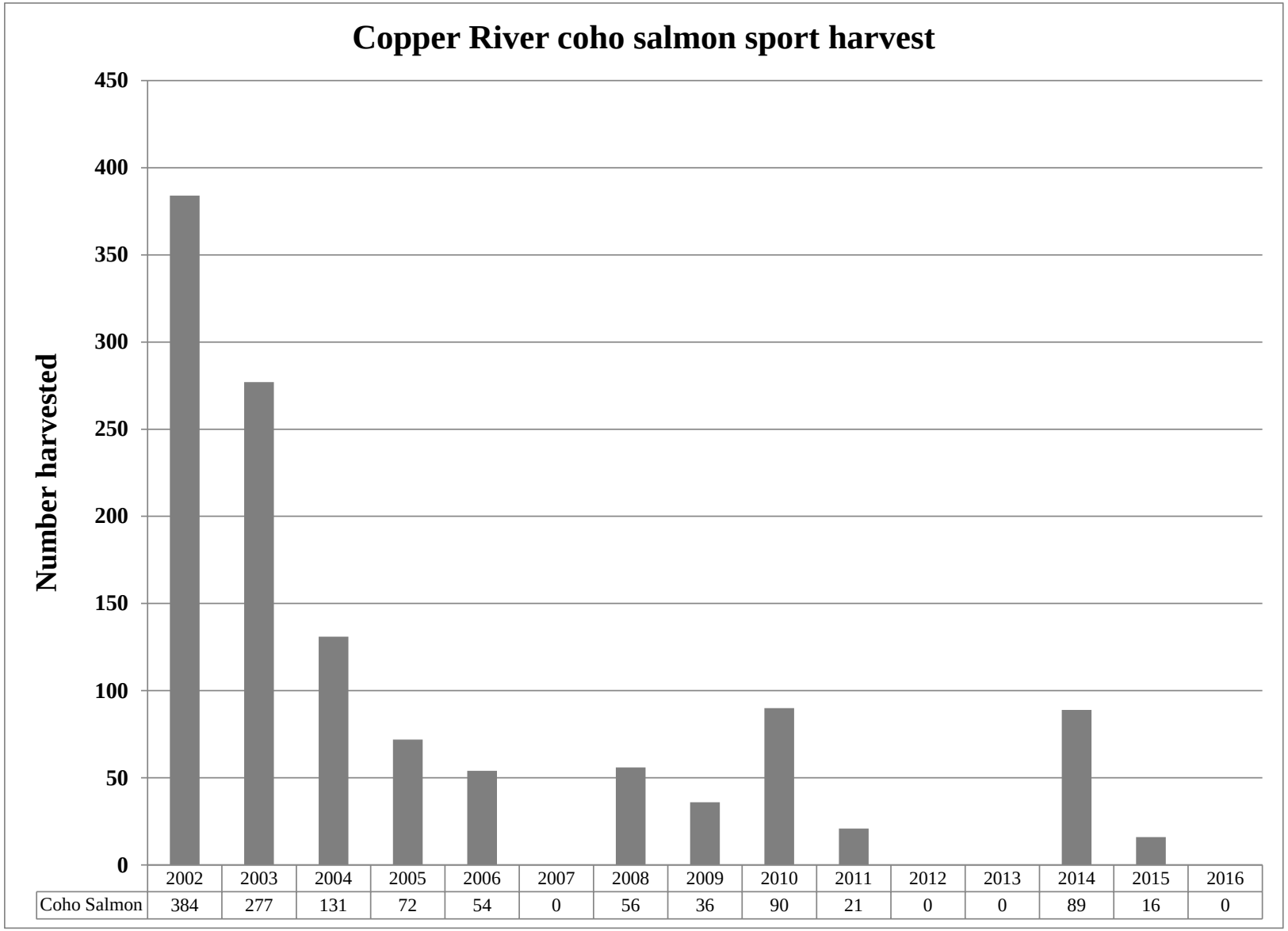
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gulkana River	2,983	3,707	1,890	2,573	2,147	3,269	2,323	516	1,452	563	196	0	447	774	293
Klutina River	1,778	1,873	1,338	1,276	1,136	1,683	1,160	733	863	1,043	314	223	414	481	0
Other Rivers	337	137	207	244	142	161	133	106	101	147	25	62	70	88	34

Figure 13.–Copper River king salmon sport harvest, 2002–2016.



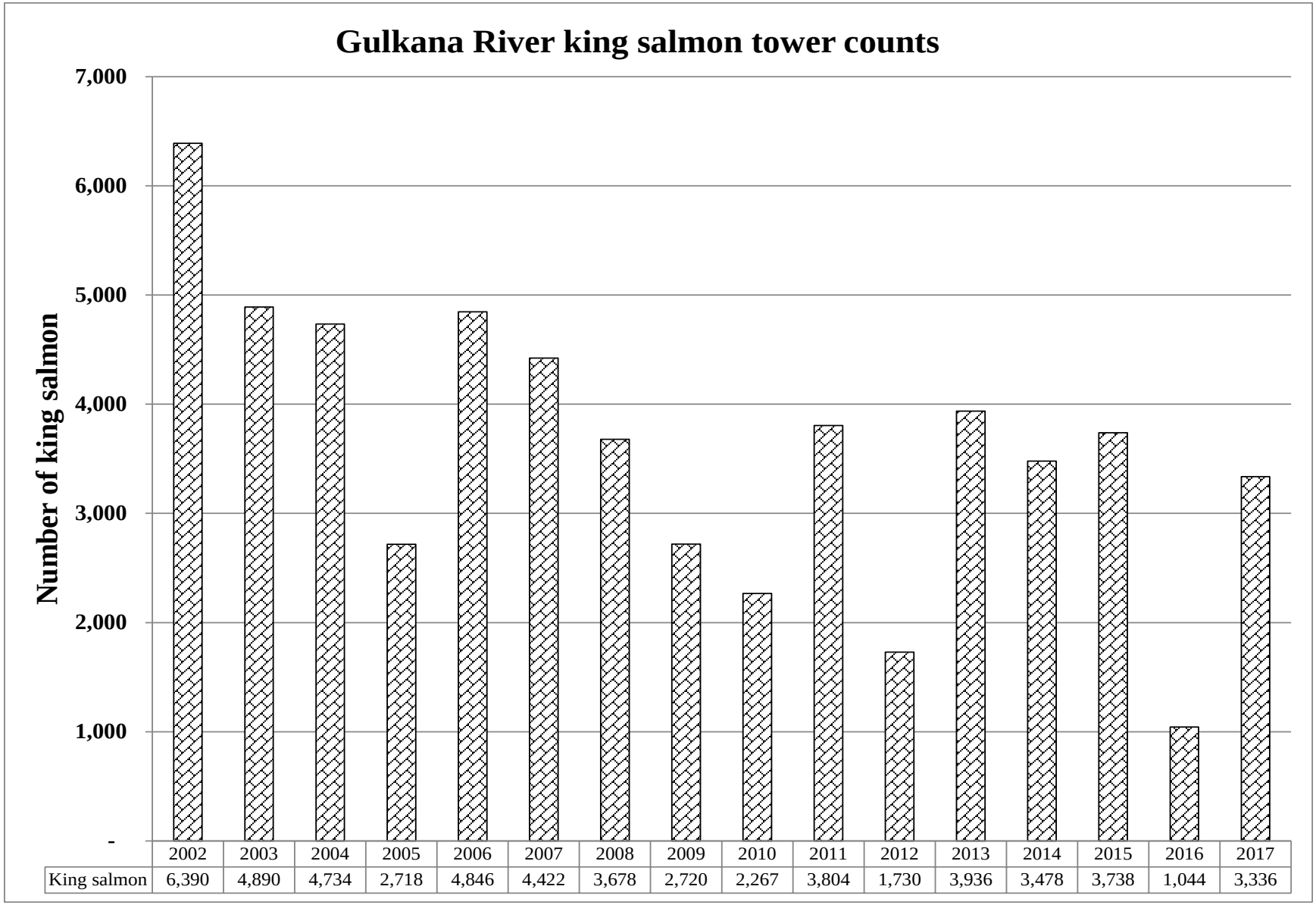
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gulkana River	2,545	1,465	976	1,169	923	1,452	575	1,335	1,476	785	1,539	1,978	709	533	853
Klutina River	4,704	5,321	5,069	6,646	13,222	21,242	10,107	11,759	12,238	6,025	21,564	23,721	17,004	8,903	6,406
Other Rivers	512	322	419	320	152	315	749	321	1,029	917	301	912	292	53	279

Figure 14.–Copper River sockeye salmon sport harvest, 2002–2016.



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coho Salmon	384	277	131	72	54	0	56	36	90	21	0	0	89	16	0

Figure 15.–Copper River coho salmon sport harvest, 2002–2016.



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
King salmon	6,390	4,890	4,734	2,718	4,846	4,422	3,678	2,720	2,267	3,804	1,730	3,936	3,478	3,738	1,044	3,336

Figure 16.–Expanded cumulative escapement of king salmon past the Gulkana River counting tower, 2002–2017.

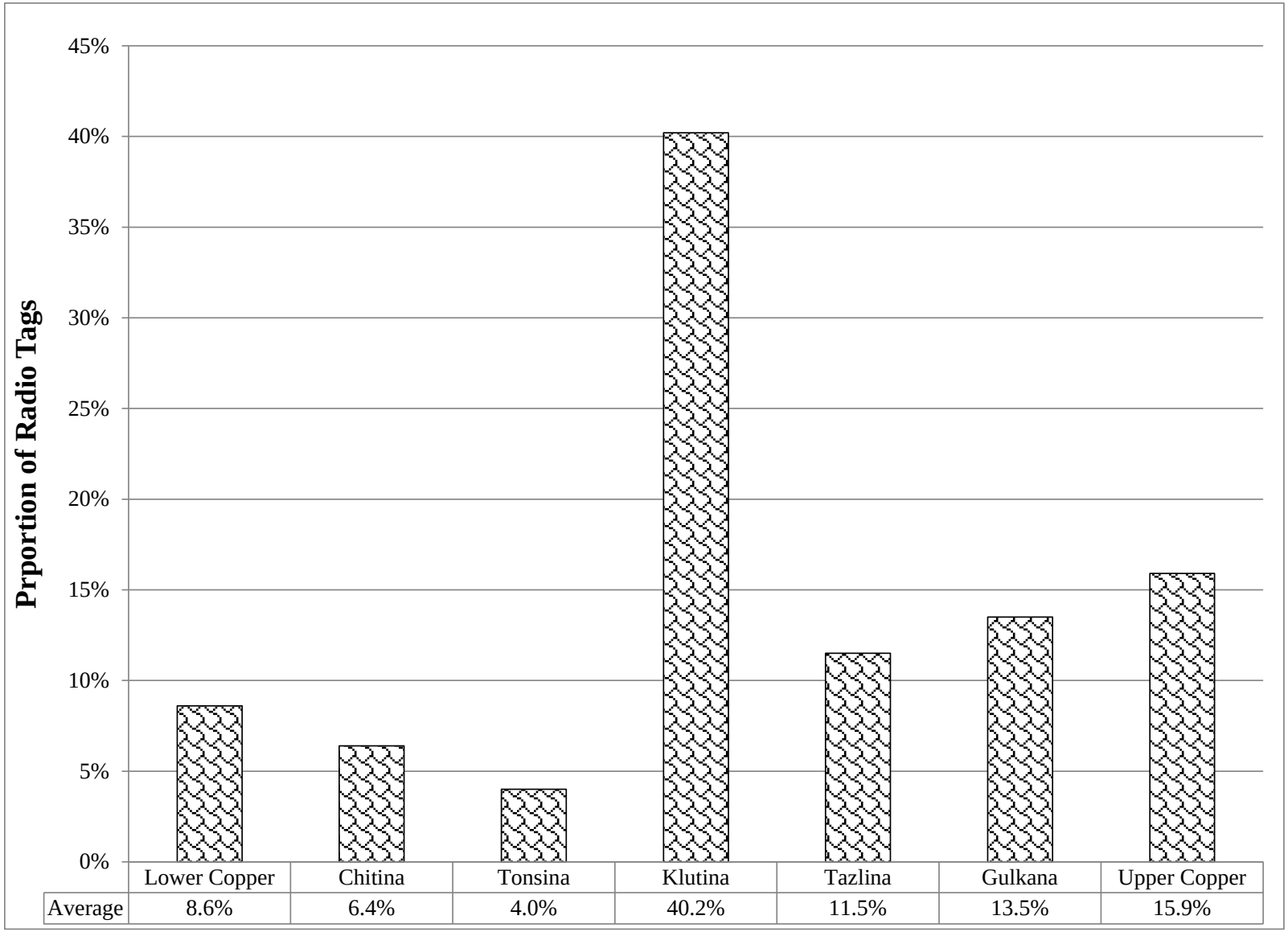


Figure 17.–Average percentage of radiotagged sockeye salmon located within portions of the Copper River drainage, 2005–2009.