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Management of Salmon Stocks in the Copper River, Report to the Alaska Board of Fisheries: December 1-7, 2008, Cordova, Alaska

by

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and

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November 2008

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

fork length	FL
mideye to fork	MEF
mideye to tail fork	METF
standard length	SL
total length	TL

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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The Special Publication series was established by the Division of Sport Fish in 1991 for the publication of techniques and procedures manuals, informational pamphlets, special subject reports to decision-making bodies, symposia and workshop proceedings, application software documentation, in-house lectures, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. Special Publications are intended for fishery and other technical professionals. Special Publications are available through the Alaska State Library, Alaska Resources Library and Information Services (ARLIS) and on the Internet: http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm. This publication has undergone editorial and peer review.

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EXECUTIVE SUMMARY

The Copper River Salmon Fishery Management Plan is the foundation upon which the salmon returning to the Copper River are divided among the commercial, subsistence, personal use, and sport users. Since the original plan became regulation in 1984, the number of participants in the subsistence, personal use, and sport fisheries has grown. The returns of sockeye and Chinook (king) salmon since 1984 have been well above historical averages and have supported increasing harvests in both the commercial and upriver fisheries.

In 1994, a proposal was submitted to the Alaska Board of Fisheries (BOF) to review the plan. The board initiated the review process by requesting that the Alaska Department of Fish and Game (ADF&G) conduct an analysis of the plan. The board subsequently appointed the Copper River Salmon Work Group (CRSWG) from participants in the various Copper River salmon fisheries to revise the Copper River Personal Use Dip Net Salmon Fishery Management Plan (5 AAC 77.591) and the Copper River District Salmon Management Plan (5 AAC 24.360), with technical support from the department, for presentation to the Alaska Board of Fisheries at their December 1996 meeting regarding Prince William Sound finfish issues. Five meetings of this group were held in the winter of 1996. These meetings served to familiarize the various user groups with the fishery characteristics, issues and viewpoints of each group. Although some general guidelines for changes to the management plan were agreed upon, no specific proposals were developed by the group for presentation to the board. The board ended up deliberating on several allocative proposals submitted by the various user groups represented on the CRSWG.

ADF&G presented to the BOF a series of recommended changes to the management plan that would better reflect the plan's intent, but would not change the allocations among users. These recommended changes included eliminating ambiguous terminology in the plan to more accurately state the escapement objectives necessary to provide for sustained yield; better defining the origin and composition of the inriver goal and; clarifying the manner in which the department adjusts the inriver goal to meet management objectives. In addition to adopting the recommended changes, the board increased the spawning escapement goal for salmon other than sockeye from 15,000 to 17,500 fish. The BOF also made allocative changes to the management plan; (1) the sport fish allocation was changed from 3,500 sockeye and 2,500 king salmon to 15,000 salmon (2) the personal use allocation was increased from 60,000 salmon to 100,000 salmon and (3) the subsistence allocation remained linked to the current harvest pattern and was given a range of 60,000 to 75,000 salmon.

In addition, BOF developed the Copper River King Salmon Management Plan (5 AAC 24.361). This plan was formulated in response to the lack of consistent Chinook (king) salmon escapement data for the years preceding the 1996 Board meeting. The purpose of the Copper River King Salmon Management Plan was to insure 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 five percent. In 1999, the Copper River King Salmon Management Plan was modified to include a king salmon spawning escapement goal of 28,000 to 55,000 king salmon. This six year plan had a sunset clause of 2002 when the department, along with the affected users, was to develop a refined king salmon management plan with attainable goals and measurable objectives to present to the BOF for their consideration. ADF&G requested that the BOF adopt the existing plan, with minor adjustments,

including an escapement goal of 24,000 king salmon or more. The board adopted this modified plan at the 2003 meeting. In 1998, a process to initiate a strategic plan for research and management activities directed toward Copper River king salmon was begun by ADF&G. This plan was finalized and published in 2000. Fieldwork in support of this strategic plan was initiated in 1999 and has continued through the 2008 season.

This report summarizes the most recent fishing seasons and management actions which occurred in the Copper River commercial, personal use and sport salmon fisheries during those years, in addition to briefly summarizing recent research activities.

ABSTRACT

Management of the Copper River commercial, personal use, subsistence and sport fisheries is guided by The Copper River Personal Use Dip Net Salmon Fishery Management Plan (5 AAC 77.591), the Copper River District Salmon Management Plan (5 AAC 24.360), the Copper River Subsistence Salmon Fisheries Management Plan (5 AAC 01.647), and the Copper River King Salmon Management Plan (5 AAC 24.361). 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 2008 season. Chinook, sockeye, and coho salmon are the targeted salmon species within the Copper River fisheries and are fished from mid-May through the end of September. From 1998 – 2007 salmon harvest averaged 1,672,571 fish in the Copper River District commercial fishery, 3,764 fish in the Copper River District subsistence fishery, 122,134 fish in the Chitina Subdistrict personal use dip net fishery, 75,916 fish in the Glennallen Subdistrict subsistence fishery, 125 fish in the Batzulnetas subsistence fishery, and 16,357 fish in the upper Copper River sport fisheries. Sockeye salmon account for over 80% of the commercial harvest and over 95% of the personal use and subsistence harvests and 67% of the sport harvest.

Key words: Copper River, Klutina River, Gulkana River, commercial, personal use, subsistence, sport fishery, Alaska Board of Fisheries, Cordova, management, Chinook, sockeye, coho salmon, arctic grayling, rainbow trout

INTRODUCTION

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/Nabesna. 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, National 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.

HISTORY OF THE COPPER RIVER SUBSISTENCE FISHERIES

From Statehood until 1978, the dip net and fish wheel fisheries in the Copper River were classified as "subsistence." In 1978, Alaska passed its first subsistence law. Under this law, the Alaska Board of Fisheries (BOF) adopted the Copper River Subsistence Salmon Management Plan. This management plan established seasons, open areas, legal gears, permit requirements, and bag limits for a subsistence salmon fishery in the Copper River. The plan also directed Alaska Department of Fish and Game (ADF&G) to manage the Copper River commercial salmon fishery to assure an adequate escapement for spawning and to provide for subsistence harvest. In 1980, with the passage of the Alaska National Interest Lands Conservation Act, the federal government mandated subsistence hunting and fishing preference for rural residents on federal public lands. To comply with this requirement and prevent federal involvement in fishery management, the joint Boards of Fish and Game adopted a regulation in 1982 stating only rural residents had customary and traditional use of fish and game and established eight criteria for identifying use patterns. Due to growth in the fishery in the early 1980s, BOF

eliminated non-basin residents from the Copper River subsistence fishery based on an analysis of the eight criteria in 1984. The preclusion of non-basin residents from participating in the Copper River subsistence fisheries prevented many individuals from harvesting fish for their personal use. This led the Board of Fisheries in 1984 to create a personal use salmon fishery in the Copper River under the Copper River Personal Use Salmon Management Plan. The original plan remained relatively unchanged from 1984 through 1996.

Changes in harvest patterns and run timing rendered several aspects of the original plan obsolete. Increased numbers of fish contributing to the later portion of the run by the hatchery on the Gulkana River changed the overall timing of fish available for harvest in the river. In addition, harvests during the early portion of the season had been increasing in recent years. These changes made the aspects of the management plan that focused harvest during certain portions of the run contrary to sound management of a mixed stock fishery.

Due to changes in the distribution of fishing effort since the inception of the plan in 1984, a revised management plan was developed during the 1996 BOF meeting. The revised plan distributed the personal use harvest throughout the season based upon the daily projected sonar counts at the Miles Lake sonar. The maximum harvest level was increased from 60,000 to 100,000 salmon, not including any salmon in excess of the inriver goal or salmon taken after August 31. During the December 1997 BOF meeting, an agenda change request was addressed by the board that would allow personal use permit holders to harvest additional fish in years of surplus escapement. A decision on this proposal was deferred until the February 1998 meeting to allow the advisory committees to review and comment on the amended proposal. At the February meeting, the BOF passed the proposal that allowed personal use permit holders who have filled their original limit to obtain a supplemental permit for 10 additional fish in weeks when a harvestable surplus of 50,000 salmon or greater will be available in the Chitina Subdistrict.

During the 1999 BOF meeting, the board ruled in favor of a positive customary and traditional use finding for the salmon stocks of the Chitina Subdistrict of the Upper Copper River. As a result of this decision, the Copper River Personal Use Salmon Dip Net Fishery was repealed and a Chitina Subdistrict subsistence fishery was established. The regulations for the Chitina Subdistrict subsistence fishery remained similar to the Copper River Personal Use Salmon Dip Net Fishery regulations with three exceptions. These included an adjustment to the annual bag limit, a maximum harvest level of wild stock sockeye salmon of 85,000–130,000, and permit holders were no longer required to possess a sport fishing license. Annual bag limits continued to be 30 salmon for a household of two or more, and 15 salmon for a household of one, of which only one fish could be a Chinook (king) salmon**.** The BOF determined that reducing the bag limit of king salmon from four in the personal use fishery to one in the subsistence fishery, provided for a reasonable opportunity to harvest a king salmon, but would also maintain king salmon harvests at historic levels. Based upon recent harvests the board determined that 100,000–150,000 salmon were necessary for subsistence needs to be met for the Chitina Subdistrict fishery. This number included contributions of hatchery fish, and after this contribution was subtracted, resulted in the 85,000–130,000 wild stock harvest level. As a result of this determination, there were three subsistence fisheries in the Upper Copper River District during 2000–2002.

At the February 2003 meeting in Cordova, the BOF ruled against a positive customary and traditional use finding for the salmon stocks of the Chitina Subdistrict of the Upper Copper River. As a result, the Chitina Subdistrict subsistence fishery was repealed and the Copper River Personal Use Dip Net Salmon Fishery was re-established. The Board viewed this as a name and allocation priority change only, management of the fishery continued as it had prior to the 1999 ruling, based upon the number of fish passing the Miles Lake sonar. The exception to the 1999 regulations was that the one fish per household limit of king salmon remained, as did the harvest allocation of 100,000–150,000 salmon for the Chitina Subdistrict within the Copper River District Salmon Management Plan.

At the December 2005 meeting in Valdez, the BOF reaffirmed its 2003 ruling against a positive customary and traditional use finding for the salmon stocks of the Chitina Subdistrict of the Upper Copper River. In addition, the subsistence allocation for the Glennallen Subdistrict was increased to 61,000 to 82,500 to meet amounts necessary for subsistence in three subsections of the Glennallen Subdistrict.

CURRENT MANAGEMENT TOOLS AND STRATEGIES

RUN TIMING

Several stocks of sockeye salmon with different run timing characteristics migrate through the Copper River's commercial fishery (Figure 2). Most Chinook (king) salmon that migrate through the district spawn in tributaries of the Upper Copper River. Three major stock components of sockeye salmon also 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 returns that spawn in Copper River tributaries above Miles Lake. The second component is an enhanced sockeye salmon return that is produced at the Gulkana Hatchery. This enhanced return 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 returns 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 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 below Miles Lake.

Chinook salmon returning to the Copper River drainage begin passing through the Copper River Delta and entering the Copper River in early May. The peak migration into the river is generally 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 delta wild stock run timing begin in mid-May, but a majority of the delta return 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, ADF&G adopted a Salmon Escapement Goal Policy, 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 300,000–500,000 spawners.

In 2002, an SEG of 24,000 spawners was created for Copper River Chinook salmon. The Copper River delta sockeye 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 delta streams, and a mark-recapture study to assess Chinook salmon.

Miles Lake Sonar

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. Beginning in 2003, Dual–frequency Identification Sonar (DIDSON) has been used. Sonar units are installed each spring below Miles Lake after shore ice is gone, which generally occurs around May 20.

The total inriver goal for the Miles Lake sonar site is established annually (Table 1). Upriver SEG and allocations are fixed in regulation while the hatchery brood stock and hatchery surplus components are determined annually. The sonar operates from mid-May to the end of July. Although Chinook salmon and coho salmon pass the sonar site, they constitute a minor portion of the total count and species apportionment is currently not possible. Sonar passage information, therefore, is primarily used for inseason sockeye salmon management and forecasting. Daily escapement projections are compared to actual daily counts to evaluate the 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, when aerial surveys are used to estimate escapement into the delta systems.

Bendix sonar counters at Miles Lake have been replaced by the new DIDSON acoustical lensing sonar system. Bendix sonar counters that were used at Miles Lake were constructed in 1985. Bendix had not supported these units since the late 1980s and the electronic architecture was significantly outdated and critical parts were no longer being manufactured. From 2003 through 2007, DIDSON sonar units were deployed along side Bendix sonar devices where both technologies were operated simultaneously and their resultant upriver escapement counts were compared and little significant variation was observed between the two systems. Improvements in the DIDSON system include target tracking, digital capture and archiving of acoustic data and the ability to conduct real time data processing and interpretation. DIDSON sonar is also able to distinguish the direction of fish migrations and identify specific individual targets within complex groups. These features are highly useful to distinguish directional movement of fish

and are useful in 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. Future improvements in DIDSON technology could potentially provide greater information regarding salmon as they pass the counting station at Miles Lake.

Aerial Surveys

Aerial surveys of delta streams are conducted weekly beginning in mid-June through late October. These counts 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 Copper River delta streams. Due to the large number of spawning systems on the Lower Copper River delta, total escapement enumeration cannot be obtained. Instead, an escapement index is estimated from the aerial surveys of selected streams. The observed weekly escapement indices are compared to the anticipated weekly escapement indices that are averages of past years' (1971–2007) escapement observations. The SEG range for the delta (55,000–130,000 sockeye salmon) is compared to the combined total of the peak count for each index stream.

Previously, aerial surveys were used to estimate escapement of Chinook salmon into the Upper Copper River. Chinook 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 have been surveyed consistently since 1966. In 2005, the number of surveyed spawning streams was reduced to four (Gulkana River, East Fork Chistochina River, and Manker and St. Anne creeks in the Klutina River drainage), due to data gathered from the Chinook salmon radiotelemetry study that indicated only a minor component of the Chinook salmon return actually spawned in the clear water tributaries of the glacial rivers (such as the Tazlina and Tonsina rivers) As with the delta's sockeye and coho salmon, assessment of Chinook salmon spawning escapements through aerial surveys of key index areas does not provided an estimate of the total spawning population. The current four index streams provide an inseason index of run strength for the major sport fishery and Upper Copper River Chinook salmon stocks. Spawning escapement abundance is estimated by the mark-recapture fish wheel study conducted by the Native Village of Eyak.

OVERVIEW OF COPPER RIVER SALMON FISHERIES

Salmon fisheries in the Copper River District primarily harvest Chinook, 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 spawning tributaries. In addition, since 1999 federal subsistence fisheries occur in the Glennallen and Chitina subdistricts and the Batzulnetas area. Prior to 1999, participants in these fisheries participated in the state fisheries and overall participation has not increased as a result of the

federal fisheries. Since 1984, total harvest of Chinook salmon has ranged from 27,000 in 1990 to over 85,000 salmon in 1998 (Figure 3); for sockeye salmon, from 638,000 in 1988 to slightly more than three million in 1997 (Figure 4); and commercial coho salmon harvest has ranged from less than 30,000 in 1997 to nearly 700,000 in 1994 (Table 2; Figure 5).

COMMERCIAL FISHERIES

Copper River District includes all waters of the Gulf of Alaska between Hook Point and Point Martin (Figure 5). The seaward boundary of the Copper River District is a line three miles due south of a line from the southernmost tip of Pinnacle Rock on Kayak Island to the tip of Hook Point on Hinchinbrook Island. The inshore boundary line 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 markers located approximately two miles seaward of the grass banks and in Boswell Bay. The inshore boundary line has 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 on the inside waters.

Average 10-year commercial harvest from the Copper River District for the years 1998–2007 was 43,059 Chinook, 1,344,291 sockeye and 285,221 coho salmon (Tables 3, 4, and 5). The 25-year average for the years from 1983-2007 is 42,129 Chinook, 1,264,732 sockeye and 304,550 coho salmon. Estimated 2008 harvest was 11,263 Chinook, 311,883 sockeye and 207,012 coho salmon.

Copper River District is managed using three 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 (Figure 6). The anticipated catch is the average weekly catch from 1971 to 2007, including only those years that have similar fishing patterns (i.e., non-strike years). The objective is to have a fishing schedule of two 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 August the department's priority switches to coho salmon management.

There are fifteen proposals currently before the Alaska Board of Fisheries that concern commercial fisheries in the Copper River and Bering River districts specifically:

Retention of fish taken in the commercial fishery/subsistence participation (3 proposals)

- #118–Restrict commercial activity of participants in a subsistence fishery;
- #119–Prohibit retention of Chinook salmon from a commercial harvest for home use; and,
- #120–Repeal 5 AAC 24.356 Chinook salmon reporting requirement.

Fishing gear (2 proposals)

- #121–Prohibit the use of dip nets and gaffs by commercial fishers to land Chinook salmon; and,

- #122–Require that gillnet buoys be marked clearly with letters 4” high x 1” wide.

Closed waters (3 proposals)

- #123–Update coordinates that define the inside closure area, 5AAC 24.350(1)(B);
- #124–Open waters within 3 miles of the SE side of Kayak Is. to commercial fishing; and,
- #125–Open waters within 1 mile of the SE side of Kayak Is. to commercial fishing.

Copper River District Salmon Management Plan (3 proposals)

- #126–Revise inriver escapement goals making them species and stock specific;
- #127–Remove reference to inriver goal; and,
- #128–Delay commercial fishing until 5,000 salmon have been counted by the sonar.

Copper River King Salmon Management Plan (4 proposals)

- #129–Increase the Sustainable Escapement Goal (SEG) for Chinook (king) salmon;
- #130–Increase the number of fishing periods in the inside closure area during statistical weeks 20 and 21 from 2 periods to 3 periods during this 2 week interval;
- #131–Limit commercial fishing in the inside closure area during weeks 22 and 23 to 1 period per week; and,
- #132–Allow more than one fishing period in the inside closure area during weeks 20 and 21.

2008 Sockeye and Chinook Salmon Fisheries, Season Summary

The 2008 commercial harvest forecast for Copper River District was 46,908 Chinook, 742,166 sockeye, and 288,013 coho salmon. The enhanced sockeye salmon returns to the Gulkana Hatchery, (GH) were forecast to be 273,000. Prince William Sound Aquaculture Corporation (PWSAC) requires approximately 18,900 fish for brood stock leaving 90,100 sockeye salmon available for subsistence and sport harvests as well as an estimated 164,000 for the common property gillnet fishery in the Copper River District. The 2008 inriver goal for salmon passing the Miles Lake sonar was set at 614,606 to 814,606 fish. This number equated to a preseason sonar goal of 597,174 to 791,377 salmon by July 31, the normal season ending date for sonar counting at Miles Lake.

The Copper River sockeye salmon harvest was 311,883, 42 percent of the projected 742,166 and 23% of the 10-year average of 1,344,291 sockeye salmon. The harvest of 11,263 Chinook salmon was 24% of the projected 46,908 and 26% of the 10-year average of 43,059 fish. Escapement to the Upper Copper River on July 31 surpassed the minimum inriver escapement goal for that date of 597,174 salmon with a total of 713,544 salmon counted by the sonar. The aerial escapement index for sockeye salmon escapement into Copper River delta systems was 67,950 and was within the SEG range of 55,000–130,000 fish.

A total of 492 drift gillnet permits were active in the Copper River District in 2008 out of a total 532 with peak participation occurring in the second fishing period of the season on May 19 with 466 permit holders fishing.

Typically the Copper River District has opened for commercial fishing in mid-May, with the management strategy to provide for two evenly spaced fishing periods per week as escapement allows.

The Miles Lake south bank sonar became operational on May 15 with observed salmon escapement on the first day of operations of 6 fish. The north bank sonar became functional three days later with 90 fish counted.

The first Copper River District commercial fishing period on Thursday, May 15 was for 12-hours and had 170 commercial drift gillnet permits fishing. Harvest from this period was 2,366 sockeye and 743 Chinook salmon. Anticipated harvest was 17,105 sockeye and 5,673 Chinook salmon. High winds and rough seas during this period were significant contributing factors to the low harvest and participation. The second 12-hour period occurred on Monday, May 19 with 466 commercial permits reporting deliveries. Harvest from this period was 30,137 sockeye and 2,029 Chinook salmon reported and remained below the anticipated harvest of 44,823 sockeye and 6,729 Chinook salmon.

In accordance with 5 AAC 24.361(b), inside waters as described in 5 AAC 24.350(1)(B) were closed for the duration of the 12-hour period which occurred on Thursday, May 22. Harvest from this period was 37,311 sockeye and 1,853 Chinook salmon with 444 permit holders reporting deliveries. Anticipated harvest for this period was 56,013 sockeye and 6,927 Chinook salmon.

In addition to stormy conditions, the largest series of spring tides (greater than 15 feet) occurred in early May prior to the beginning of the commercial fishing season. Larger tidal cycles typically are a contributing factor to salmon movement and passage, frequently correlating to above expected commercial harvests and counts at the Miles Lake sonar station. Sonar passage during statistical week 21 (May 18–24) was steady, but lackluster with 29,900 salmon estimated compared to an inriver goal of 44,146 for the week. The overall return appeared to be 2–3 days late as evidenced by sonar counts that matched anticipated counts for 2–3 days prior, and by processor reports of immature gonadal material in harvested salmon.

Harvest from the fourth period that occurred on Monday, May 26 was 49,052 sockeye and 1,562 Chinook salmon with 457 permit holders reporting deliveries. This harvest was approximately 10% below the anticipated sockeye harvest and just over one-third of the anticipated Chinook salmon harvest of 4,379 for that period. Sonar estimates during the first half of this week continued to lag with cumulative passage on Tuesday, May 27 at approximately 58% (49,753) of the 86,330 salmon minimum inriver goal. A commercial period was not announced for Thursday, May 29.

Over the next 6 days, sonar counts increased and surpassed the daily anticipated inriver goal on Saturday, May 31 but remained below the cumulative inriver goal for this date of 147,339 with 95,406 salmon estimated. A single 12-hour period was announced for statistical week 23 (date of period). Harvest during this period was limited to waters of the Copper River District north of a line from Pt. Steele to the southern end of Wingham Island. This effectively reduced the size of the district by more than half and minimized targeting of fish that were in offshore waters and would not enter the Copper River for several days. This limited opening provided managers with additional information regarding salmon entry in the area inside of and near the barrier islands.

In the two previous years, Copper River salmon runs had been compressed and late. In 2006, two back to back closures resulted in the passage of over 270,000 salmon in six days. The pattern in 2007 was similar with sonar estimates waning in the early portion of the season and

then booming as hundreds of thousands of salmon entered the district and river following a closure of the commercial fishery.

Harvest from the Monday, June 2 period was 42,944 sockeye and 1,485 Chinook with 372 permit holders making deliveries. Anticipated harvest was 74,724 sockeye and 6,072 Chinook salmon. Salmon passage at the Miles Lake sonar remained above the daily inriver goal through Wednesday, June 4. This resulted in the cumulative minimum inriver estimate approaching the goal for that date. The escapement deficit on Wednesday, June 4 was 17,925; down from a deficit of 40,822 salmon one week earlier. A 12-hour period was held on Thursday, June 5 during which 42,312 sockeye and 1,724 Chinook salmon were harvested by 341 permit holders. This compares to an anticipated harvest of 44,650 sockeye and 3,607 Chinook salmon for this period. A 12-hour period was announced for Monday, June 9. A total of 339 permit holders reported deliveries of 44,616 sockeye and 880 Chinook salmon. Anticipated harvest for this period was 27,804 sockeye and 2,505 Chinook salmon.

Daily sonar passage during the week from Wednesday, June 4 through Wednesday, June 11 was erratic with daily sonar counts both above and below the daily inriver goal. Accordingly, the Thursday June 12 commercial fishing period did not occur. Sonar estimates over the next week showed a slightly increasing trend, with counts generally over the minimum inriver goal. The lingering cumulative deficit, which on Friday, June 13 was 18,356 salmon, prompted a 12-hour period for Monday, June 16. Harvest from this period was 25,881 sockeye and 923 Chinook salmon by 220 permit holders and was below the anticipated harvest for this date of 34,289 sockeye and 2,111 Chinook salmon. On Wednesday, June 18 the cumulative sonar deficit had increased to 19,219 fish, and consequently there was no second period during this week. Sonar estimates continued to weaken over the next several days with a cumulative deficit of 24,324 on Friday, June 20. In response to this trend, there was no Monday period in statistical week 26 (June 22–28), nor was there a Thursday period as passage continued to be erratic with estimates falling both above and below the daily minimum inriver goal.

With a tidal cycle that brought weak minus tides from June 16 to 24, an increase in fish passage was anticipated from approximately June 25 to 30, 5 to 7 days later. This would coincide with the historical peak of the enhanced Gulkana Hatchery run. Miles Lake Sonar exhibited an increasing escapement trend beginning on Wednesday, June 25 when 7,827 salmon passed the sonar compared to an inriver goal for that day of 6,436. This trend continued and a Monday fishery opening was anticipated until on Saturday, June 28, when daily sonar counts dropped to slightly above the daily inriver goal. As of June 28, the overall sonar count was 22,995 below the cumulative minimum inriver goal. Daily passage for the first half of statistical week 27 (June 29–July 5) remained approximately 1,000 fish above the daily inriver goal. On Wednesday, July 2 with a sonar deficit of 15,801 and erratic passage, a commercial opening was not announced. On the following day, 11,400 salmon passed the sonar and the midnight to 6:00 a.m. count of 7,056 projected Friday's count could reach 28,000 fish. An announcement was immediately made for a 12-hour period on Saturday, July 5. Harvest from this period was 9,368 sockeye and 11 Chinook salmon with 125 permit holders reporting deliveries.

Large daily sonar estimates continued from July 3 to 8 remaining between 11 thousand and 33 thousand per day with a total of 131 thousand salmon counted during this period (Figure 2). This compares to a minimum inriver goal of 35 thousand salmon for this period. A 24-hour commercial opening was announced for Monday, July 7. Harvest from this period was 6,371

sockeye and 32 Chinook salmon with 69 permit holders reporting deliveries. The schedule of two 24-hour periods per week continued until the start of coho salmon management on August 18. Fleet participation remained low with less than 60 boats participating in any given period. This was the result of strong PWSAC hatchery returns of sockeye and chum salmon to Main Bay and Wally Noerenberg hatcheries.

Daily sonar passage at Miles Lake for the remainder of July remained more consistently above the minimum than in the early portion of the summer. The cumulative sonar estimate on July 31 was 713,544 salmon. This was above the midpoint value of 694,275 for the inriver goal range of 597,174 to 791,377 salmon. The final escapement index value for Copper River Delta sockeye salmon stocks based on aerial surveys was 67,950, and was within the SEG range of 55,000 to 130,000 fish.

Poor salmon returns to the Copper River in 2008 for both sockeye and Chinook salmon may be, in part attributed to extremely hot and dry weather conditions in 2004. This may have negatively impacted smolt of both species from the 2003 brood year that were in freshwater. Typically 5-yr old sockeye salmon make up 70–85% of the Copper River run and 5-yr old Chinook salmon make up 50–80% of the run. The economic impact to the gillnet fleet of the 2008 Copper River run was ameliorated by the success of sockeye and chum salmon returning to PWSAC's Main Bay and Wally Noerenberg hatcheries. Overall commercial harvest of 311,883 sockeye and 11,263 Chinook salmon from the Copper River District was the lowest commercial harvest since 1978, 1979, and 1980.

2008 Coho Salmon Fishery Season Summary

The coho salmon harvest of 206,550 was 28 percent below the projected harvest of 288,013. Escapement estimates of coho salmon were hampered by frequent storms and high silt levels in major index streams. Rough seas and inclement weather also likely had a negative impact on harvest levels of coho salmon.

Coho salmon season officially began at 7:00 a.m. on Monday, August 18 during statistical week 34 with a single 24-hour period. An aerial survey flown on August 11 produced a count of 7,922 coho salmon in index streams, which was within the SEG range for statistical week 33 of 5,846–12,239 fish. Harvest from the first coho salmon period was 20,030 fish with 143 permit holders reporting deliveries. The second period on August 25 had 56,660 coho salmon delivered by 202 permit holders. Given the increase in harvest and catch per unit effort a third fishing period was announced for 12-hours on Thursday, August 28. An aerial survey flown under poor observational conditions on Wednesday, August 27 documented 27,881 coho salmon in index streams. This was above the average SEG anticipated for this date. Consequently, the Thursday period was extended to 24-hours. Harvest from this period was 40,245 fish with 195 permit holders reporting deliveries. An additional aerial survey was flown during this statistical week on Saturday, August 30 under excellent observational conditions. Index stream counts in the Copper River District increased to 29,155. Counts in the neighboring Bering River District increased from 5,903, which is below the 8,803–22,345 SEG range, to 11,911 which is within the range. Consequently an unscheduled announcement was made for a fishing period in the Bering River District to coincide with a previously announced 24-hour period in the Copper River District on the following Monday, September 1. Harvest from this period was 20,022 coho with 120 permit holders reporting deliveries from the Copper River District. A second period during this week yielded 20,008 coho salmon harvested by 82 permit holders. Stormy

conditions persisted in the Cordova area for the next several weeks likely having a negative impact on harvest and participation for the remainder of the season. The following week, September 7–13, had two periods with 31,325 coho salmon harvested in total by 115 permit holders during the first period and 108 in the second. Harvest from the following week was 10,790 coho salmon with 88 permit holders reporting deliveries from the first period and 22 from the second. There were 461 coho salmon delivered by 11 permit holders during the Monday, September 22 period. There were no further deliveries in the remaining 3 weeks that the season was open. Aerial surveys flown on September 24 and October 3 documented levels of coho salmon in index streams above the SEG ranges for statistical weeks 39 and 40.

The final 2008 aerial escapement index value for Copper River Delta coho salmon stocks was 76,892 fish and was above the SEG range of 32,000–67,000 coho salmon for the Copper River District.

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 operated by Alaska Department of Fish and Game, Division of Commercial Fisheries. In 1992, the hatchery was transferred to PWSAC. The donor stock for the facility was the local wild stock at the hatchery site on the Gulkana River. Gulkana Hatchery was expanded to two facilities in 1986. The two hatcheries combined have produced an average of 26.5 million fry annually over the last ten years (Table 6). 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 returns 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 delta wild and late upriver wild stocks, the harvest rate in the commercial fishery is determined by the strength of the wild stock escapement. Enhanced returns 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 returns are large and wild stocks are weak or less plentiful. These unharvested enhanced returns 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 estimates 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 released in Crosswind Lake, the forecasted hatchery surplus has ranged from 12,890 fish in 1985 to 230,500 fish in 2000 (Table 1). In 2005, the forecasted hatchery surplus component was 48,000 sockeye salmon. Gulkana Hatchery stocks are intermixed with other sockeye stocks and other salmon species to the extent that no targeted harvest can occur within the commercial fishery or inriver fisheries. Gulkana hatchery brood stock needs are estimated annually and are also included in the Copper River inriver escapement goal. From 1986 through 2005, the brood stock escapement component past the sonar 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.

Historically, the Gulkana Hatchery operator has harvested only brood fish. Under ADF&G management, hatcheries were operated through general fund appropriations. Since PWSAC has operated the Gulkana facility, only brood stock was harvested until 1997. Primarily, 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 adults.

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. 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, give away up to 30 sockeye per household to residents who come to the site and request the fish. Less than three permits per year have been issued and total harvests have been less than 200 fish annually. The average of actual sockeye salmon returns to Crosswind Lake from 1995 to 2004 is 55,750 fish. The 2005 return to Crosswind Lake is approximately 69,000 fish.

When PWSAC is unable to harvest surplus hatchery sockeye in the SHA, they will, under authority of the ADF&G, destroy all sockeye salmon in excess of escapement needs. Disposal of these fish is undesirable; however, allowing them to escape into Crosswind Lake is also problematic. 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 continue to be allowed into the lake.

The intent for developing the SHA is to limit the return 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 will prevent most of the returning sockeye salmon from migrating into the system while providing benefits to both PWSAC and state residents.

ADF&G 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 desired result is a reduction of the annual hatchery surplus, which has grown significantly larger in recent years. In spite of an abundance of sockeye salmon, there has been considerable difficulty in successfully achieving wild stock escapement goals for sockeye salmon stocks in the Copper River Delta this decade. Determining the strength and correctly managing for the escapements of both delta and upriver wild sockeye salmon stocks is an ongoing challenge. The recent large hatchery surpluses are the combined result of high survival rates and conservative management in the commercial fishery.

Mass marking of enhanced stocks using strontium chloride began in the spring of 2000 as part of the cooperative effort between ADF&G 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 return. Large Gulkana Hatchery releases over the past four years will likely continue to affect management of the Copper River District for a number of years into the future. However, 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. There are seven proposals addressing the personal use fishery before the Board this cycle:

- #1–requests the board to reconsider the Customary and Traditional Use determination for the Chitina Subdistrict;
- #22–seeks to increase the annual limit of personal use sockeye salmon;
- #23–seeks to change the time period for setting supplemental periods;
- #24–seeks to restrict supplemental permits if the commercial fishery closes for more than 8 days;
- #25–seeks to increase the personal use bag limit for king salmon in the Chitina Subdistrict and modify the recording requirement;
- #26–seeks to require reporting by transporters; and,
- #27–seeks to extend the Chitina Subdistrict boundary.

Only Alaska residents may currently 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 7). Only dip nets may be used to harvest salmon. This fishery is opened by emergency order. 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 limits are 15 salmon for a single person and 30 salmon for a household of two or more, only one of which may be a king salmon. The Board has mandated that Alaskans can participate in either the subsistence or personal use fishery in the Copper River drainage, but not both.

The Board of Fisheries has authorized ADF&G to manage the commercial salmon fishery to provide the following inriver goal of salmon, measured at the Miles Lake Sonar (in 5 AAC 24.360; Table 1):

Spawning escapement (sockeye salmon)	300,000
Spawning escapement (other salmon)	17,500
Subsistence harvest (salmon)	61,000–82,500
Personal use harvest (salmon)	100,000–150,000
Sport fishery harvest (salmon)	15,000
Hatchery brood stock (sockeye salmon)	Estimated annually
Hatchery surplus (sockeye salmon)	Estimated annually
TOTAL	Announced annually

Hatchery brood stock and hatchery surplus are adjusted annually based on the anticipated return of wild and hatchery stocks. From 1997 to 1999, maximum harvest for the personal use fishery was 100,000 salmon, excluding fish provided in excess of the inriver goal and not including any salmon harvested after August 31. Prior to 1997, this amount was 60,000 salmon. In 1998, the BOF passed a proposal that allows permit holders, who have filled their original limit, to take 10 additional sockeye salmon in weeks when a harvestable surplus of 50,000 salmon or greater will be available in the Chitina Subdistrict. This supplemental harvest is exclusive of the maximum harvest level. From 2000 to 2002, as a subsistence fishery, the Chitina Subdistrict had a harvest range of 100,000–150,000 salmon, of which 85,000–130,000 were wild salmon, based upon coded-wire tag recoveries from the commercial fishery. This harvest range has remained in place, following the change of the Chitina Subdistrict back to a personal use fishery in 2003.

The personal use dip net fishery is managed under the *Copper River Personal Use Salmon Fishery Management Plan* (5 AAC 77.591). In the Chitina Subdistrict, weekly fishing periods and limits are established by emergency order and are based on the projected inriver returns. The first opening will occur between June 1 and on or before June 11, as mandated by the plan. Inriver returns are estimated by the sonar unit located at Miles Lake. Based upon previous migration studies, a two-week travel period from the Miles Lake sonar to Wood Canyon is used for management purposes from June through mid-July and a three-week travel period for mid-July until the sonar is removed. The management plan requires that the harvest be distributed throughout the season, based upon the projected sonar counts. The daily allocation of salmon for the Chitina Subdistrict is determined pre-season based upon the projected daily sonar counts. Weekly fishing periods are established from the recent 5-year average catch per hour applied to the weekly harvest allocation. Fishing period adjustments inseason are based upon actual sonar counts, and any salmon above the projected weekly salmon escapement are considered surplus. When an escapement of more or less than the inriver goal of salmon actually pass the sonar counter, the Board has mandated that the department decrease or increase the fishing time by the corresponding percentage. The pre-season and actual fishing schedules for 2006–2008 are shown in Table 7 through Table 9.

Harvests in the Chitina Subdistrict Subsistence fishery prior to 2000 were determined weekly from permits, which were to be returned after each fishing trip. Permits were only issued from

the ADF&G office in Chitina. Beginning in 2000, Chitina Subdistrict permits were available from ADF&G offices in Anchorage, Fairbanks, Glennallen, and Palmer to provide additional service to the dip netting public, reduce fishery operating costs, and prevent excessive delays (up to 3 hours) at the Chitina ADF&G 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. This prevented any inseason estimation of weekly harvest and participation since 2000, but lack of this information has not influenced management decisions.

Actual harvest data have been collected since the fishery was established in 1984. Through 1988, harvests remained relatively stable. From 1988 to 1996 harvests generally increased (Figure 8). The number of permits issued has generally followed the trend in harvests (Figure 9). The harvest of approximately 154,000 fish in 1997 was the largest on record since the personal use fishery was created and had the third highest participation. Number of participants increased dramatically in 1997 when 9,086 permits were issued. Participation peaked in 1998 and 1999 when 10,006 and 9,943 permits were issued, respectively. The increase in participation was likely a reflection of the strong sockeye returns in those years and media coverage of the fishery. From 1999 to 2003, participation declined in the Chitina Subdistrict then increased in 2004 stabilizing at about 8,500 permits. In contrast participation has continued to increase in the Glennallen Subdistrict from 1999 to an all time high of 1,466 permits in 2007 (including federal subsistence permits). It is likely a combination of factors that precipitated the variation in participation in the Chitina Subdistrict and an increase in the Glennallen Subdistrict. Though this has not been directly compared between the Chitina Subdistrict Personal Use and Glennallen Subdistrict Subsistence databases, anecdotal information from the Chitina and Glennallen ADF&G offices indicate that a number of past participants of the Chitina Subdistrict have shifted to the Glennallen Subdistrict. Reasons for this shift may include: 1) the increased permit fee for the Chitina Subdistrict from $10 in 1999 to $25 in 2000; 2) the opportunity to harvest 5 Chinook (king) salmon in the Glennallen Subdistrict, as opposed to 1 in the Chitina Subdistrict (if fishing with a dip net); and 3) the opportunity to participate in a fishery without interruption (the Glennallen Subdistrict opens June 1 and remains open through September 30). This is supported by the increase in permits issued for dip nets in the Glennallen Subdistrict from 1999 through 2002 (Table 10). In addition, in 2001, 2002, and again in 2006 landslides occurred along the access road to the fishery that blocked road access for approximately half the season in 2001 and have blocked access for vehicles larger than 4-wheelers and hindered that access for 4-wheelers since 2007. The diminished access may also have caused some Chitina Subdistrict users to shift to the Glennallen Subdistrict in 2007 and 2008. During the 2003 Alaska legislative session, the legislature removed the $25 fee associated with the Chitina Subdistrict permit, which took effect beginning in the 2004 season. This action was based upon a 2002 survey that indicated the majority of the access road Right-of-Way (ROW) provided river access and the fee to provide payment to the landowners for access was no longer necessary. Participation in the Chitina Subdistrict increased in 2004 and 2005 and the removal of the permit fee likely contributed to the increase (Figure 9).

Sockeye salmon dominate the harvest until the second week in September. Harvests typically peak in the second and third week of June with a smaller peak in the second to third week of July. Sockeye salmon are 94 percent of the Chitina Subdistrict harvest on average (Figure 8). They have ranged from 41,054 in 1986 to 148,727 in 1997. The large harvests from 2004 to 2007 reflect the strong returns of sockeye salmon in recent years. King salmon harvests peak the

second week in June but king salmon are present in the harvest in small numbers through August. King salmon comprise about 4 percent of the Chitina Subdistrict harvest. Harvests generally increased through 1999 with the largest harvest of 6,723 occurring in 1998. King salmon annual harvests have declined to approximately 3,000, due to the bag limit reduction to one king salmon in 2000. Coho appear in harvests in late August and dominate the catch by the second week of September. Coho comprise less than 3 percent of the harvest. Coho harvests have fluctuated from a low of 160 in 1997 to a high of 4,870 in 1995. The large harvest in 1995 occurred because the closure of the personal use fishery in August shifted pressure into September when coho salmon are more prevalent. The low coho salmon harvest in 1997 was a result of the season closure of coho salmon due to poor returns.

In 2006, the Chitina Subdistrict Personal Use Fishery remained closed during the week of June 1–June 4 (Table 7). Actual salmon numbers past the Miles Lake sonar during the week of May 15– 21 were below projected counts by 14,808 fish. This resulted in no opening for the first fishing period and a decrease in the preseason schedule by 32 hours. The Chitina Subdistrict Personal Use Fishery season was opened by emergency order on June 9 for a 68-hour fishing period. Actual salmon numbers past the Miles Lake sonar during the week of May 22–28 were below projected counts by over 59,000 fish. This resulted in decreasing the preseason schedule by 100 hours for the second fishing period. Salmon numbers past the sonar from May 29 to June 4 were above the projected salmon counts for this period by 192,491 fish, and the third fishing period (June 12–18) remained at 168 hours. Due to a greater than 50,000 salmon surplus above the weekly salmon escapement objective, this third period was also a supplemental period. The fourth period (June 19–25) also remained at 168 hours as actual sonar counts exceeded projected sonar counts by 25,109 fish from June 5 to 11. Sonar counts continued above projected counts for the next four periods and the fishery remained open during the fifth through the eighth period. By the ninth period with actual sonar counts continuing to exceed projected counts the fishery was open to continuous fishing beginning July 24th through August 31st and remained open through September 30 by regulation.

In 2007, the Chitina Subdistrict Personal Use Fishery remained closed during the week of June 1–June 3 (Table 8). Actual salmon numbers past the Miles Lake sonar during the week of May 13— 20 were below projected counts by 10,532 fish. This resulted in no opening for the first fishing period a decrease in the preseason schedule by 24 hours. The Chitina Subdistrict Personal Use Fishery season was opened by emergency order on June 9 for a 36-hour fishing period. Actual salmon numbers past the Miles Lake sonar during the week of May 21– 27 were below projected counts by over 54,000 fish. This resulted in decreasing the preseason schedule by 132 hours for the second fishing period. Salmon numbers past the sonar from May 28 to June 3 rebounded and were above the projected salmon counts for this period by 103,111 fish, and the third fishing period (June 11–17) remained at 168 hours. Due to a greater than 50,000 salmon surplus above the weekly salmon escapement objective, this third period was also a supplemental period. The fourth through the sixth periods also remained at 168 hours as actual sonar counts exceeded projected sonar counts from June 4 to 24. Sonar counts continued above projected counts for the next four periods and the fishery remained open during the seventh through the tenth period. Due to a greater than 50,000 salmon surplus above the weekly salmon escapement objective from June 25 to July 1, July 2 to 8, and July 9 to 15, the seventh, eighth, and ninth periods were also supplemental periods. By the eleventh period with actual sonar counts

continuing to exceed projected counts the fishery was opened to continuous fishing from August 6th through August 31st and remained open through September 30 by regulation.

In 2008, the Chitina Subdistrict Personal Use Fishery remained closed during the week of June 1 (Table 9). Actual salmon numbers past the Miles Lake sonar during the week of May 12–18 were below projected counts by 2,159 fish. This resulted in maintaining the preseason schedule of no fishing time for the first fishing period. The Chitina Subdistrict Personal Use Fishery season was opened by emergency order on June 5 for a 72-hour fishing period. Actual salmon numbers past the Miles Lake sonar during the week of May 19–25 were below projected counts by over 19,000 fish. This resulted in decreasing the preseason schedule by 40 hours for the second fishing period. Salmon numbers past the sonar from May 26 to June 1 remained below the projected salmon counts for this period by 29,076 fish, but based upon historic harvest and participation levels the third fishing period (June 9–15) remained at 168 hours. The fishery remained open during the fourth through the seventh periods as actual sonar counts exceeded projected sonar counts from June 2 to 29.

Beginning with the eighth fishing period (July 14–20) for 2008, the preseason apportionment of fish passing the sonar for the Chitina Subdistrict Personal Use Fishery was reduced from 122,825 fish to 50,000 fish as a result of the Copper River District Commercial Fishery being closed for 13 consecutive days. The new apportionment of 50,000 fish was used to calculate the number of fish available to the Personal Use Fishery eighth through the fourteenth fishing periods. Salmon numbers past the sonar from June 23 to July 6 were above the projected salmon counts for this period by 53,350 fish, and the eighth fishing period (July 14–20) remained at 168 hours. The fishery remained open the following week (July 21– 27) due to sonar counts that remained above escapement objectives by over 99,000 salmon. Due to a greater than 50,000 salmon surplus above the weekly salmon escapement objective, the eighth and ninth periods were also supplemental periods. Actual salmon numbers past the Miles Lake sonar during the week of July 7–13 were above projected counts by 22,204 fish. Based upon historic harvest and participation levels and the reduced apportionment of fish, this surplus could not maintain a full week of fishing time and the preseason schedule was reduced by 48 hours for the tenth fishing period. Actual salmon numbers past the Miles Lake sonar during the week of July 14–20 were above projected counts by 7,880 fish. Based upon historic harvest and participation levels and the reduced apportionment of fish this surplus resulted in a reduction of 24 hours from the 168-hour preseason schedule for the eleventh fishing period. Actual salmon numbers past the Miles Lake sonar during the week of July 21–27 were above projected counts by 4,831 fish. Based upon historic harvest and participation levels and the reduced apportionment of fish this surplus resulted in a reduction of 34 hours from 168-hour preseason schedule for the twelfth fishing period. Salmon numbers past the sonar from July 28 to August 2 were above the projected salmon counts for this period by 4,581 fish, and the thirteenth fishing period (August 18–24) remained at 168 hours. The sonar counter was removed on August 2. The fishery remained open through August 31 based on projected sonar counts and remained open through September 30 by regulation.

In 2004, there was a sharp increase (6,560 in 2003 to 8,495 in 2004) in the number of permits issued for the Chitina Subdistrict personal use fishery (Figure 9). From 2005 through 2007 the number of permits ranged from 8,305 to 8,642 permits. Annual harvest increased from 125,690 in 2005 to 131,217 in 2007. Increased participation in 2004 likely resulted from removal of the $25 fee associated with the permit prior to the 2004 season. 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 data for 2008.

SUBSISTENCE FISHERIES

Subsistence fishing is restricted to three areas on the Copper River: 1) the Copper River commercial fishing 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. There are 9 proposals dealing with Upper Copper River District subsistence issues before the board this year:

- #12–seeks to reformat the regulations on fish wheel specifications;
- #13–seeks to increase the distance between fish wheels from 75 to 300 feet;
- #14–seeks to prohibit dip netting within 30 feet of a fish wheel;
- #15–seeks to reformat regulations for subsistence annual possession limits;
- #16–seeks to revise the annual limits in the Glennallen Subdistrict subsistence fishery;
- #17–seeks eliminate permits for additional subsistence salmon in the Glennallen Subdistrict;
- #18–seeks to amend the Copper River Management Plan to include harvest monitoring;
- #19–seeks to modify harvest reporting requirements in the Glennallen Subdistrict fishery to 24 hours; and,
- #20–seeks to modify harvest reporting requirements in the Glennallen Subdistrict fishery to 48 hours.

UPPER COPPER RIVER DISTRICT SUBSISTENCE FISHERIES

Under State of Alaska regulations there is currently one subsistence fishery in the Upper Copper River District which occurs in the Glennallen Subdistrict. The Glennallen Subdistrict subsistence fishery is managed by the Alaska Department of Fish and Game under the Copper River Subsistence Salmon Fisheries Management Plans (5 AAC 01.647). Currently, 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 ADF&G following the end of the fishing season. Alaskans can participate in either the Glennallen Subdistrict subsistence fishery or the Chitina Subdistrict personal use fishery in the Copper River drainage. There is a second subsistence fishery upstream of the Upper Copper River District which 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 Prince William Sound subsistence salmon fishing permit per year, therefore a household cannot participate in both the Batzulnetas and Glennallen Subdistrict subsistence fisheries in the same year.

Glennallen Subdistrict Subsistence Fishery

The Glennallen Subdistrict of the Upper Copper River District opens June 1 through September 30 for continuous 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 1996 Board of Fisheries meeting, the Copper River District Salmon Fishery Management Plan was modified and established a range of 60,000–75,000 subsistence salmon to accommodate the variability in harvest levels and allow for increased harvests between board cycles. Prior to 1997, this amount

was 35,000 salmon. During the 2005 Board of Fisheries 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 necessary for subsistence (ANS) in three sub-areas 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. 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 one, 60 salmon for a household of two, and 10 salmon for each additional person in a household of more than two 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 5 of the salmon may be Chinook (king) salmon. Upper Copper River and Copper River District subsistence fishery participants must clip the tips of the caudal fin from all salmon that are harvested. In addition, Upper Copper River District subsistence users must record their harvest before leaving the fishing site.

Harvests by the Upper Copper River subsistence fisheries have been estimated since 1965. Prior to 1980 the fisheries' harvest and participation had remained relatively stable. The fishery experienced rapid growth from 1980 through 1983, when a peak harvest of about 119,000 salmon were taken (Table 10). Under the subsistence fishery management plan, which established the Chitina Subdistrict Personal Use Fishery, Glennallen Subdistrict harvests decreased substantially in 1984 to about 29,000 salmon. Since 1990, participation in the Glennallen Subdistrict Subsistence Fishery has gradually increased to 1,466 permits issued in 2007 (Figure 12). Harvests have also increased since 1990, the 88,578 salmon harvested in 2001 was the highest since 1983 (when Chitina and Glennallen Subdistrict harvests were combined) (Figure 12). The average number of permits issued from 1993 to 1997 was 917. The average total harvest during the same period was 64,120 salmon. For the period of 1998–2002, the average number of permits issued for the Glennallen Subdistrict increased to 1,185, while average total harvest during this period averaged 73,127 salmon. From 2003 to 2007, permits issued averaged 1,281 and harvest was 78,510. State subsistence permits with completed harvest information are required to be returned to the department by October 31 of each year. Federal subsistence permits are not due until December 31st. As of October 8, only 41.8% of state permits had been received. As a result, this report contains incomplete and preliminary data for 2008.

Fish wheel permits are the majority of permits issued for the fishery. Since 1990, the number of dip net permits has increased (Table 10). Prior to 1990, fewer than 100 dip net permits were issued each year. In 1999, over 300 dip net permits were issued and in 2008, 536 were issued. The 469 dip net permits in 2002 and the 536 permits issued in 2008 represent the highest percentages (42% and 45% respectively) of permits issued for that gear type since 1991 (Table 10). The decline in state fish wheel permits in 2002 can be partly attributed to the fact that this was the first year permits were issued by the National Park Service for the federal subsistence fishery in the Glennallen Subdistrict. The majority of federal permit holders use fish wheels. The corresponding increase in dip net permits in 2007 and 2008 may reflect a shift of dip netters from the Chitina fishery to the subsistence fishery due to the restricted access in the Chitina Subdistrict following the landslides in the fall of 2006.

In 1999, federal regulations were adopted for Copper River subsistence fishing, but as 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, as 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 one and 500 salmon for a household of two or more for both the Chitina and Glennallen subdistricts. Federal subsistence users are able to participate in both fisheries, while state subsistence users must select either the Chitina Subdistrict or Glennallen Subdistrict in which to participate. As a result, the National Park Service issued separate federal subsistence fishing permits to federal subsistence users beginning in 2002. The number of federal permits issued for the Glennallen Subdistrict increased from 201 to 262 from 2002 to 2003 and have since stabilized around the 2003–2007 average of 264 permits.

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. The enforcement of these regulations prohibited the subsistence fishing by non-rural 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 Wrangell-St. Elias National Park and Preserve. Only those rural residents that qualified for federal subsistence salmon harvest in the Glennallen Subdistrict were issued permits to fish in this area. As a result, no state subsistence fishing permits have been issued for this portion of the Glennallen Subdistrict since 2004. 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 third 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 one-half mile downstream of the mouth of Tanada Creek in the Copper River. In 1987, an interim subsistence fishery was provided for by emergency regulation at Batzulnetas to settle the United States District Court case of John vs. Alaska. The Batzulnetas fishery encompasses all waters from the regulatory markers near the mouth of Tanada Creek and approximately one-half mile downstream from that mouth and in Tanada Creek between ADF&G 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.

In 1987, the fishery was conducted near the mouth of Tanada Creek near the historical village site of Batzulnetas. Eight permits were issued in that year to individuals or family groups from Mentasta and Dot Lake, and the fishery was conducted during July and early August. A total harvest of 22 sockeye salmon was reported in 1987. The Board of Fisheries reviewed the fishery before the 1988 season and set seasons, eliminated the quota, and provided for additional gear

types. Permits can be issued throughout the season and must be completed and returned to ADF&G by September 30. No permits were issued for this fishery between 1988 and 1992. However, in 1993 one permit was issued and 160 sockeye salmon were harvested. In 1994, five permits harvested 997 sockeye. In 1995 four permits were issued and 16 sockeye were harvested. No permits were issued in 1996. In 1997, three permits were issued. One household reported fishing and harvested 176 sockeye salmon. In 1998, one permit was issued and a harvest of 386 sockeye salmon was reported. In 1999, one permit was issued and a harvest of 55 sockeye salmon was reported. No permit was issued in 2000. In 1999 and 2000, the U.S. District Court issued a preliminary injunction against the State of Alaska from enforcing 5 AAC 01.647(i)(5) which established fishing periods through emergency order authority. The injunction allowed subsistence fishing seven days per week from June 1 through September 1 or until 1,000 sockeye salmon were taken. No more than 250 sockeye salmon could be taken in any one week. Since 2001, permits for this fishery have been issued under the federal subsistence fishery program, and during these years no state permits have been issued. Since 2001, one federal permit has been issued each year except in 2006 and 2007 when no permits were issued. Reported harvests averaged 185 salmon from 2001 to 2004. No harvest has been reported since 2004. Action taken by WRST-NPS in the spring of 2005 prohibits the issuance of state permits for this fishery at this time.

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 a week. Once the commercial season has commenced, subsistence fishing is allowed only during commercial fishing periods or by emergency order. 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 legal limit for the number of Chinook (king) salmon is no more than 5 per household (5AAC 01.645(b). From 1998 to 2007 an average of 236 subsistence permit holders have reported an average harvest of 2.7 Chinook salmon harvested per year (Table 11). In addition to the subsistence fishery, commercial fishermen may withhold a portion of their catch for home use. Any commercially caught finfish not sold must be reported on a fish ticket. From 1998 to 2007 an average of 263 permit holders per year have reported retaining 3.4 Chinook salmon on average from their commercial harvest (Table 11).

Currently there are six proposals before the Alaska Board of Fisheries that concern subsistence fisheries and home packs of salmon from commercial deliveries in the Copper River District:

- #5–Establish minimum specifications for marking subsistence drift gillnet buoys;
- #6–Require that the upper and lower lobe of a subsistence harvested salmon be removed prior to removing the fish from the harvest site or concealing it. Currently there are no marking requirements in PWS, and in the Copper River District only the tips are required to be removed;
- #8 and #9–Change the opening date for the subsistence harvest in the Copper River District from May 15, to May 1 and May 10 respectively;

- #118–Prohibit commercial harvesters who participate in a subsistence harvest from making a commercial delivery for one month following the subsistence fishery; and,
- #119–Prohibit commercial harvesters from retaining any Chinook salmon for personal use from their commercial harvest.

SPORT FISHERIES

Sport fisheries for salmon in the Copper River target primarily Chinook (king) and sockeye salmon. The fisheries primarily occur in various tributaries to the Copper River with the largest harvest occurring in the Gulkana and Klutina rivers (Figure 13). The Chinook (king) salmon fishery is the most important recreational salmon fishery in the Copper River in terms of effort and economic value. Sport harvest and effort has been estimated annually since 1977 by a mail survey. The sport harvest of Chinook (king) salmon from Copper River tributaries as reported in the survey has increased substantially since 1990, with the 1996 harvest of 9,116 the highest on record (Figure 14). From 2003 to 2007, the average harvest of Chinook (king) salmon by recreational anglers in the Copper River has been about 4,359 fish. Approximately 95% of the estimated sport harvest of Chinook (king) salmon taken from the Copper River drainage since 1990 has been taken from the Gulkana and Klutina river drainages. From 2003 through 2007, sport anglers have expended an average of 46,651 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 levels similar to those observed prior to 1990. The majority of fishing effort is believed to be directed towards Chinook (king) salmon in the Gulkana and Klutina rivers.

Since 1970, sport harvest of Chinook (king) salmon over 20 inches in length in the sport fishery of the Copper River Basin has been limited by a bag and possession limit of one per day and one in possession. Further protection was afforded area Chinook (king) salmon stocks through spawning season closures beginning in 1989. Beginning in 1989, to reduce catch-and-release mortality, any Chinook (king) salmon removed from UCUSMA waters becomes part of the daily bag and possession limit of the person who hooked the fish. During 1991, sport Chinook (king) salmon fishing was closed in Fish, Indian, Bernard, Ahtell and Natat creeks and the Little Tonsina River. This action was taken in an effort to bolster escapements to these small clear water tributaries, which had shown a decline in Chinook (king) salmon returns. Also during 1991, the portion of the Gulkana River 7.5 miles upstream of the confluence of the West Fork was designated as an area where only unbaited, single-hook artificial lures may be used. This action was taken as a conservation measure for rainbow trout and has had little or no effect on the Chinook (king) salmon fishery. In 1994, a seasonal bag limit of five Chinook (king) salmon was instated for the Copper River drainage. In 1997, following the 1996 BOF meeting, sport Chinook (king) salmon fishing was closed in 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 ¼ mile radius around the mouth of Kiana Creek. In addition, the season closure date in the Klutina River for Chinook (king) salmon was moved from August 10 to August 1 for the flowing waters downstream of the department markers located at mile 19.2 on the Klutina Lake Road. These measures were taken to protect spawning Chinook (king) salmon. Due to increasing harvests in

the 1990's and limited escapement data on Chinook (king) salmon returns, the use of bait was restricted and only unbaited, single hook, artificial lures were permitted on the Tonsina River. With the exception of the Klutina River, the sport Chinook (king) salmon fisheries throughout the Copper River drainage closed to fishing after July 19 to protect spawning Chinook (king) salmon.

During the 1996 Board of Fisheries meeting, the Copper River King Salmon Management Plan (5 AAC 24.361) was adopted. The purpose of this plan was to insure that escapement of Chinook (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 five percent. This was done through inside statistical area closures in the commercial fishery during statistical weeks 20 and 21, in the personal use fishery through a season bag limit reduction of Chinook (king) salmon from five to four, and in the sport fishery through a sport fish guiding closure on Tuesdays. At the 1999 Board of Fisheries meeting, the plan was amended to direct the Department to manage the commercial and sport fisheries to achieve a spawning escapement range of 28,000–55,000 Chinook (king) salmon. Additional means were provided the Department to manage these fisheries to achieve this spawning escapement range. The sport fish guiding restriction was replaced with a sport fish seasonal bag limit reduction from five to four Chinook (king) salmon. The portion of the plan directed at the personal use fishery was also removed, following the reclassification of the Chitina Subdistrict as a subsistence fishery. At the 2003 Board of Fisheries meeting, the Copper River King Salmon Management Plan was revised and the department was directed to manage the commercial and sport fisheries to achieve a sustainable escapement goal of 24,000 Chinook (king) salmon or more. Also at the 2003 meeting, the Tonsina River bait restriction was lifted, after the Department's radiotelemetry study indicated that the Chinook (king) salmon return was larger than originally believed.

There are seven public proposals and two department proposals addressing the Upper Copper River salmon sport fisheries:

- #104–is a department proposal seeking to close king salmon fishing on the Lakina and Slana Rivers and Sinona Creek;
- #105–is a department proposal seeking to expand existing areas closed to king salmon fishing in the Upper Copper River drainage;
- #106–seeking to expand existing area closed to king salmon fishing on Ahtell Creek;
- #107–seeks extend the king salmon season on the Copper River to August 10;
- #108–seeks extend the king salmon season on the Klutina River to August 10;
- #109–seeks to extend the king salmon season on the Tonsina River to August 10;
- #110–seeks to allow retention of unintentionally hooked sockeye salmon;
- #111–seeks to prohibit removal from the water any salmon not retained; and,
- #112–seeks to require including any salmon landed or released against daily bag limit.

GULKANA RIVER CHINOOK (KING) SALMON FISHERY

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

The sport fishery typically peaks during late June, but limited fishing for king salmon continues until the season closes on July 19. Spawning begins in mid-July and continues through late August. Most spawning occurs upstream of the confluence of the West Fork, primarily in the reach between the confluence of the West and Middle forks, but also in the Middle Fork and a few tributaries of the West Fork.

Under current regulations, the Gulkana River is open from January 1 through July 19. The closure is intended to offer protection to spawning fish. The Gulkana River downstream from the Richardson Highway Bridge to the confluence of the Copper River is designated as single-hook, artificial flies only from June 1 through July 31. In all waters upstream of a marker 7.5 miles upstream from the West Fork confluence only unbaited, artificial lures may be used. This regulation is intended to protect rainbow trout stocks.

Sport harvest of king salmon in the Gulkana River averaged 3,786 fish annually from 1998–2002, and 2,718 fish annually from 2003 to 2007 (Figure 15). The 1993 harvest of 5,892 king salmon was the largest on record and accounted for 72% of the sport harvest of king salmon in the Copper River. Sport fishing effort on the Gulkana River averaged 28,864 angler-days annually from 1998 to 2002, and 20,807 angler-days from 2003 to 2007.

The majority of effort and harvest of king salmon occurs from the Richardson Highway Bridge upstream to the confluence of the West Fork. There are five developed access points to the Gulkana River. The most heavily used are at the Richardson Highway Bridge, 4 miles upstream from the confluence with the Copper River, Sailor's Pit, 4 miles upstream from the Richardson Highway Bridge, Poplar Grove, 12 miles upstream from Sailor's Pit, and the Sourdough boat launch 17 miles from Poplar Grove.

Some salmon fishing occurs upstream of the West Fork confluence from rafters floating down from Paxson Lake (about 35 miles). Access in the Upper Gulkana River occurs from the boat ramp on Paxson Lake, and is limited to non-motorized boats (rafts, canoes) due to river conditions. Two ATV trails also access the river: one about 2 miles downstream of Paxson Lake and another about 16 miles from Paxson Lake at the Canyon.

In 2005, based on the low tower counts and anecdotal reports of poor king salmon harvests in the sport, subsistence and personal use fisheries, restriction of the king salmon sport harvest was implemented on the Gulkana River, to provide additional king salmon for the Gulkana River drainage spawning escapement.

KLUTINA RIVER CHINOOK (KING) SALMON FISHERY

The Klutina River supports the second largest sport fishery for Chinook (king) salmon in the UCUSMA. The river has considerable stretches of whitewater and is considered to be very challenging to jet riverboat operators. 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 second week of July; however, fishing for king salmon continues until the season closes on July 31. Peak spawning occurs from late July through August. The king salmon season runs from January 1 through July 19 upstream of

Mile 19.2 of the Klutina River Road, and from January 1 through July 31 downstream from this point. The upper reach has a shorter season to protect spawning fish.

The Klutina River sport fishery for king salmon rapidly increased in popularity during the 1990's. Sport harvest of king salmon from the Klutina River drainage has been estimated using the mail survey since 1983. Based on this survey, harvests remained relatively stable from 1983 to 1990. The sport harvest of king salmon from the Klutina River drainage averaged 2,129 fish annually from 1998 to 2002, and 1,462 fish annually from 2003 to 2007 (Figure 16). The 1999 harvest of 3,489 king salmon was the largest on record for the drainage and accounted for 52% of the sport harvest of king salmon in the Copper River. Sport fishing effort on the Klutina River averaged 10,858 angler-days annually from 1998 to 2002, and 11,741 angler-days from 2003 to 2007. Due to the nature of the mail survey, we do not know how much of this effort was directed towards king salmon versus other species. Observations, however, suggest that a majority of the effort is directed towards king salmon with the possible exception of 2006 and 2007 when a substantial amount of effort appeared directed at the large returns of sockeye salmon those two years.

There is one public proposal regarding the king salmon fishery on the Klutina River. Proposal 108 seeks to extend the season to August 10 for the Klutina River king salmon fishery. There are no department proposals specifically addressing the Klutina River king salmon fisheries.

OTHER COPPER RIVER CHINOOK (KING) SALMON FISHERIES

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

The Tonsina River king salmon sport fishery harvest increased annually from 1988 to 1995, peaking at 539 in 1995. Following the elimination of bait in 1997, king salmon sport harvests dropped off significantly. With the use of bait allowed in 2003, king harvests have gradually increased and averaged 91 king salmon from 2003 to 2007.

Current regulations allow sport fishing for king salmon in the Tonsina River from January 1 through July 19. The July 19 closure date was established in 1989 to allow king salmon to spawn undisturbed. The Little Tonsina River, Bernard Creek, and all flowing waters within a 1/4 radius of their confluence with the Tonsina River are closed to king salmon fishing to protect spawning fish. Current daily bag and possession limits for king salmon over 20 inches in this drainage river are one and one, respectively, and is included in the seasonal bag limit of four for the Copper River drainage.

A limited fishery for king salmon also occurs on Kaina Creek in the Tazlina River drainage. Harvests in this fishery have averaged 35 fish from 1990 to 1998, the peak harvest of 63 king salmon occurred in 1998. No harvests have been reported since 1998. Fishing is only permitted within a ¼ mile radius around the mouth of Kaina Creek.

There is one public proposal regarding the king salmon fishery on the Tonsina River. Proposal 109 seeks to extend the season to August 10 for the Tonsina River king salmon fishery. There are no department proposals specifically addressing the Tonsina River king salmon fisheries.

COPPER RIVER SOCKEYE AND COHO SALMON FISHERIES

Sockeye sport harvests have generally increased since 1977. A significant increase in harvests occurred from 1996 to 2000 during which harvests averaged over 11,000 salmon (Figure 17). From 2001 to 2005 harvests reduced to more historic levels and averaged about 7,500 salmon. Harvests dramatically increased in 2006 and 2007 to 14,297 and 23,028 salmon, respectively. The large harvests of 2006 and 2007 are attributed to very large returns of sockeye salmon to the Klutina River. Based upon anecdotal accounts the sockeye sport harvest returned to average or below average levels in 2008. Approximately 93% of the sockeye harvest occurs in the Gulkana and Klutina rivers.

The sport fisheries for coho salmon in the upper Copper River are very minor. Average coho harvest from 1990 to 2007 is 152. Harvests have been variable through the years ranging from no reported harvest in 1990 and 2007 to 496 coho in 1984 (Figure 18). The majority of the coho salmon harvest occurs in the Tonsina River drainage.

The bag and possession limits for all salmon other than king salmon are 3 per day and 3 in possession for all drainages in the upper Copper River.

There is one public proposal specifically addressing sockeye salmon for this Board cycle. Proposal 110 seeks to allow retention of unintentionally foul hooked sockeye salmon in the Upper Copper River Drainage. Two public proposals indirectly address the sockeye or coho salmon fisheries of the Copper River drainage. Proposal 111 would prohibit removing from the water any salmon not retained. Proposal 112 would require that any salmon landed or released be counted against the daily bag limit for that salmon.

UPPER COPPER RIVER ESCAPEMENT

Based on the results of the radiotelemetry study conducted by the department from 1999 to 2004 it has been determined that approximately 25% of the king salmon returns to the Klutina and Tonsina rivers spawn in the index streams, the remainder spawn in the glacial mainstem of those rivers. As a result, in 2005 the department discontinued aerial surveys on five of the nine index streams. Only the Gulkana River, East Fork Chistochina River, and St. Anne and Manker Creeks in the Klutina River drainage have been flown since 2005. The revised aerial survey program no longer provides an index of total escapement for the Copper River king salmon return. The radiotelemetry study indicated that the nine index streams represented approximately 24–40% of the total escapement, and due to the variability between years were not a reliable index of escapement. The current aerial survey streams provide an inseason index of run strength in the major sport fishery systems, prior to the availability of the total escapement estimates post-season. In 2007 all four streams were flown within the preferred timing window of July 17–31 with Gulkana River being the only system falling slightly below the index objective (Table 12). In 2008, poor weather conditions and high flows prevented counts in all but St. Anne and Manker Creeks. These counts were well below the index objective, but the counts were conducted late within the preferred timing window and probably were late for these earlier stocks.

CHINOOK (KING) SALMON RESEARCH

In 2005–2008, the Native Village of Eyak (NVE) continued to conduct a mark-recapture study that estimated the inriver abundance of Chinook (king) salmon. In 2007 and 2008 NVE also

conducted a mark-recapture study to estimate the abundance of sockeye that past the Miles Lake sonar and compare that estimate to the sonar count. In 2005–2008, ADF&G also continued a study to estimate the escapement of king salmon above the West Fork of the Gulkana River.

COPPER RIVER CHINOOK (KING) SALMON IN RIVER ABUNDANCE STUDIES

NVE King Salmon Escapement Monitoring (CEM)

In 2005–2008, NVE conducted a Chinook (king) salmon escapement monitoring study on the Copper River. The overall objectives of the study were to estimate the annual, system-wide escapement 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 were germane to Baird Canyon (just upriver from Miles Lake and before any inriver fisheries) and were generated using two-event mark-recapture techniques such that the estimates were within 25% of the actual inriver abundance, 95% of the time. Unbiased estimates of total inriver escapement (before any inriver fisheries) were 30,333 (SE=1,529) in 2005, 67,789 (SE=4,779) in 2006, and 46,399 (SE=3,391) in 2007 (Table 13).

NVE has successfully overcome many of the challenges associated with this study, which has proved to be a success. The study has generated unbiased and reasonably precise inriver abundance estimates for 2003–2007, and it's expected the 2008 results will also satisfy the established objective criteria.

Total Escapement Estimates

Estimates of total escapement were determined by subtracting the subsistence, personal-use, and sport harvests from the inriver abundance estimates. The resulting escapement estimates were 21,607 in 2005, 58,489 in 2006, and 34,634 in 2007 (Table 4). Total run size was the inriver abundance plus the harvest from the commercial and commercial home pack fisheries, and estimates were 66,039 in 2005, 99,639 in 2006, and 87,675 in 2007. Total exploitation rates for 2005, 2006 and 2007 were 67, 41, and 61% respectively.

GULKANA RIVER CHINOOK (KING) SALMON COUNTING TOWER

In 2006–2008, the ADF&G along with the Bureau of Land Management continued to operate a counting tower on the Gulkana River above the West Fork to estimate the escapement of king salmon. The counting tower has been in operation since 2002. The long-term goal of this project is to establish a Sustainable Escapement Goal (SEG) for the Gulkana River. Counts at this location do not provide an enumeration of total in-river 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. Personnel conducted counts for 10 minutes of each hour every day. The 10-minute counts are expanded to provide an estimate of passage for each hour. From 2002 to 2007, the average expanded count of king salmon past the tower has been about 4,400 salmon. In 2008, the preliminary count was 2,772 king salmon. This is the lowest count since 2005 (Figure 19).

SOCKEYE SALMON RESEARCH

In 2005–2008, a radiotelemetry study was conducted by NVE to determine spawning distribution, and define migratory timing patterns of sockeye salmon in the Copper River. In

2007 and 2008, NVE also conducted a mark-recapture study to estimate the abundance of sockeye that passed the Miles Lake sonar and compare that estimate to the sonar count.

NVE Sockeye Salmon Radiotelemetry

In 2005–2007, a radiotelemetry study was conducted by the NVE to determine spawning distribution, and define migratory timing patterns of sockeye salmon in the Copper River. Spawning distribution of sockeye in the major drainages was highest in the Klutina River all three years (Figure 20).

Stock-specific run timing varied among stocks in each of the years 2005–2007, but showed a consistent pattern of upriver stocks, such as the Upper Copper drainage and Gulkana River stocks, entering first and lower river stocks, such as the Klutina and Tonsina stocks, entering last (Table 14).

NVE Sockeye Inriver Abundance Estimate

In 2007 and 2008, NVE conducted a mark-recapture study to estimate the abundance of sockeye that past the Mile Lake sonar and compare that estimate to the sonar count for those years. The overall objective of the study is to provide an independent confirmation of the sonar counter used to manage the Copper River fisheries. This consists of marking sockeye salmon collected at the Baird Canyon fish wheel site. Sockeye are marked with yellow spaghetti tags embedded with a PIT tag. The tags are inserted in the fish and scanned at the marking site prior to releasing the fish. The recapture site is located below Wood canyon where sockeye are again collected via fish wheels. All captured sockeye are recorded and marked fish have their tags rescanned and the proportion of marked fish is compared to the unmarked portion to determine a total estimate of the number of sockeye salmon above Miles Lake.

The 2007 estimate of sockeye salmon past the Miles Lake sonar site was 1,259,000 (CV=7.2%). This compares to a final sonar count of 926,438 salmon for 2007 (Table 13). The 2008 estimate is not available.

TABLES AND FIGURES

Table 1.–Apportionment of the inriver salmon escapement goal for the Copper River 1998–2008.

Category	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Sockeye Spawning Escapement	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
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	65,000	68,500	75,000	75,000	75,000	68,000	68,000	68,500	68,500	70,000	75,710
Chitina Personal Use Harvest[a]	100,000	65,000	110,000	110,000	125,000	120,000	120,000	110,000	82,500	82,500	122,825
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	100,000	229,500	230,500	185,500	99,000	76,879	11,169	47,859	107,718	44,096	63,570
Minimum inriver goal	617,500	715,500	768,000	723,000	651,500	497,379	431,669	468,859	611,218	549,096	614,605

[a] During 2000-2002 the Chitina dip net fishery was classified as a subsistence fishery rather than personal use.

Table 2.–Average harvest by species and fishery in five year increments in the Copper River from 1971-2007, and the 2008 harvests.

		Fishery			
Year	Species	Commercial	Chitina Subdistrict	Glennallen Subdistrict	Sport
	King	19,475	ND	1,517	ND
1971-75	Sockeye	523,982	ND	25,567	ND
	Coho	108,966	ND	165	ND
	King	21,679	ND	2,136	1,556
1976-1980	Sockeye	363,448	ND	24,946	2,244
	Coho	176,756	ND	491	243
	King	40,242	ND	2,391	2,165
1981-1985	Sockeye	821,925	ND	64,458	3,101
	Coho	393,961	ND	279	278
	King	32,995	2,504	635	2,437
1986-1990	Sockeye	881,848	47,182	24,586	4,026
	Coho	232,880	767	197	168
	King	43,412	3,503	1,470	6,131
1991-1995	Sockeye	1,200,005	82,064	49,457	5,592
	Coho	435,695	2,628	320	160
	King	53,868	4,967	2,762	7,596
1996-2000	Sockeye	1,843,276	126,082	67,238	11,758
	Coho	155,587	2,303	586	185
	King	39,759	2,331	3,486	4,649
2001-2005	Sockeye	1,227,960	105,988	71,847	7,527
	Coho	370,102	2,401	756	191
	King	34,687	2,698	3,536	4,274
2006-2007[a]	Sockeye	1,699,264	125,348	77,630	18,663
(2-year avg.)	Coho	217,734	2,259	256	27
	King	11,263	N/A	2,580	~4,300
2008[a]	Sockeye	311,883	N/A	41,906	~5,000
	Coho	206,550	N/A	647	~100

[a] Subsistence (41.8% of permits reported), personal use, and sport fish harvests for 2008 are preliminary estimates.

Table 3.–Total disposition of sockeye salmon returns to the Copper River 1998-2007.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-year Average
Commercial harvest[a]	1,341,692	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	1,344,291
Commercial, home pack[a]	1,435	1,333	651	2,113	1,138	4,077	525	1,785	1,598	2,023	1,668
Commercial, donated[a]	0	0	434	0	128	35	74	83	114	0	87
Educational [a]	0	0	0	0	151	0	0	42	16	62	27
Subsistence (Cordova, drift gillnet)[b]	850	1,330	4,360	3,072	3,067	1,607	1,822	728	4,355	6,148	2,734
Federal Subsistence (PWS/Copper River)								109	150	36	98
Subsistence (Batzulnetas)[b]	582	55	0	62	208	164	182	0	0	0	125
Subsistence (Glennallen Subdistrict)[b]	64,463	76,215	59,497	83,787	50,850	47,007	55,510	64,213	57,710	65,714	62,497
Federal Subsistence (Glennallen Subdistrict)[c]					7,950	13,616	17,789	19,444	16,611	15,225	15,106
Personal Use (Chitina Subdistrict)[b]	137,161	141,658	107,856	132,108	85,968	80,796	107,312	120,013	123,261	125,126	115,486
Federal Subsistence (Chitina Subdistrict)[c]					575	689	1,215	1,265	1,379	929	1,009
Upriver sport harvest	11,184	11,101	12,361	8,169	7,761	7,108	6,464	8,135	14,297	23,028	10,961
Delta sport harvest[d]	2,015	2,855	2,189	298	798	631	952	656	158	639	1,119
Upriver spawning escapement[e]	485,541	458,427	300,134	509,519	584,423	463,682	454,132	516,890	605,874	637,979	501,660
Delta spawning escapement[f]	175,000	201,950	196,090	142,130	151,470	146,300	138,770	116,812	197,792	176,570	164,288
Hatchery brood stock/Excess[g]	144,174	138,432	75,385	75,620	62,361	45,024	6,618	92,455	97,192	28,648	76,591
Total estimated sockeye salmon run size	2,364,097	2,715,915	1,632,892	2,280,455	2,205,351	1,998,788	1,839,369	2,274,294	2,617,261	2,983,900	2,291,232

[a] Numbers are from fish ticket data. Home pack numbers for sockeye are voluntarily reported.

[b] Data represent expanded state permit harvests.

[c] Data are reported harvest from federal permits.

[d] 2007 Delta sport harvest data unavailable at time of writing.

[e] Upriver spawning escapement prior to 1999 is based on the Miles Lake sonar passage multiplied by the percentage of sockeye salmon in the total upriver subsistence and personal use fisheries to adjust the Miles Lake sonar count to sockeye salmon only. The upriver subsistence, personal use, sport, hatchery brood stock, and onsite surplus are then subtracted from the adjusted Miles Lake sonar counts. Beginning in 1999 sockeye salmon spawning escapement is based on the Miles Lake sonar passage minus the king salmon inriver midpoint abundance estimate, upriver subsistence, personal use, sport, hatchery brood stock and onsite surplus.

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

[g] Hatchery brood stock and on site excess are from the PWSAC annual reports.

Table 4.–Total disposition of king salmon returns to the Copper River 1998-2008.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-year Average
Commercial harvest[a]	68,827	62,337	31,259	39,524	38,734	47,721	38,191	34,624	30,278	39,095	43,059
Commercial, home pack[a]	1,411	1,115	740	935	773	1,073	539	760	779	1,016	914
Commercial, donated[a]	0	0	6	0	4	3	5	11	3	0	3
Educational [a]	0	0	0	0	25	0	0	92	11	70	20
Subsistence (Cordova, drift gillnet)[b]	295	353	689	826	549	710	1,106	219	779	1,145	667
Subsistence (Batzulnetas)[c]	0	0	0	0	0	0	0	0	0	0	0
Subsistence (Glennallen Subdistrict)[b]	1,842	3,141	4,856	3,553	3,653	2,538	3,346	2,229	2,769	3,276	3,120
Federal Subsistence (Glennallen subdistrict)[c]	ND	ND	ND	ND	564	554	653	339	430	596	523
Personal Use harvests (Chitina Subdistrict)[b]	6,723	5,913	3,168	3,113	2,023	1,903	2,495	2,043	2,663	2,694	3,274
Federal Subsistence (Chitna subdistrict)[c]	ND	ND	ND	ND	33	18	7	22	13	26	20
Sport harvest[d]	8,245	6,742	5,531	4,904	5,098	5,717	3,435	4,093	3,425	5,123	5,231
Upriver spawning escapement[e]	11,386	16,294	24,492	28,208	21,502	34,034	30,628	21,607	58,489	34,634	28,127
Total estimated king salmon run size	98,729	95,895	70,741	81,063	72,958	94,271	80,405	66,039	99,639	87,675	84,742

[a] Numbers are from fish ticket data.

[b] Data represent expanded state permit harvests.

[c] Data are reported harvest from federal permits.

[d] 2007 Delta sport harvest data unavailable at time of writing.

[e] Upriver spawning escapement is calculated by taking the inriver abundance estimate and from that subtracting the subsistence, personal use and sport harvests. Prior to 1999 inriver abundance was calculated using aerial and foot surveys; from 1999-2007 inriver estimates were calculated using mark-recapture studies. Since 2003 the Alaska Board of Fisheries has directed that the SEG be 24,000 or more king salmon. From 2000-2002 the board directed that the spawning escapement range be 28,000-55,000 king salmon. From 1997-1999, the department was directed to reduce the harvest potential of king salmon by 5%.

Table 5.–Total disposition of coho salmon returns to the Copper River 1998-2008

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-year Average
Commercial harvest[a]	108,232	153,061	304,944	251,473	504,223	363,489	467,859	263,465	318,285	117,182	285,221
Commercial, home pack[a]	14	36	0	24	187	0	2	119	137	340	86
Commercial, donated[a]	0	0	0	5,141	0	0	0	0	0	0	514
Educational drift gillnet permit[a]	0	0	0	0	0	0	0	0	0	0	0
Subsistence (Cordova, drift gillnet)[b]	680	682	44	70	28	36	46	15	1	15	162
Federal Subsistence (PWS/Copper River)	ND	ND	ND	ND	ND	ND	ND	141	100	68	103
Subsistence (Batzulnetas)[c]	0	0	0	0	na	na	0	0	0	0	0
Subsistence (Glennallen Subdistrict)[b]	533	1,132	532	1,154	611	619	729	224	212	238	598
Federal Subsistence (Glennallen subdistrict)[c]	ND	ND	ND	ND	81	152	152	70	28	34	86
Personal Use (Chitina Subdistrict)[b]	2,145	2,174	3,541	2,720	1,934	2,533	2,860	1,869	2,715	1,742	2,423
Federal Subsistence (Chitina subdistrict)[c]	ND	ND	ND	ND	0	70	18	0	20	40	25
Delta sport harvest[d]	3,941	6,954	4,155	12,052	6,525	14,166	14,512	10,168	5,745	10,223	8,844
Upriver sport harvest[c]	289	24	324	92	384	277	131	72	54	0	165
Upriver spawning escapement[e]	–	–	–	–	–	–	–	–	–	–	–
Delta spawning escapement[f]	79,700	92,450	86,260	82,192	179,630	144,360	199,960	202,164	178,540	107,640	135,290
Total estimated coho salmon run size	195,534	256,513	399,800	354,918	693,603	525,702	686,269	478,307	505,837	237,522	433,401

[a] Numbers are from fish ticket data.

[b] Data represent expanded state permit harvests.

[c] Data are reported harvest from federal permits.

[d] 2007 Delta sport harvest data unavailable at time of writing.

[e] Upriver spawning escapement is calculated by taking the inriver abundance estimate and from that subtracting the subsistence, personal use and sport harvests. Prior to 1999 inriver abundance was calculated using aerial and foot surveys; from 1999-2007 inriver estimates were calculated using mark-recapture studies. Since 2003 the Alaska Board of Fisheries has directed that the SEG be 24,000 or more king salmon. From 2000-2002 the board directed that the spawning escapement range be 28,000-55,000 king salmon. From 1997-1999, the department was directed to reduce the harvest potential of king salmon by 5%.

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

Table 6.–Number of sockeye salmon fry released at the Gulkana Hatchery (Paxson Lake) and remote releases at Summit and Crosswind lakes, 1974-2007.

Release Year	Gulkana (I&II) (Paxson Lake)	Summit Lake	Crosswind Lake	Total
1974	79,691	ND	ND	79,691
1975	785,110	ND	ND	785,110
1976	627,080	ND	ND	627,080
1977	514,922	ND	ND	514,922
1978	477,219	ND	ND	477,219
1979	940,974	ND	ND	940,974
1980	1,105,397	ND	ND	1,105,397
1981	3,368,642	1,340,660	ND	4,709,302
1982	5,985,270	1,860,491	ND	7,845,761
1983	5,470,056	2,047,947	ND	7,518,003
1984	6,162,450	4,312,628	ND	10,475,078
1985	9,261,785	4,741,759	ND	14,003,544
1986	8,586,509	8,451,782	1,287,042	18,325,333
1987	9,905,907	14,999,085	ND	24,904,992
1988	6,204,332	12,491,926	2,487,396	21,183,654
1989	10,105,238	12,026,642	3,130,373	25,262,253
1990	13,288,695	12,004,491	4,906,005	30,199,191
1991	10,522,819	6,455,011	5,469,759	22,447,589
1992	10,553,621	7,048,536	5,420,351	23,022,508
1993	5,295,017	2,651,542	4,495,966	12,442,525
1994	9,405,449	7,637,009	9,144,382	26,186,840
1995	10,317,116	7,418,311	9,973,600	27,709,027
1996	13,900,000	8,400,148	9,732,911	28,850,917
1997	11,589,845	10,162,655	10,512,299	32,264,799
1998	12,286,366	8,987,213	10,516,107	31,789,686
1999	10,198,541	9,191,217	9,984,392	29,374,150
2000	10,705,795	3,300,504	8,331,080	22,337,379
2001	7,870,334	493,516	5,585,665	13,949,515
2002	11,922,685	5,805,231	8,174,754	25,902,670
2003	11,284,330	6,599,519	8,360,966	26,244,815
2004	12,408,512	6,574,962	8,359,115	27,342,589
2005	3,308,065	n/a	3,703,295	7,011,360
2006	5,523,920	4,681,325	10,017,211	20,222,456
2007	4,873,000	6,000,000	10,000,000	20,873,000

Table 7.–2006 Chitina Subdistrict fishing schedule (hours in bold indicate supplemental periods)

Week Ending	PU Week	Preseason Opening Schedule	Hours	Actual Opening Schedule	Hours
4-Jun	1	Saturday, June 3 12:01 PM–Sunday, June 4 8:00 PM	32		0
11-Jun	2	Monday, June 5 12:01 AM–Sunday, June 11 11:59 PM	168	Friday, June 9 12:01 PM–Sunday, June 11 8:00 PM	68
18-Jun	3	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	4	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
2-Jul	5	Monday, June 26 12:01 AM–Sunday, July 2 11:59 PM	168	Monday, June 26 12:01 AM–Sunday, July 2 11:59 PM	168
9-Jul	6	Monday, July 3 12:01 AM–Tuesday, July 4 11:59 PM	48	Monday, July 3 12:01 AM–Sunday, July 9 11:59 PM	168
		Friday, July 7 12:01 AM–Sunday, July 9 8:00 PM	68	Monday, July 10 12:01 AM–Sunday, July 16 11:59 PM	168
16-Jul	7	Tuesday, July 11 12:01 PM–Sunday July 16 11:59 PM	132	Monday, July 17 12:01 AM–Sunday, July 23 11:59 PM	168
23-Jul	8	Monday, July 17 12:01 PM–Sunday, July 23 11:59 PM	156	Tuesday, July 24 12:01 PM–Sunday July 30 11:59 PM	168
30-Jul	9	continuous	168	Monday, July 17 12:01 PM–Sunday, July 23 11:59 PM	168
6-Aug	10	continuous	168	continuous	168
13-Aug	11	continuous	168	continuous	168
20-Aug	12	continuous	168	continuous	168

Table 8.–2007 Chitina **Subdistrict fishing schedule (hours in** bold **indicate supplemental periods)**

Week Ending	PU Week	Preseason Opening Schedule	Hours	Actual Opening Schedule	Hours
3-Jun	1	Saturday, June 02, 12:01 PM–Sunday, June 03, 11:59 AM	24		0
10-Jun	2	Monday, June 04, 12:01 AM–Sunday, June 10, 11:59 PM	168	Saturday, June 09, 8:00 AM–Sunday, June 10, 8:00 PM	36
17-Jun	3	Monday, June 11, 12:01 AM–Sunday, June 17, 11:59 PM	168	**Monday, June 11, 12:01 AM–Sunday, June 17, 11:59 PM**	**168**
24-Jun	4	Monday, June 18, 12:01 AM–Sunday, June 24, 11:59 PM	168	Monday, June 18, 12:01 AM–Sunday, June 24, 11:59 PM	168
1-Jul	5	Monday, June 25, 12:01 AM–Sunday, July 01, 11:59 PM	168	Monday, June 25, 12:01 AM–Sunday, July 01, 11:59 PM	168
8-Jul	6	Monday, July 02, 12:01 AM–Sunday, July 08, 11:59 PM	168	Monday, July 02, 12:01 AM–Sunday, July 08, 11:59 PM	168
15-Jul	7	Monday, July 09, 12:01 PM–Sunday, July 15, 4:00 PM	148	**Monday, July 09, 12:01 AM–Sunday, July 15, 11:59 PM**	**168**
22-Jul	8	Wednesday, July 18, 12:01 PM–Sunday, July 22, 11:59 PM	108	**Monday, July 16, 12:01 AM–Sunday, July 22, 11:59 PM**	**168**
29-Jul	9	Tuesday, July 24, 12:01 PM–Sunday, July 29, 11:59 AM	120	**Monday, July 23, 12:01 AM–Sunday, July 29, 11:59 PM**	**168**
5-Aug	10	Tuesday, July 31, 12:01 PM–Sunday, August 05, 11:59 AM	120	Monday, July 30, 12:01 AM–Sunday, August 05, 11:59 PM	168
12-Aug	11	Continuous	168	Continuous	168
19-Aug	12	Continuous	168	Continuous	168
26-Aug	13	Continuous	168	Continuous	168
3-Jun	1	Saturday, June 02, 12:01 PM–Sunday, June 03, 11:59 AM	24		0

Table 9.–2008 Chitina Subdistrict fishing **schedule (hours in** bold **indicate supplemental periods)**

Week Ending	PU Week	Preseason Opening Schedule	Hours	Actual Opening Schedule	Hours
1-Jun	1		0		0
8-Jun	2	Wednesday, June 04, 8:00 AM–Sunday, June 08, 11:59 PM	112	Thursday, June 05, 8:00 PM–Sunday, June 08, 8:00 PM	72
15-Jun	3	Monday, June 09, 12:01 AM–Sunday, June 15, 11:59 PM	168	Monday, June 09, 12:01 AM–Sunday, June 15, 11:59 PM	168
22-Jun	4	Monday, June 16, 12:01 AM–Sunday, June 22, 11:59 PM	168	Monday, June 16, 12:01 AM–Sunday, June 22, 11:59 PM	168
29-Jun	5	Monday, June 23, 12:01 AM–Sunday, June 29, 11:59 PM	168	Monday, June 23, 12:01 AM–Sunday, June 29, 11:59 PM	168
6-Jul	6	Monday, June 30, 12:01 AM–Sunday, July 06, 11:59 PM	168	Monday, June 30, 12:01 AM–Sunday, July 06, 11:59 PM	168
13-Jul	7	Tuesday, July 08, 12:01 AM–Sunday, July 13, 11:59 PM	144	Monday, July 07, 12:01 AM–Sunday, July 13, 11:59 PM	168
20-Jul	8	Monday, July 14, 12:01 AM–Sunday, July 20, 11:59 PM	168	**Monday, July 14, 12:01 AM–Sunday, July 20, 11:59 PM**	**168**
27-Jul	9	Tuesday, July 22, 8:00 AM–Sunday, July 27, 11:59 PM	136	**Monday, July 21, 12:01 AM–Sunday, July 27, 11:59 PM**	**168**
3-Aug	10	Monday, July 28, 12:01 AM–Sunday, August 03, 11:59 PM	168	Wednesday, July 30, 12:01 AM–Sunday, August 03, 11:59 PM	120
10-Aug	11	Continuous	168	Tuesday, August 05, 12:01 AM–Sunday, August 10, 11:59 PM	144
17-Aug	12	Continuous	168	Tuesday, August 12, 12:01 PM–Sunday, August 17, 11:59 PM	132
24-Aug	13	Continuous		Monday, August 18, 12:01 AM–Sunday, August 24, 11:59 PM	168
31-Aug	14	Continuous	168	Thursday, August 28, 12:01 PM–Sunday, August 31, 11:59 PM	84

Table 10.–Number of permits issued and salmon harvested in the Glennallen Subdistrict Subsistence Salmon Fishery, 1965–2008 (Includes federal subsistence permits and harvest since 2002).

Year	Number Permits Issued				Estimated Salmon Harvest
	Total	Dip nets	Fish wheels	Federal[d]	
1965	1,125	982	143	ND	16,818
1966	1,270	1,132	138	ND	21,896
1967	1,320	1,166	154	ND	19,007
1968	1,378	1,235	143	ND	20,383
1969	1,582	1,415	167	ND	29,266
1970	3,487	3,220	267	ND	42,757
1971	4,542	4,168	374	ND	48,449
1972	3,690	3,485	205	ND	32,468
1973	4,145	3,840	305	ND	29,248
1974	3,593	3,305	288	ND	26,001
1975	2,802	2,452	350	ND	15,357
1976	2,963	2,512	451	ND	23,623
1977	4,066	3,526	540	ND	41,815
1978	3,705	3,313	392	ND	22,029
1979	3,200	2,730	470	ND	30,963
1980	3,203	2,804	399	ND	35,081
1981	4,078	3,555	523	ND	68,746
1982	6,090	5,475	615	ND	110,006
1983	7,541	6,911	630	ND	118,728
1984	562	104	458	ND	28,617
1985	533	[a]	[a]	ND	31,614
1986	405	39	336	ND	28,423
1987	431	59	372	ND	34,142
1988	409	70	339	ND	30,755
1989	386	78	308	ND	29,308
1990	406	95	311	ND	32,524
1991	711	293	418	ND	41,205
1992	655	151	504	ND	47,095
1993	772	193	579	ND	54,854
1994	970	267	703	ND	70,391
1995	858	191	667	ND	55,323
1996	850	219	631	ND	54,290
1997	1,133	286	847	ND	85,744
1998	1,010	272	738	ND	66,951
1999	1,101	336	765	ND	82,119
2000	1,251	464	787	ND	65,106
2001	1,239	407	832	ND	88,578
2002[b]	1,322	469	652	201	63,859
2003[b]	1,233	399	613	221	64,539
2004[b]	1,218	330	626	262	78,267
2005[b]	1,236	363	598	275	86,584
2006[b]	1,254	338	646	270	77,895
2007[b]	1,466	467	707	292	85,266
2008[c]	1,454	536	647	271	45,132
1990-1992	591	180	411	ND	40,275
1993-1997	917	231	685	ND	64,120
1998-2002	1,185	390	755	ND	73,323
2003-2007	1,281	379	638	264	78,510

[a]Data not available.
[b]Includes federal subsistence permits and reported harvest..
[c]Estimated harvest data are preliminary based on 41.8% of state issued permits..
[d]Federal permits are not limited to a single gear type and allow use of fish wheel, dip net, or rod and reel

Table 11.–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, 1995-2007.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	10-year average
Number of subsistence permits fished	72	101	165	144	175	293	288	199	225	321	121	300	295	236
Number of subsistence king salmon harvested	154	276	200	295	353	689	826	549	710	1,106	260	779	1,145	671
Average number of king salmon harvested per subsistence permit holder	2.1	2.7	1.2	2.0	2.0	2.4	2.9	2.8	3.2	3.4	2.1	2.6	3.9	2.7
Number of commercial permit holders reporting personal use harvests	318	345	284	310	299	246	289	247	287	175	232	265	280	263
Number of king salmon retained for personal use	1,688	2,169	1,246	1,418	1,117	740	938	773	1,068	540	766	779	1021	916
Average number of king salmon harvested for home pack per permit holder reporting retention	5.3	6.3	4.4	4.6	3.7	3.0	3.2	3.1	3.7	3.1	3.3	2.9	3.6	3.4
Combined lower Copper River Subsistence and Personal Use harvests	1,842	2,445	1,446	1,713	1,470	1,429	1,764	1,322	1,778	1,646	1,026	1,558	2,166	1,587

Table 12.– Upper Copper River king salmon aerial escapement index counts, 1977-2008.

Year	Gulkana River.[b]		Copper River Upstream of Gulkana[a]		Klutina Drainage[a]			
			E. Fork Chistochina River		St. Anne Creek		Manker Creek	
1977	729		132		10		15	
1978	618	[f]	137		24	[e]	20	[e]
1979	764		810		16	[e]	16	[e]
1980	712		575		8	[e]	35	[e]
1981	77		120		19		33	
1982	879	[e]	1,260		35	[e]	49	[e]
1983	589		575		87		141	
1984	1,331		577		89	[f]	264	[f]
1985	224		360		15	[e]	22	[e]
1986	1,484		618		182		251	
1987	1,098		764		192		141	
1988	831		709		64		119	
1989	2,009		750		90		165	
1990	1,171	[e]	645		43	[e]	43	
1991	1,223	[e]	925		130		107	
1992	540		88		12	[e]	14	[e]
1993	693		ND	[c]	ND	[c]	ND	[c]
1994	786		508		250		75	
1995	285	[f]	37	[e]	26	[e]	8	[e]
1996[f]	1,364	[f]	450	[f]	117	[f]	164	[f]
1997	2,270		2,245	[f]	900	[f]	466	[f]
1998	1,407		740	[f]	515	[f]	843	[f]
1999	934	[e]	82	[e]	486	[e]	69	[e]
2000	1,174		580		70		54	[e]
2001	556	[e]	0	[d]	75	[e]	24	[e]
2002	2,087		956		130		130	
2003	982		160	[e]	85	[e]	ND	[c]
2004	2,014		38	[e]	13	[e]	9	[e]
2005	1086		195		ND	[c]	ND	[c]
2006	1183		312	[d]	70		130	
2007	1182		640	[f]	110		160	
2008		[c]		[c]	41	[e]	36	[e]
1978-1987[g]	766		580		114		166	
1988-1997[g]	1,097		790		259		163	
1998-2007[g]	1,389		571		179		316	
Objective	1,200		500		250			

[a] Some data published in Brady et al. 1991, remainder is unpublished.

[b] Gulkana River index counts are those upstream and including the West Fork.

[c] No aerial survey conducted.

[d] Visibility poor due to high water.

[e] Survey flown outside of July 17–31.

[f] Counts determined by two surveyors. In years where more than one surveyor was used, counts from the most experienced surveyor are listed.

[g] Averages exclude years when surveys were flown outside July 17-31.

Table 13.–Estimates of inriver abundance for king and sockeye salmon in the Copper River, 1999-2008 (Numbers in bold designate final estimates used for management purposes).

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
King (ADF&G)	**32,090**	**38,047**	**39,778**	**32,873**	33,488	33,793	-	-	-	-
Standard Error	3,814	7,675	8,262	8,863	8,389	11,038	-	-	-	-
King (M-R)[b]	-	-	-	-	**44,764**	**40,564**	**30,333**	**67,789**	**46,349**	
Standard Error	-	-	-	-	12,385	4,650	1,529	4,779	3,391	
Sockeye (Sonar)[a]	**850,951**	**587,497**	**833,569**	**819,790**	**691,652**	**665,660**	**830,768**	**959,706**	**926,438**	**717,799**
Standard Error	-	-	-	-	-	-	-	-	-	-
Sockeye (M-R)[b]	-	-	-	-	-	-	-	-	1,259,000	-
Standard Error	-	-	-	-	-	-	-	-	90,648	-

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

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

Table 14.Mean date of passage by the capture site for sockeye salmon stocks in the Copper River, 2005-2007.

Spawning Stock	2005	2006	2007
	Mean Date of Passage [a]		
Upper Copper River	6/02	6/07	6/11
Gulkana River	7/04	7/07	7/02
Chitina River	6/30	7/13	6/19
Tazlina River	5/31	6/11	6/05
Tonsina River	7/13	7/17	7/22
Klutina River	6/13	6/20	6/16
Lower Copper River	7/06	6/28	6/24

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

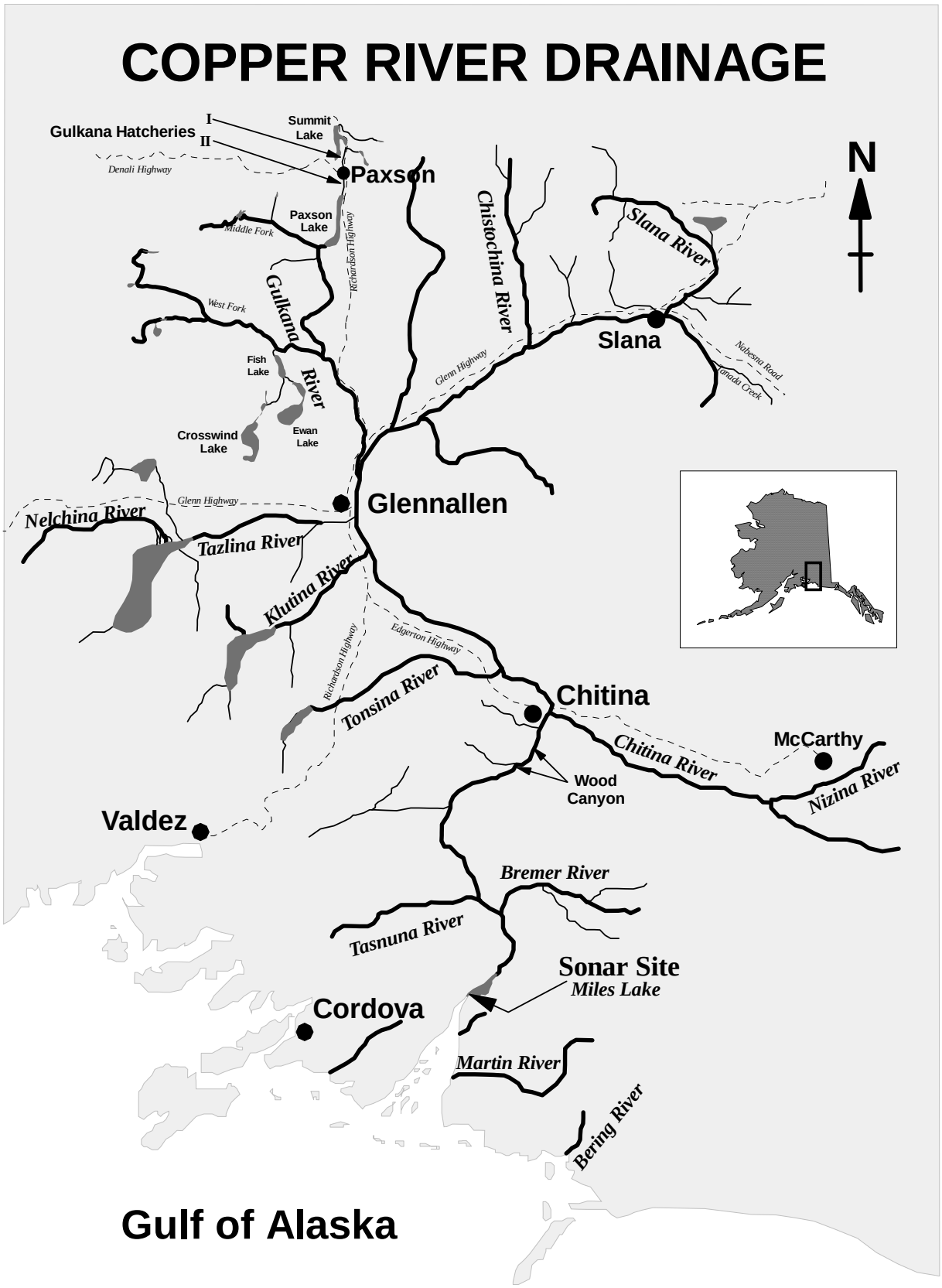


Figure 1.–The Copper River and Copper River Delta Area

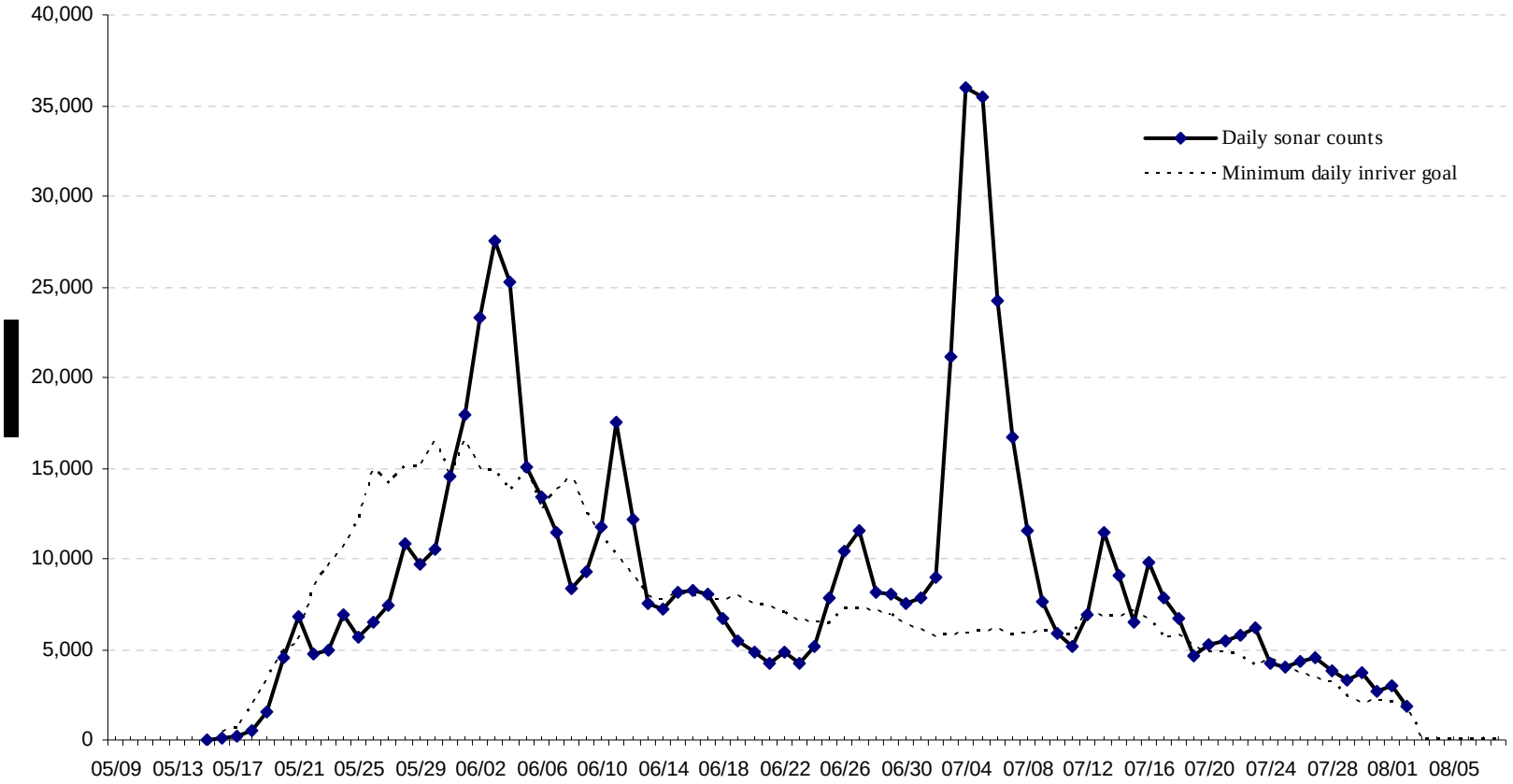
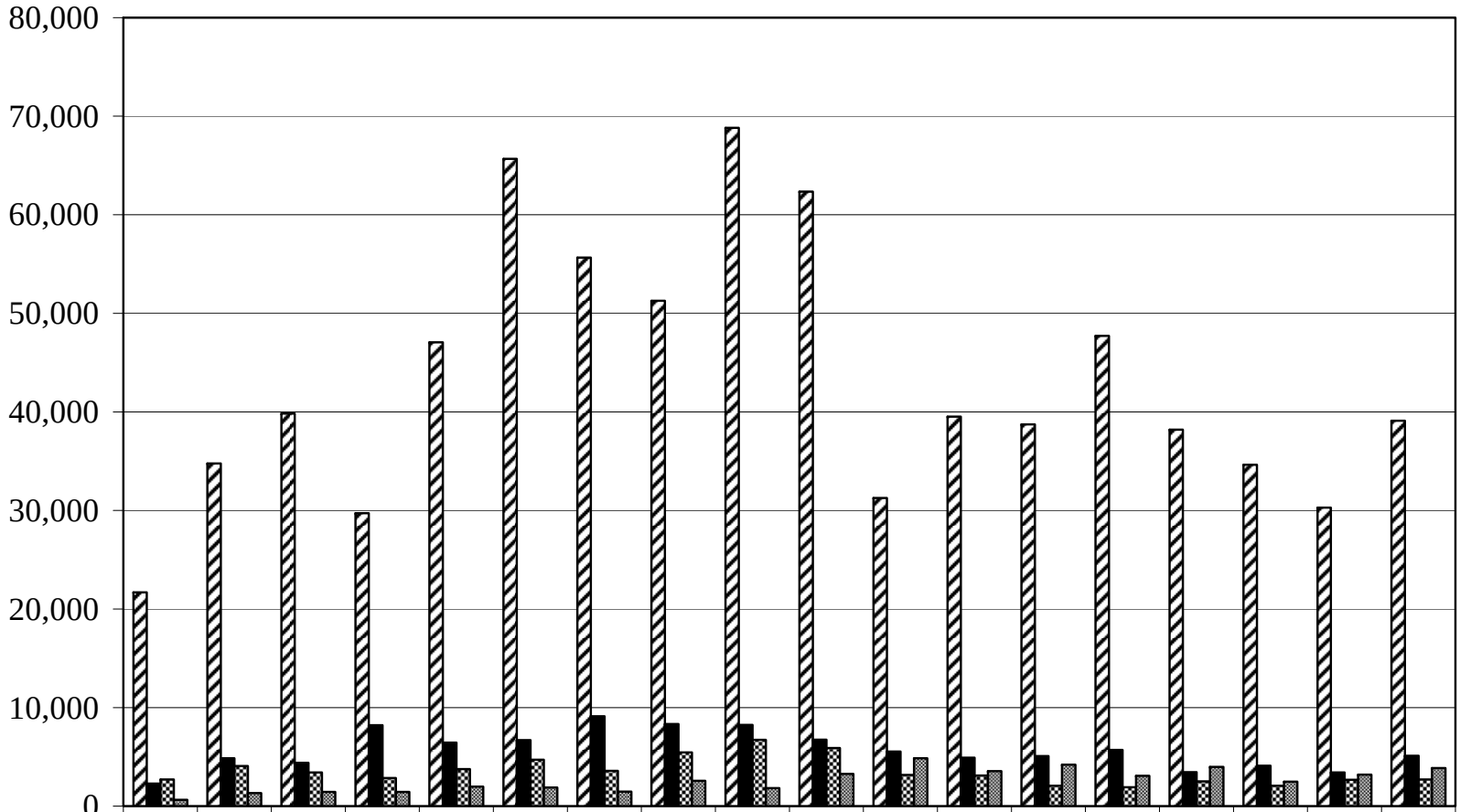
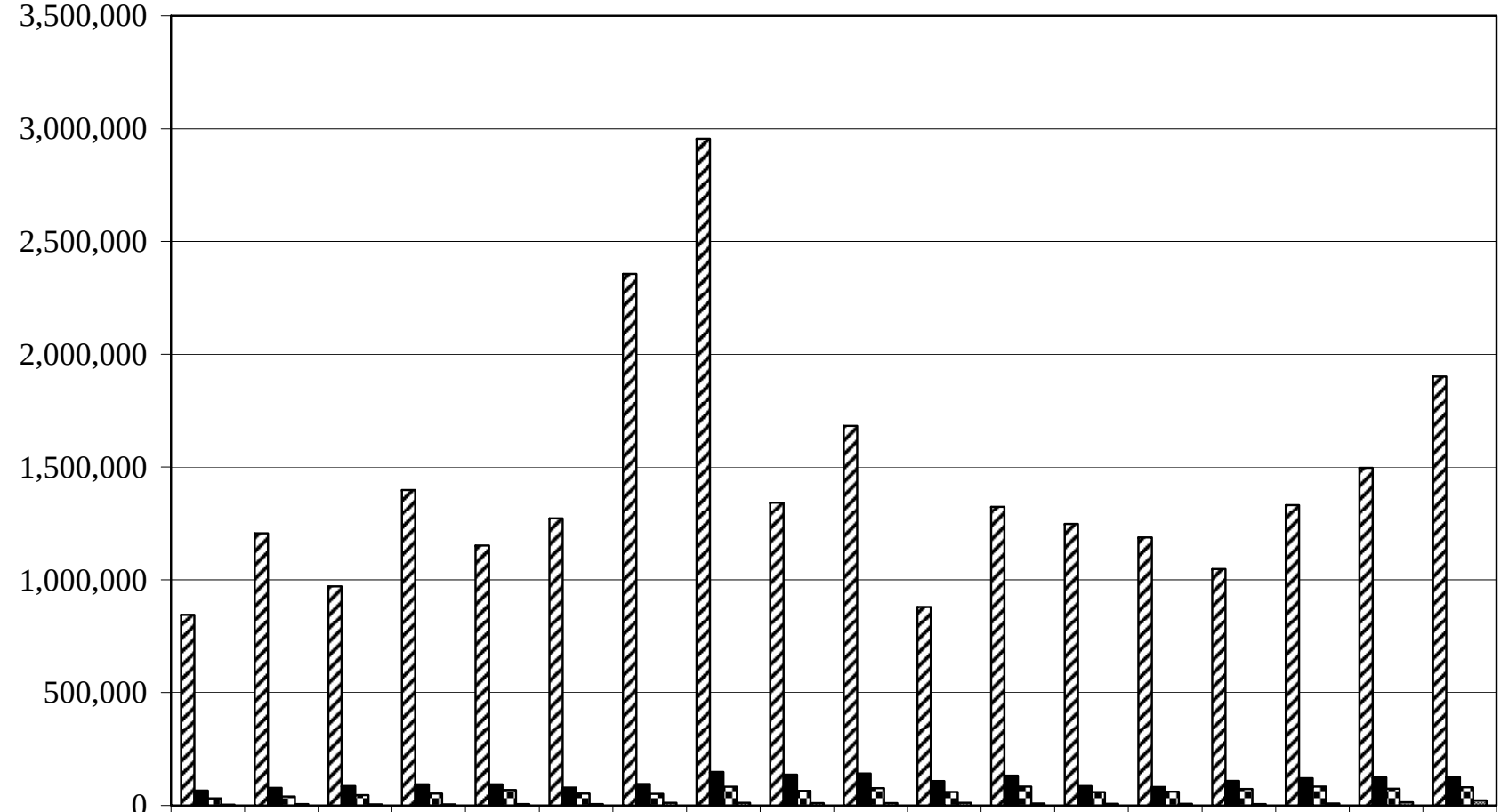


Figure 2.Anticipated components of the Copper River salmon escapement versus actual escapement past the Miles Lake sonar, 2008.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Commercial	21,702	34,787	39,819	29,716	47,061	65,675	55,646	51,273	68,827	62,337	31,259	39,524	38,734	47,721	38,191	34,624	30,278	39,095
Sport	2,302	4,846	4,404	8,217	6,431	6,709	9,116	8,346	8,245	6,742	5,531	4,904	5,098	5,717	3,435	4,093	3,425	5,123
Chitina Subdistrict	2,708	4,056	3,405	2,846	3,743	4,707	3,584	5,447	6,723	5,913	3,168	3,113	2,056	1,921	2,504	2,065	2,676	2,720
Glennallen Subdistrict	647	1,328	1,449	1,434	1,989	1,892	1,482	2,583	1,842	3,278	4,856	3,553	4,218	3,091	3,980	2,494	3,199	3,872

Figure 3.–King salmon harvest in the Copper River by fishery 1990-2007.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Commercial Fishery	844,778	1,206,811	970,938	1,398,234	1,152,220	1,271,819	2,356,365	2,955,431	1,341,692	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
Chitina Subdistrict	66,432	77,590	86,724	93,472	94,024	79,006	95,007	148,727	137,161	141,658	107,856	132,108	86,543	81,513	108,862	121,278	124,640	126,055
Glennallen Subdistrict	31,765	39,599	45,232	53,252	68,278	52,516	52,052	82,807	64,463	77,369	59,497	83,787	58,799	60,623	73,299	83,657	74,321	80,939
Sport Fishery	3,569	5,511	4,560	5,288	6,533	6,068	11,851	12,293	11,184	11,101	12,361	8,169	7,761	7,108	6,464	8,135	14,297	23,028

Figure 4.–Sockeye salmon harvest in the Copper River by fishery, 1990-2007.

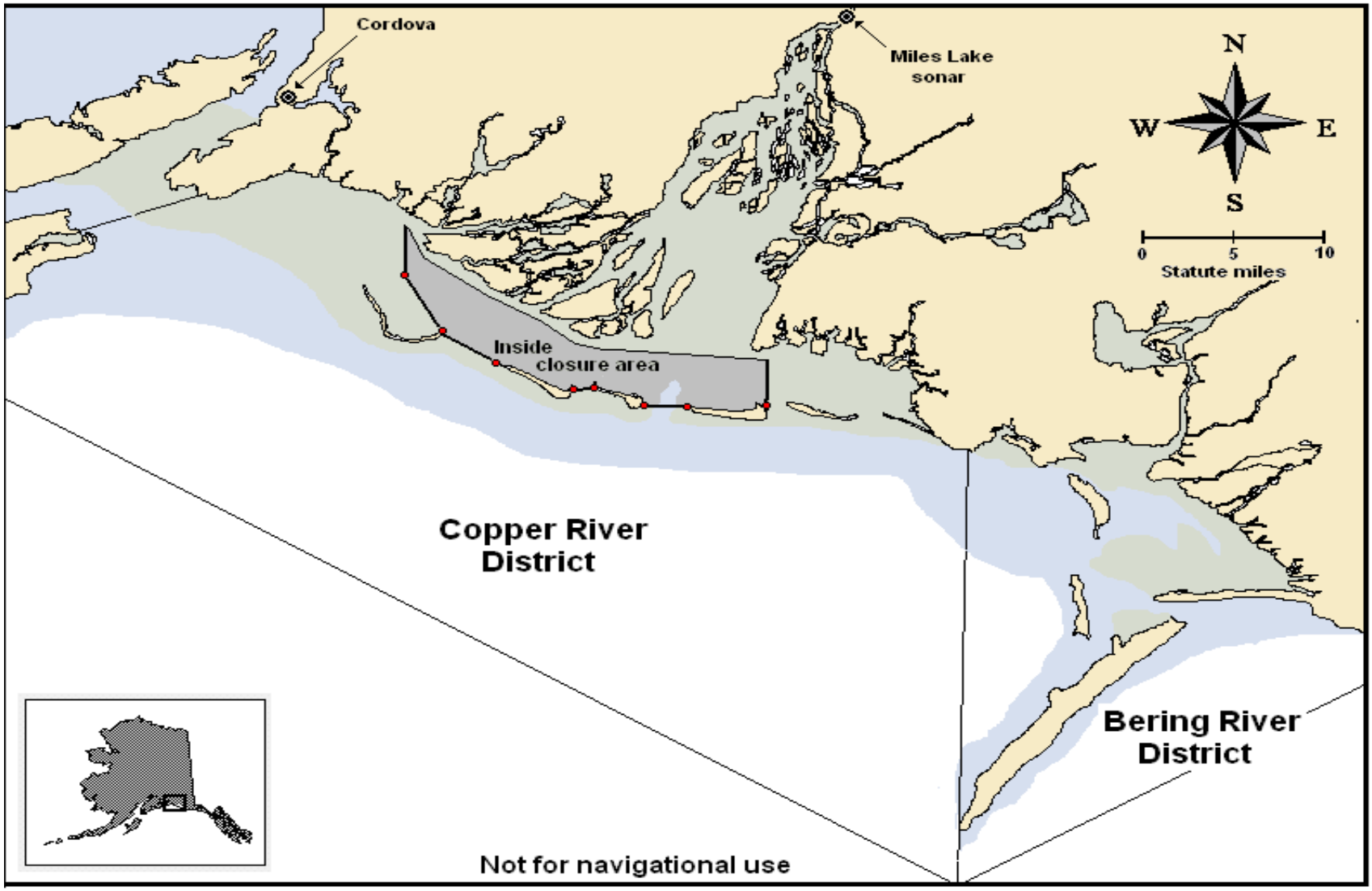


Figure 5.–Map of Copper River and Bering River districts showing inside closure area.

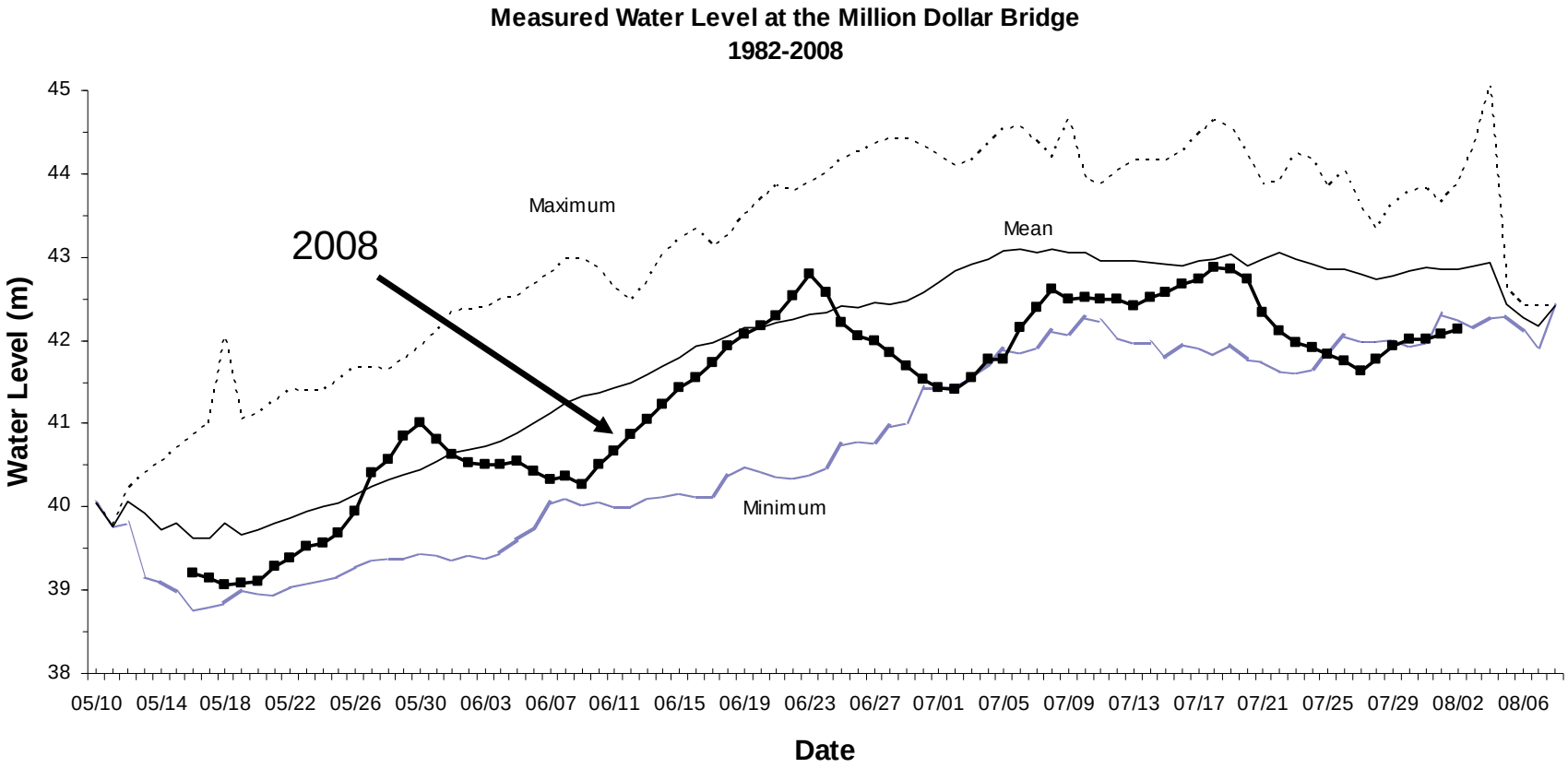


Figure 6.–Measured water level at the Million Dollar Bridge.

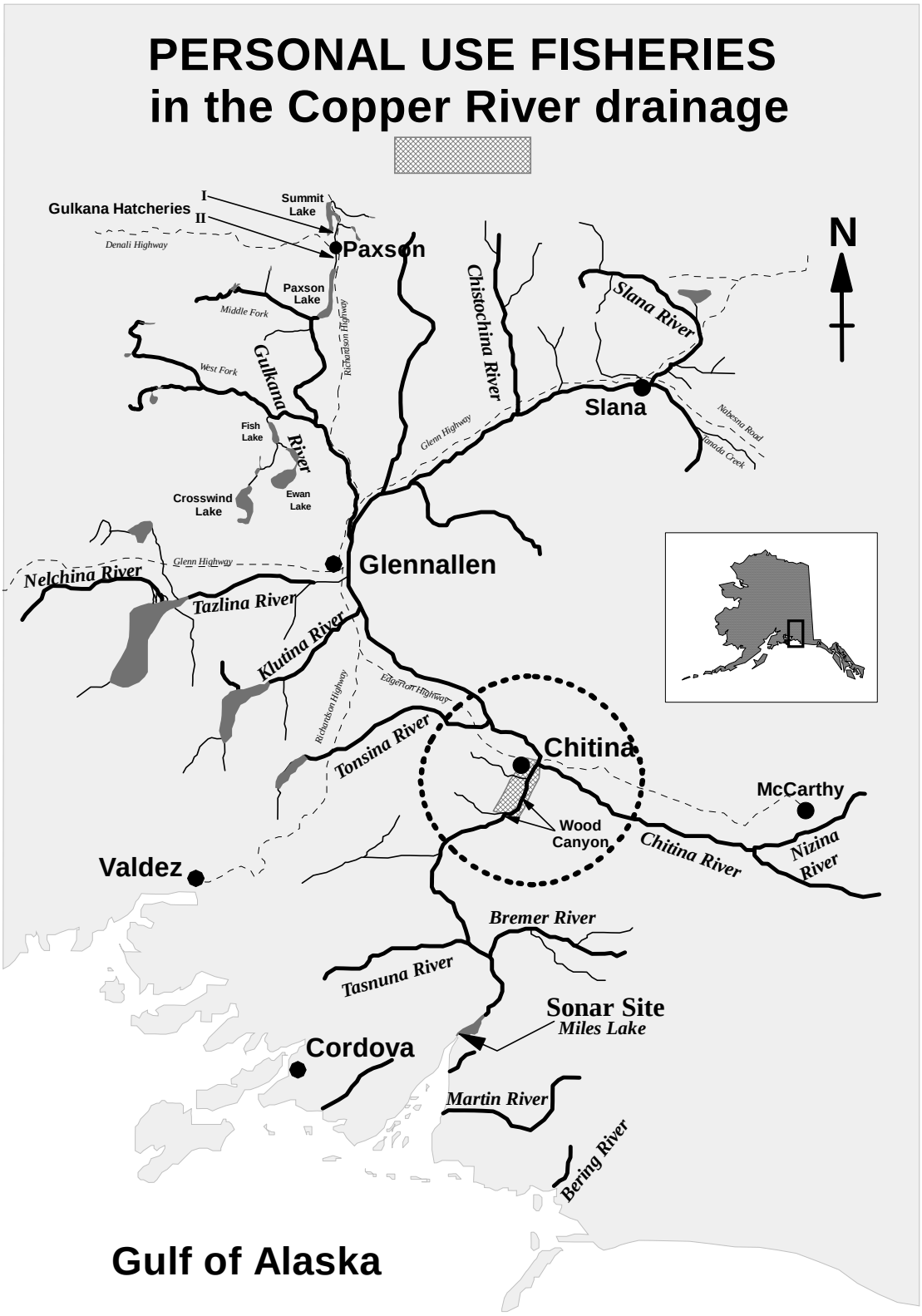
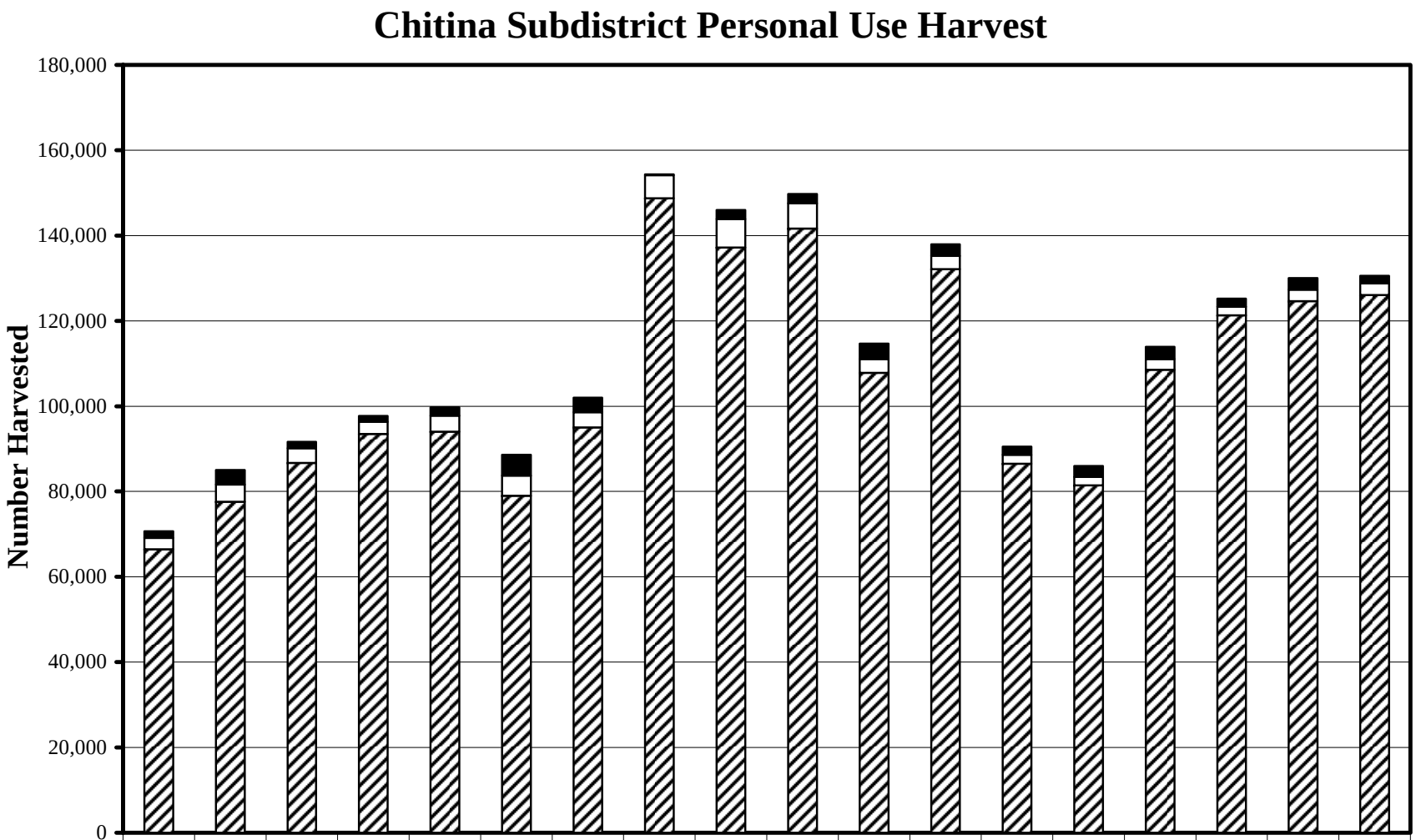
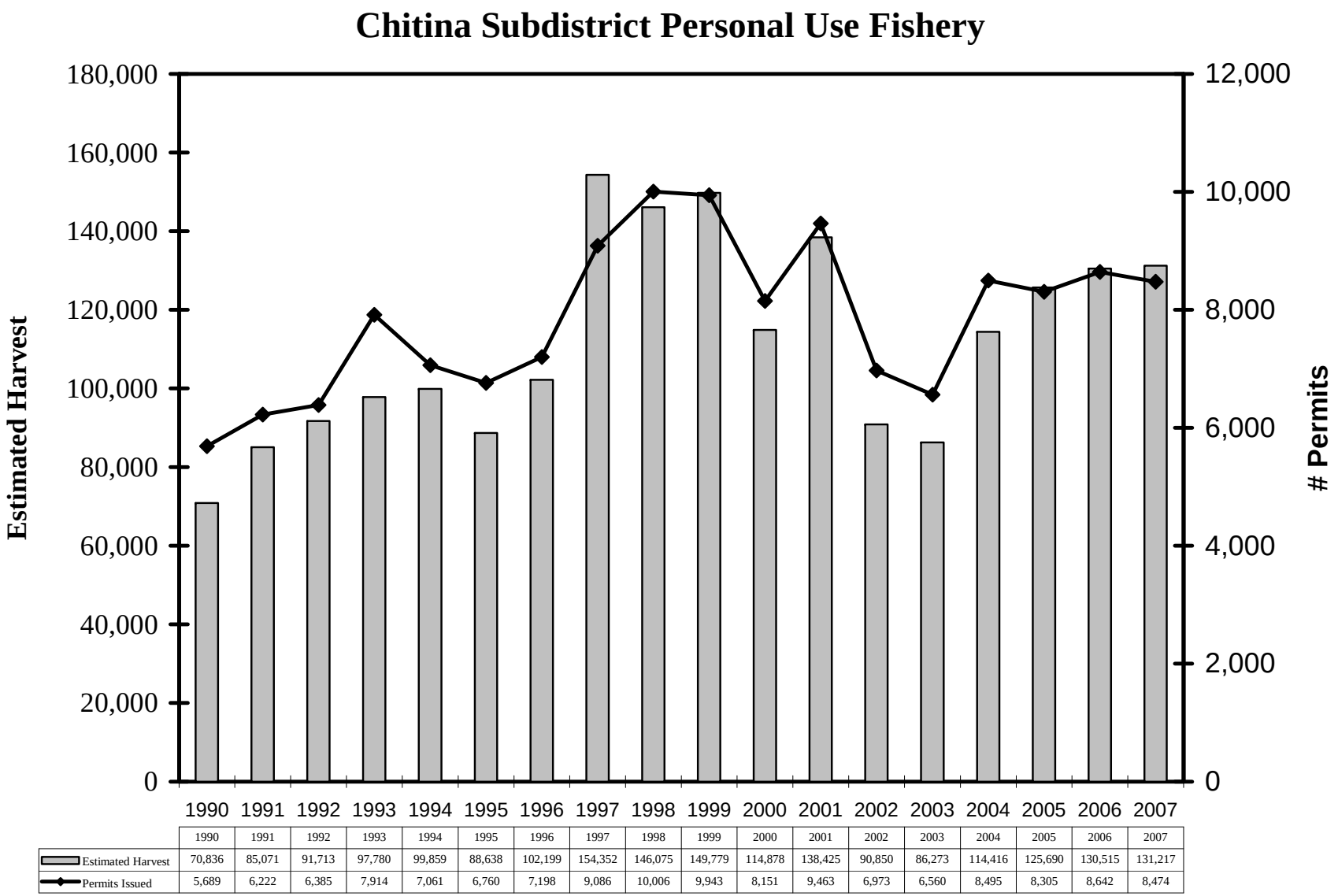


Figure 7.–Map of the personal use fisheries on the Copper River.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Coho	1,511	3,354	1,517	1,416	1,981	4,870	3,381	160	2,145	2,174	3,657	2,720	1,934	2,603	2,878	1,869	2,735	1,782
Chinook	2,708	4,056	3,405	2,846	3,743	4,707	3,584	5,447	6,723	5,913	3,168	3,113	2,056	1,921	2,502	2,065	2,676	2,720
Sockeye	66,432	77,590	86,724	93,472	94,024	79,006	95,007	148,727	137,161	141,658	107,856	132,108	86,543	81,485	108,527	121,278	124,640	126,055

Figure 8.–Chitina Subdistrict personal use salmon harvest by species, 1990-2007.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Estimated Harvest	70,836	85,071	91,713	97,780	99,859	88,638	102,199	154,352	146,075	149,779	114,878	138,425	90,850	86,273	114,416	125,690	130,515	131,217
Permits Issued	5,689	6,222	6,385	7,914	7,061	6,760	7,198	9,086	10,006	9,943	8,151	9,463	6,973	6,560	8,495	8,305	8,642	8,474

Figure 9.–Chitina Subdistrict personal use salmon harvest versus number permits issued, 1990-2007.

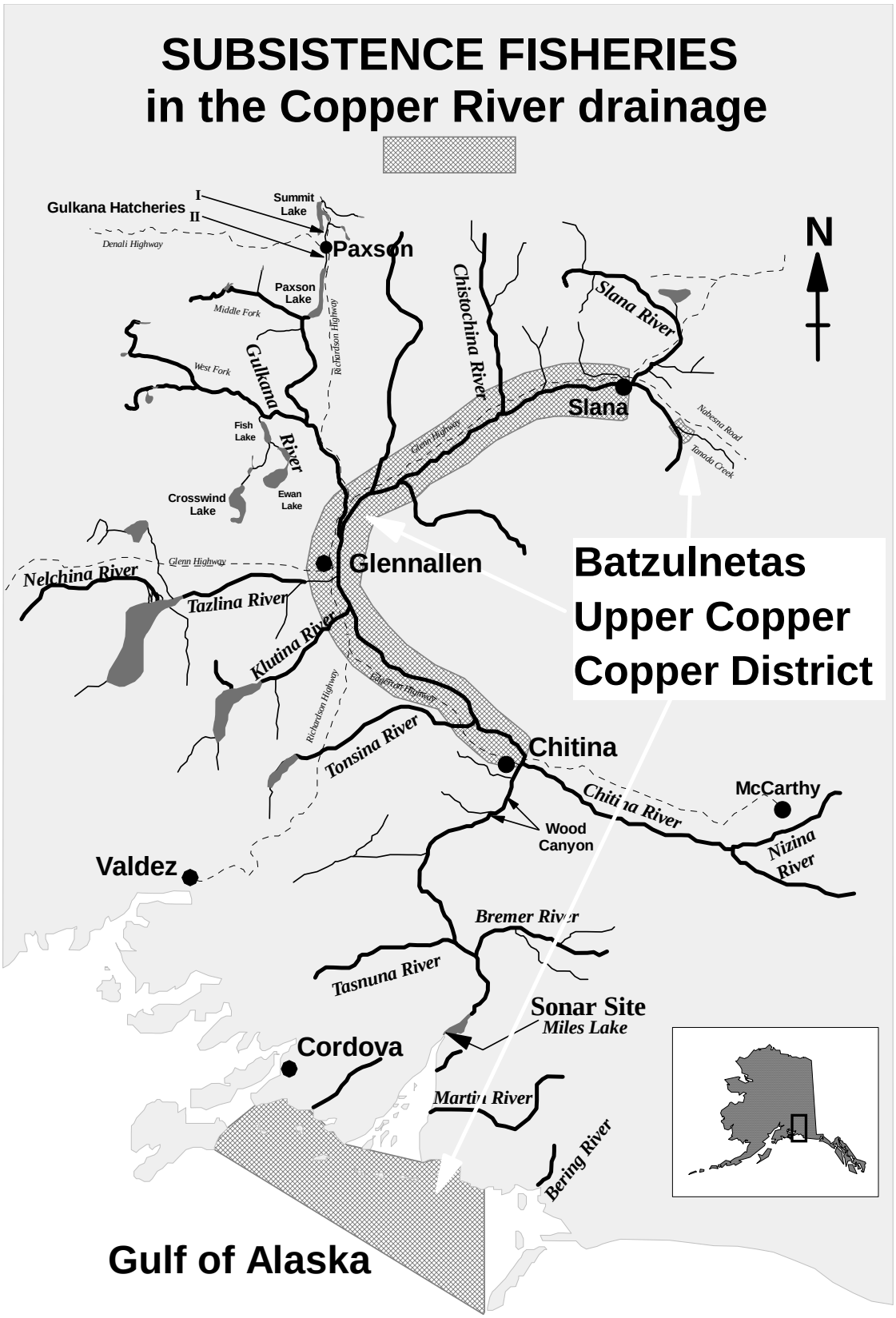
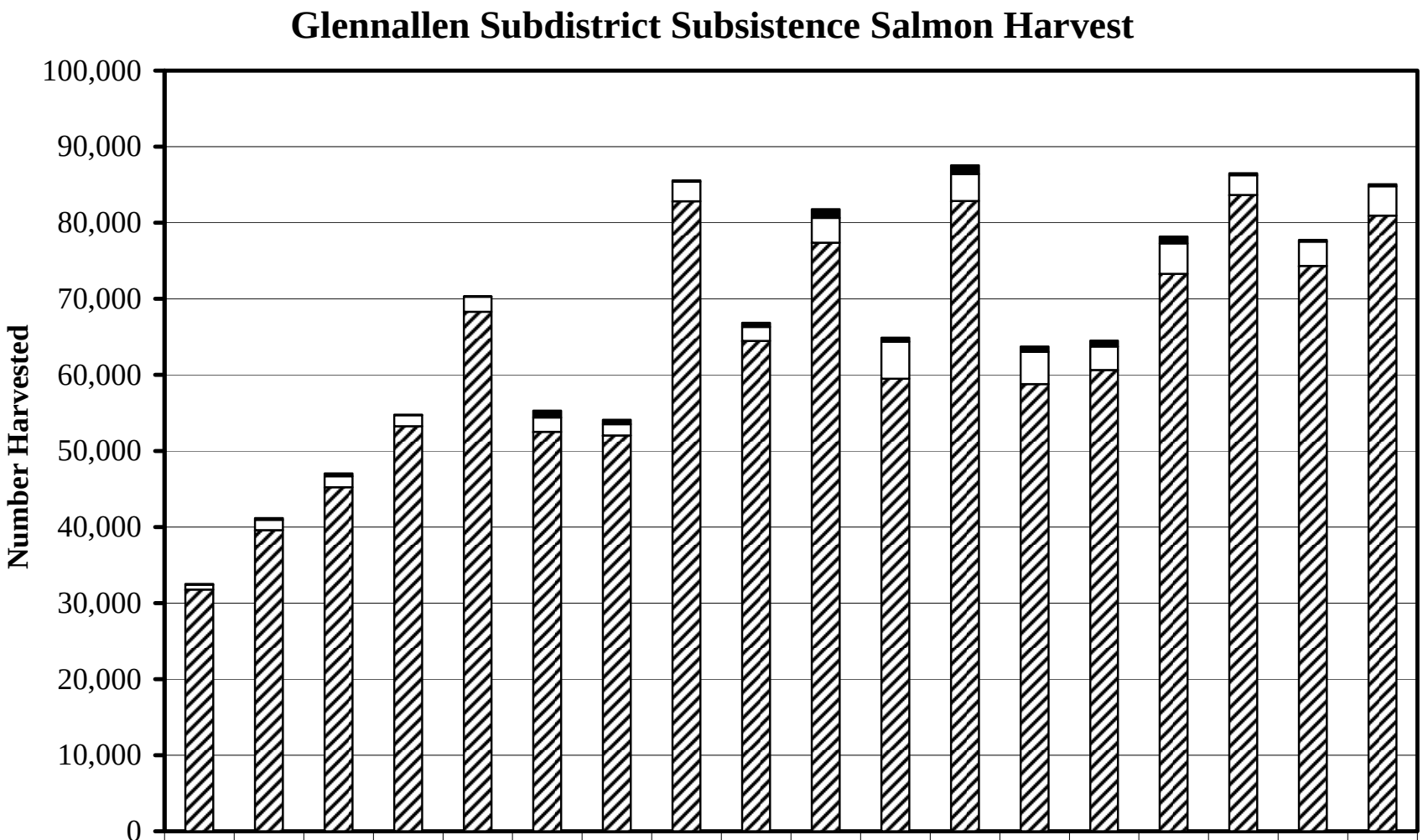
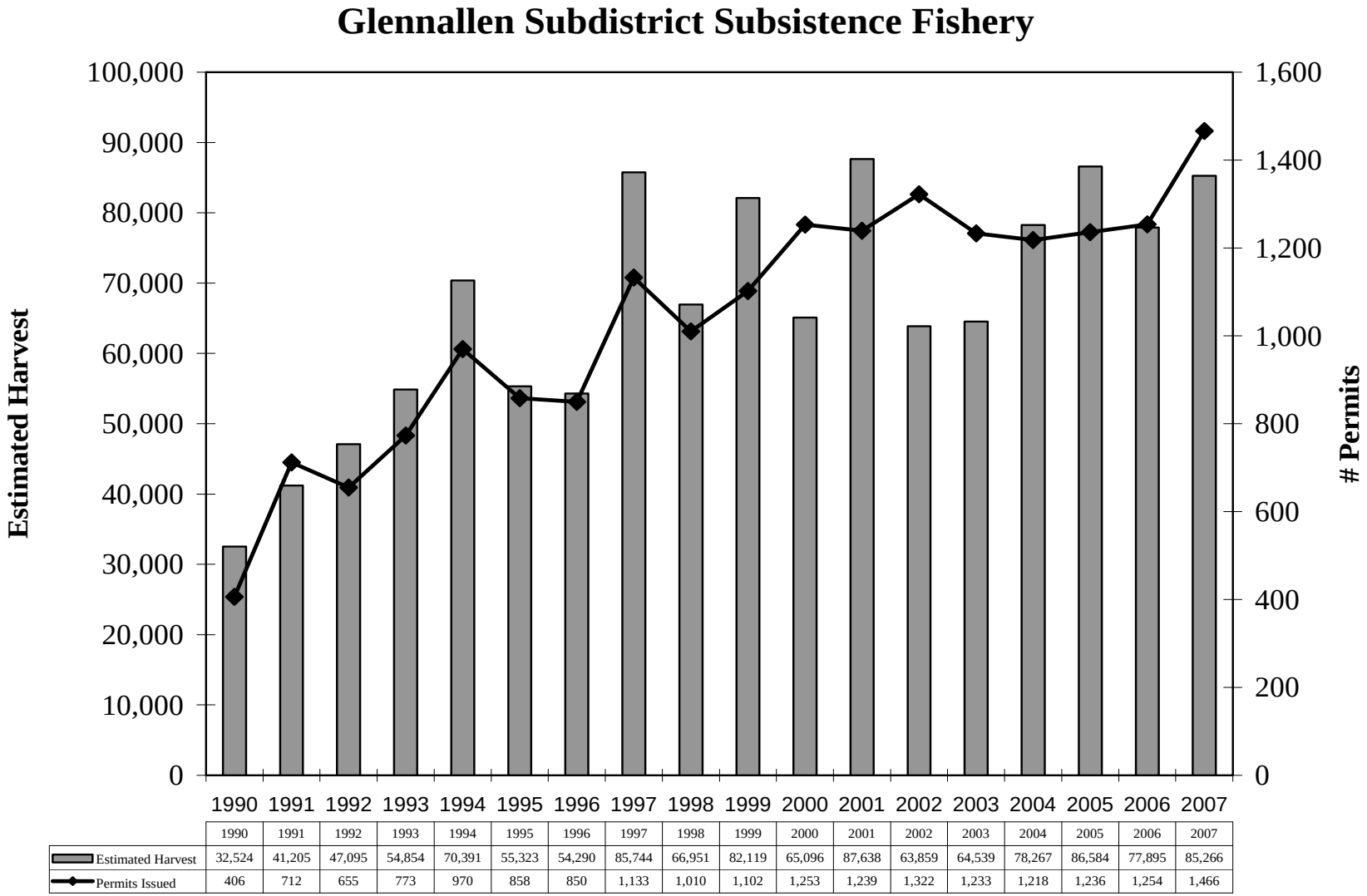


Figure 10.–Map of the subsistence fisheries on the Copper River.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Coho	92	232	350	77	60	882	557	187	533	1,121	532	1,144	692	771	881	294	240	272
Chinook	647	1,328	1,449	1,434	1,989	1,892	1,482	2,583	1,842	3,278	4,856	3,553	4,217	3,092	3,999	2,568	3,199	3,872
Sockeye	31,765	39,599	45,232	53,252	68,278	52,516	52,052	82,807	64,463	77,369	59,497	82,858	58,800	60,623	73,299	83,657	74,321	80,939

Figure 11.–Glennallen Subdistrict salmon harvest by species (state estimated and federal reported harvest), 1990-2007.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Estimated Harvest	32,524	41,205	47,095	54,854	70,391	55,323	54,290	85,744	66,951	82,119	65,096	87,638	63,859	64,539	78,267	86,584	77,895	85,266
Permits Issued	406	712	655	773	970	858	850	1,133	1,010	1,102	1,253	1,239	1,322	1,233	1,218	1,236	1,254	1,466

Figure 12.–Glennallen Subdistrict subsistence salmon harvest versus number permits issued, 1990-2007 (including state estimated and federal reported harvest and permits)

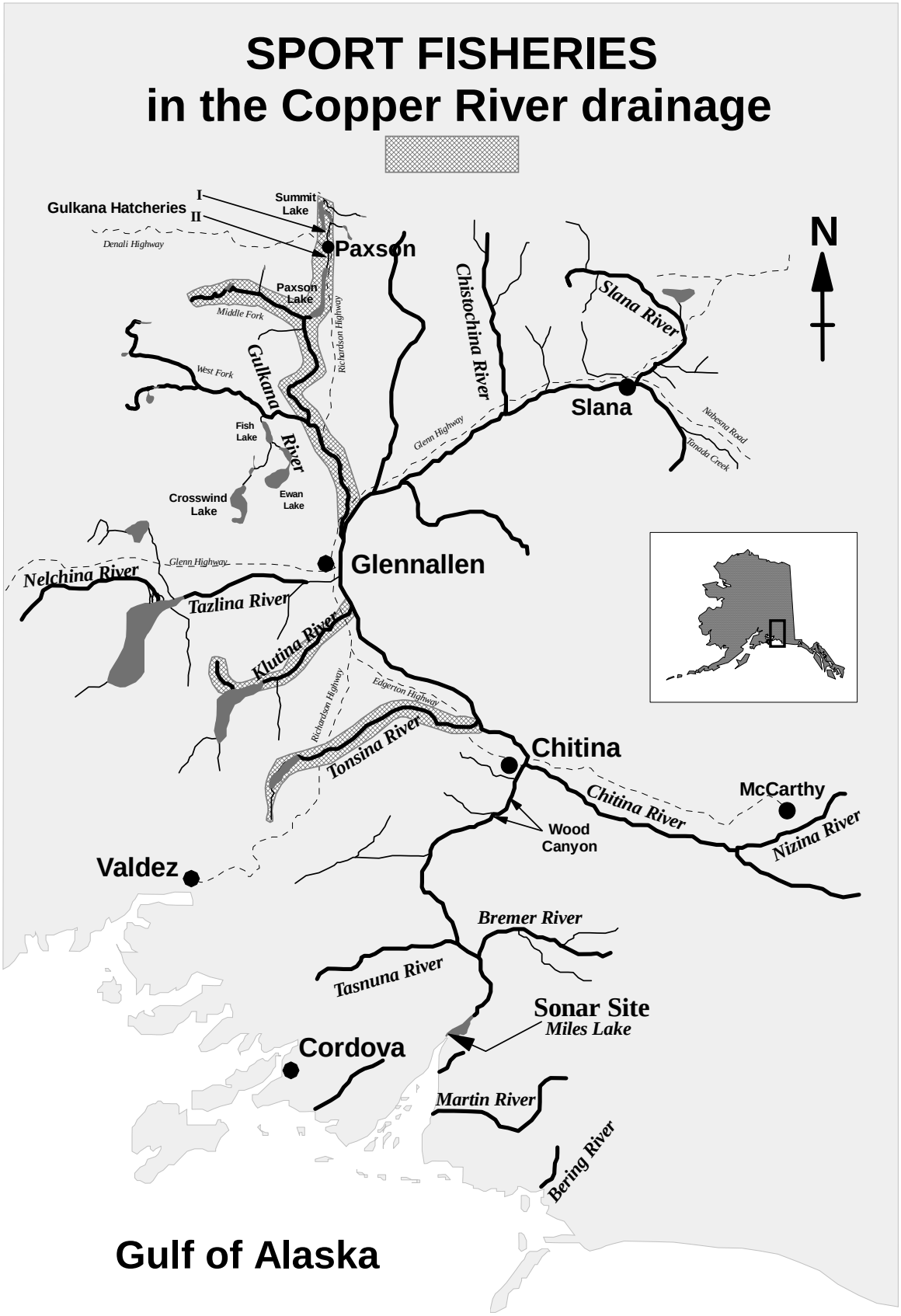


Figure 13.–Map of the sport fisheries on the Copper River

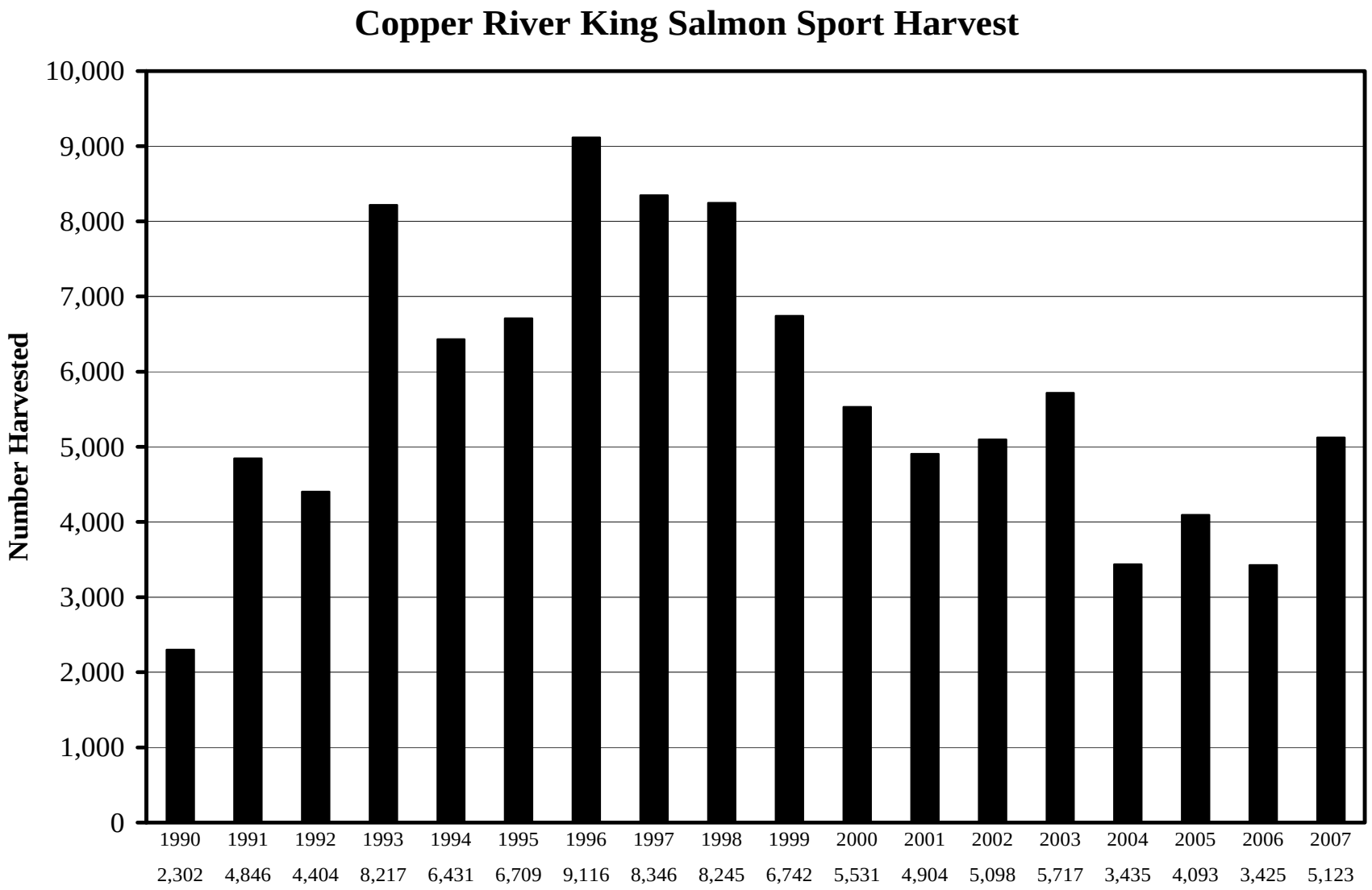


Figure 14.–Copper River king salmon sport harvest, 1990-2007.

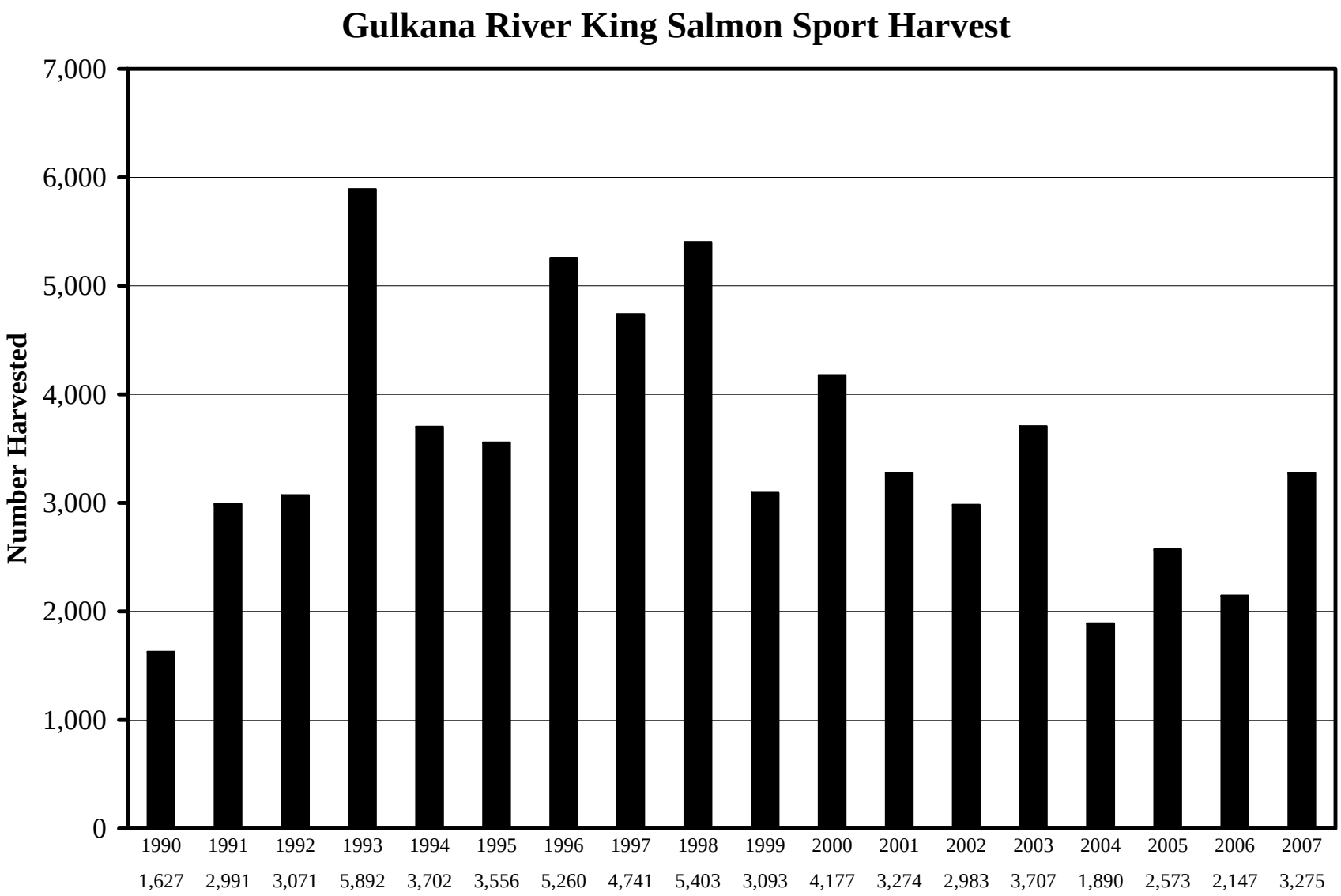


Figure 15.–Gulkana River king salmon sport harvest, 1990-2007.

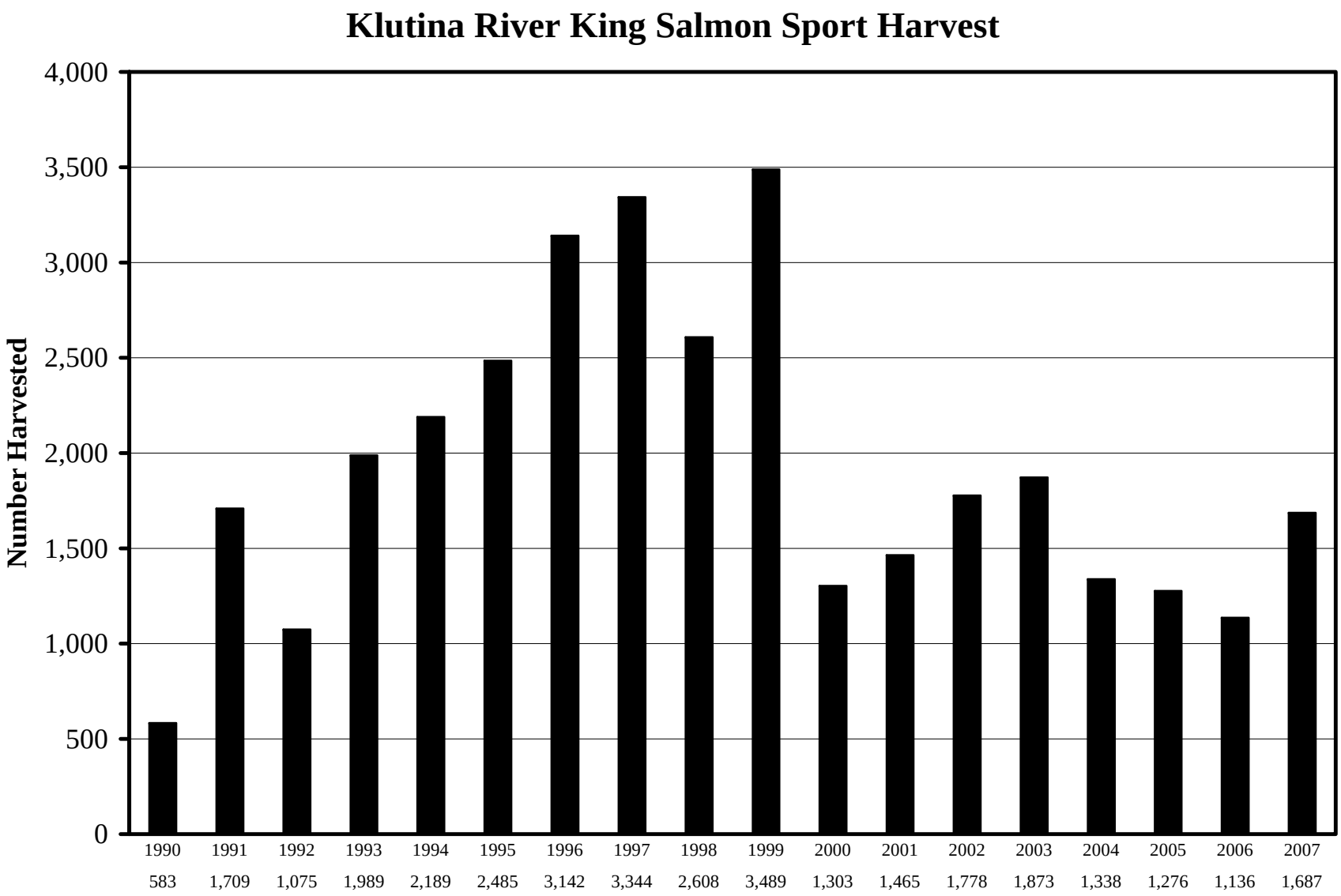


Figure 16.–Klutina River king salmon sport harvest, 1990-2007.

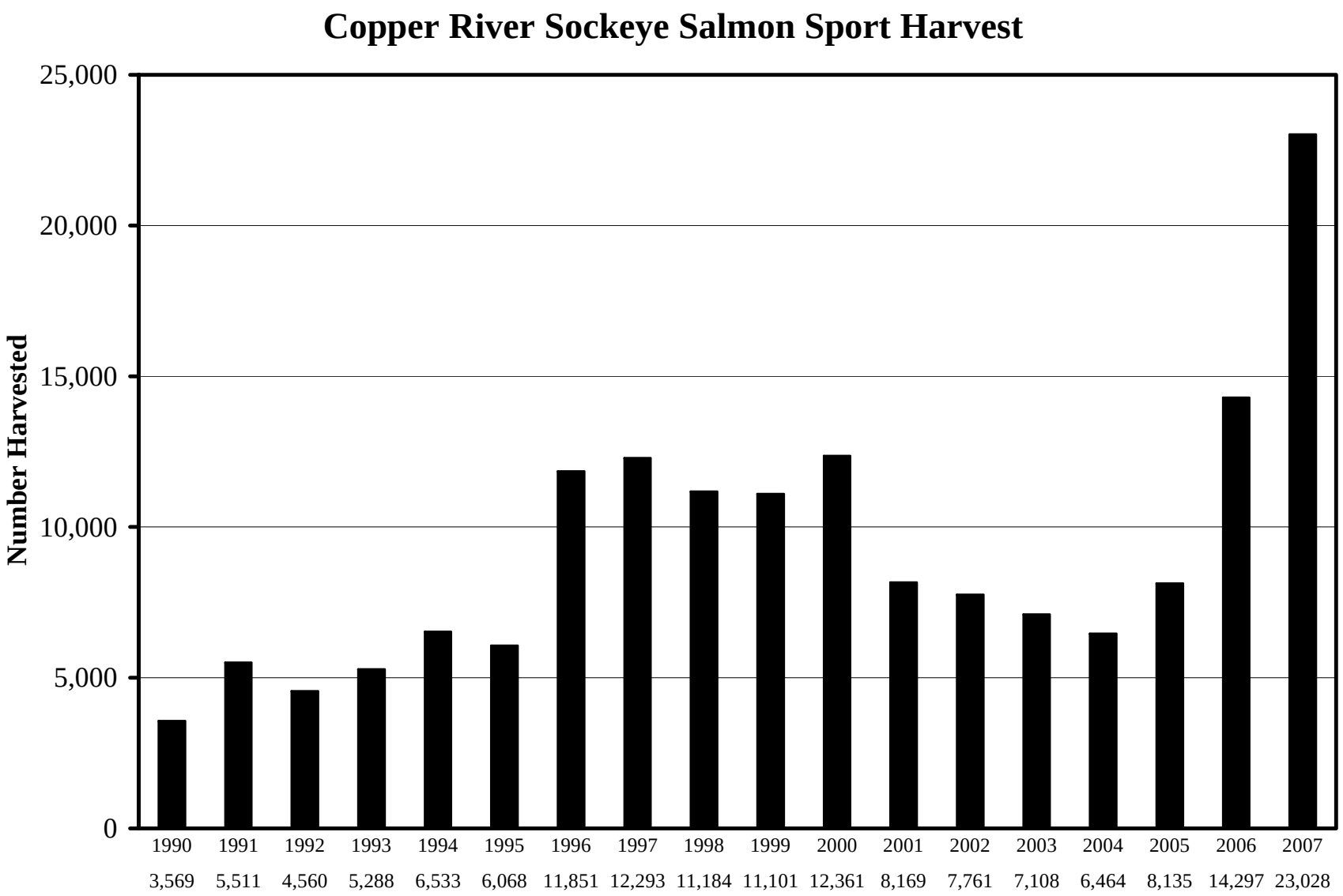


Figure 17.–Copper River sockeye salmon sport harvest, 1990-2007.

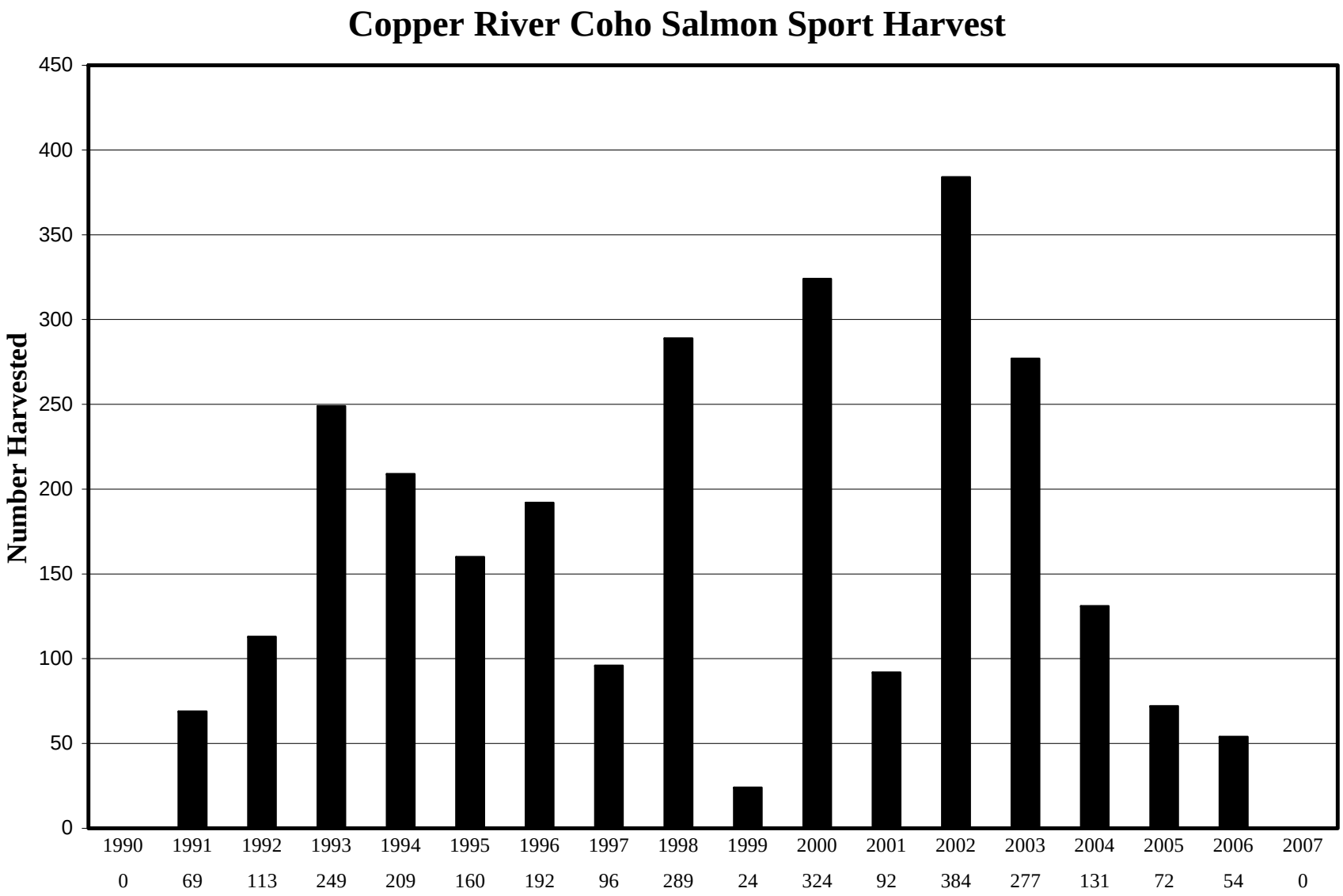


Figure 18.–Copper River coho salmon sport harvest, 1990-2007.

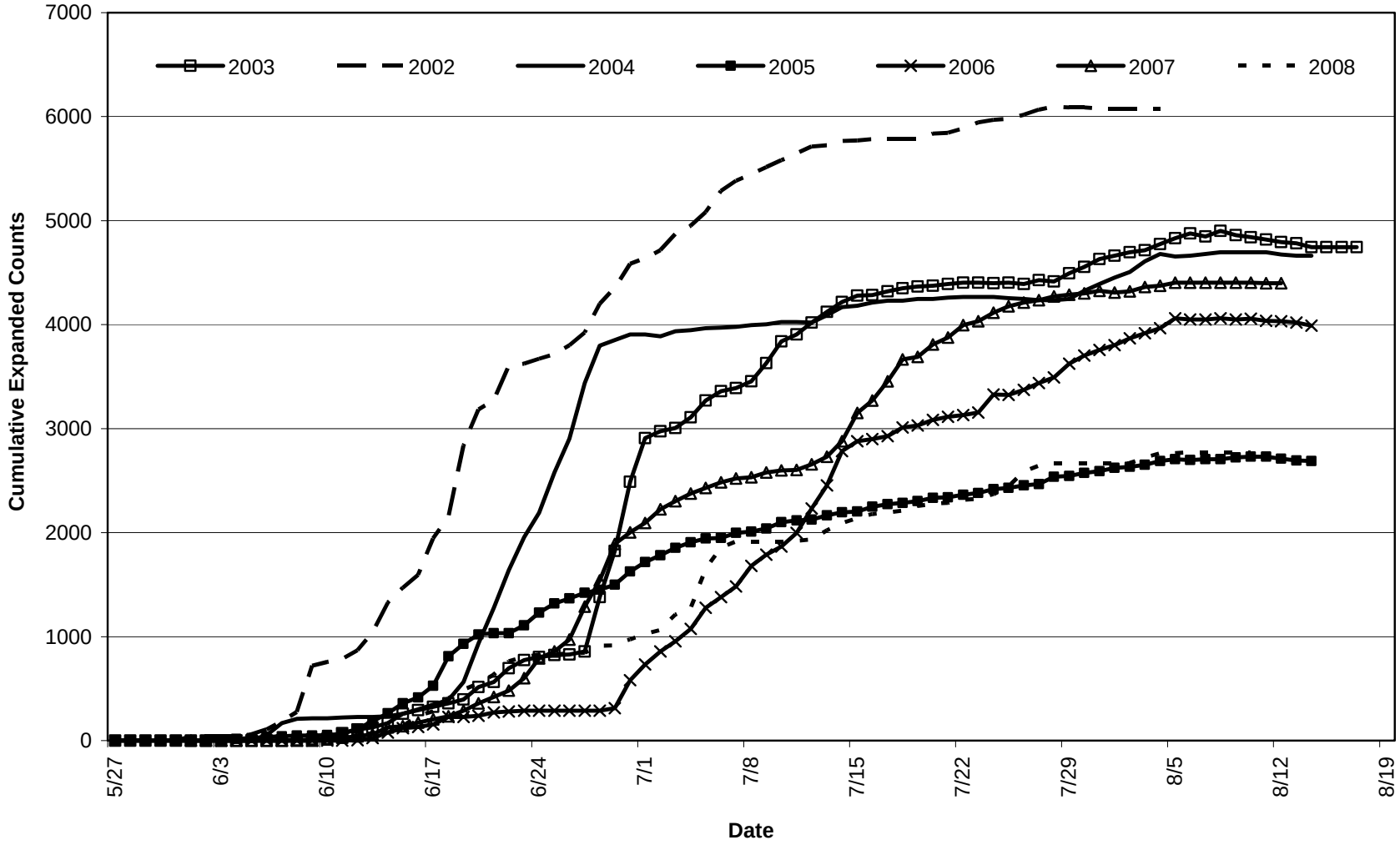


Figure 19.–Expanded cumulative escapement of king salmon past the Gulkana River counting tower, 2002-2008

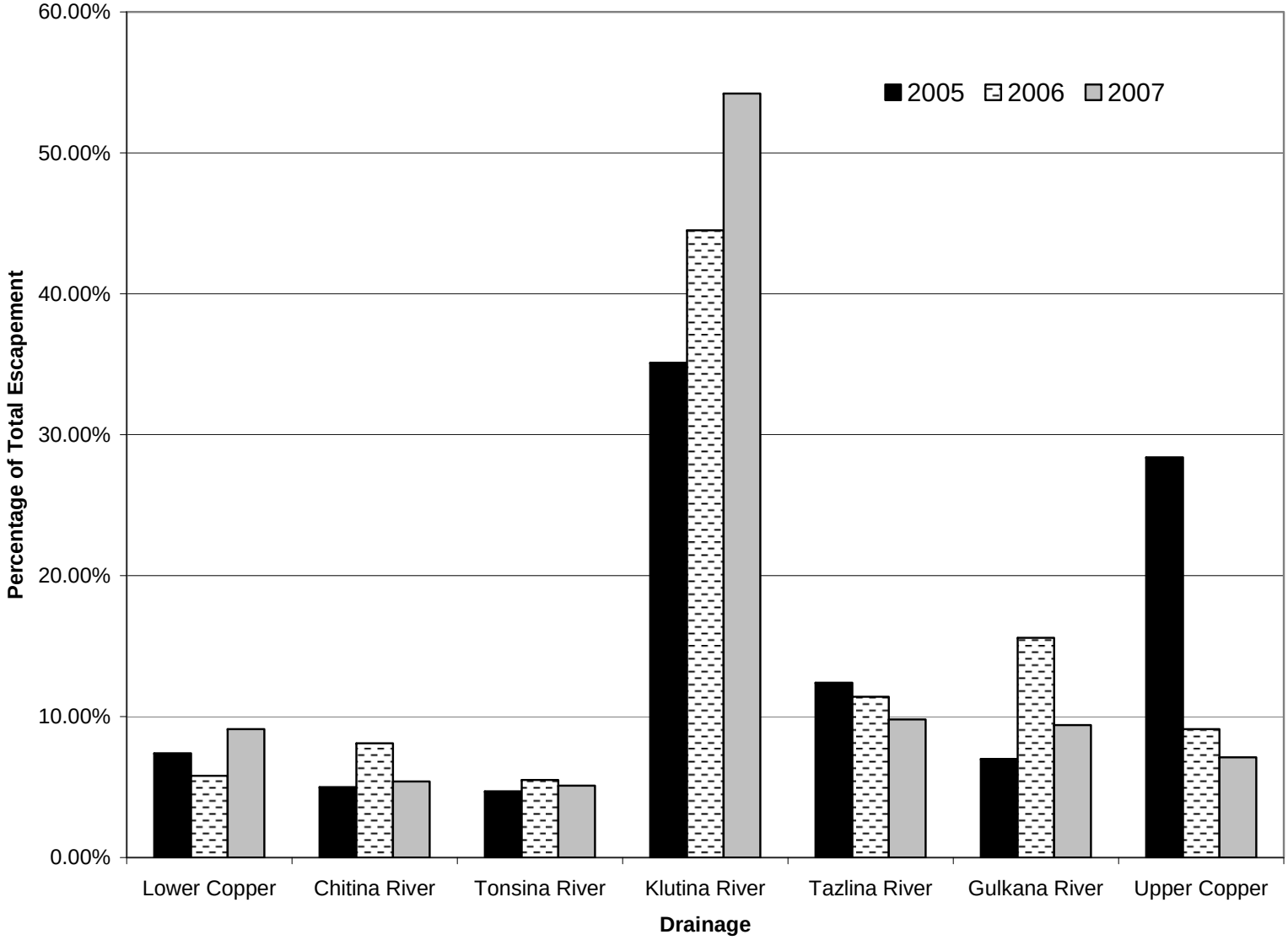


Figure 20.– Percentage of radio tagged sockeye located within portions of the Copper River drainage from 2005-2007.