

**Fishery Management Report No. 09-11**

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**Sport Fishery Management Plan for Chinook Salmon  
in the Chena and Salcha Rivers**

by

**Audra L. J. Brase**

March 2009

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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<b>Weights and measures (metric)</b>		<b>General</b>		<b>Measures (fisheries)</b>	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mid eye to fork	MEF
gram	g	all commonly accepted		mid eye to tail fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.		
meter	m	at	@	<b>Mathematics, statistics</b>	
milliliter	mL	compass directions:		<i>all standard mathematical</i>	
millimeter	mm	east	E	<i>signs, symbols and</i>	
		north	N	<i>abbreviations</i>	
		south	S	alternate hypothesis	H <sub>A</sub>
		west	W	base of natural logarithm	<i>e</i>
		copyright	©	catch per unit effort	CPUE
		corporate suffixes:		coefficient of variation	CV
		Company	Co.	common test statistics	(F, t, $\chi^2$ , etc.)
		Corporation	Corp.	confidence interval	CI
		Incorporated	Inc.	correlation coefficient	
		Limited	Ltd.	(multiple)	R
		District of Columbia	D.C.	correlation coefficient	
		et alii (and others)	et al.	(simple)	r
		et cetera (and so forth)	etc.	covariance	cov
		exempli gratia		degree (angular)	°
		(for example)	e.g.	degrees of freedom	df
		Federal Information		expected value	<i>E</i>
		Code	FIC	greater than	>
		id est (that is)	i.e.	greater than or equal to	≥
		latitude or longitude	lat. or long.	harvest per unit effort	HPUE
		monetary symbols		less than	<
		(U.S.)	\$, ¢	less than or equal to	≤
		months (tables and		logarithm (natural)	ln
		figures): first three		logarithm (base 10)	log
		letters	Jan, ..., Dec	logarithm (specify base)	log <sub>2</sub> , etc.
		registered trademark	®	minute (angular)	'
		trademark	™	not significant	NS
		United States		null hypothesis	H <sub>0</sub>
		(adjective)	U.S.	percent	%
		United States of		probability	P
		America (noun)	USA	probability of a type I error	
		U.S.C.	United States	(rejection of the null	
			Code	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

### Weights and measures (English)

cubic feet per second	ft <sup>3</sup> /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	pH
(negative log of)	
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

***FISHERY MANAGEMENT REPORT NO. 09-11***

**SPORT FISHERY MANAGEMENT PLAN FOR CHINOOK SALMON  
IN THE CHENA AND SALCHA RIVERS**

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March 2009

Development and publication of this manuscript were partially financed by the Federal Aid in Sport Fish Restoration Act (16 U.S.C.777-777K) under Project F-10-23, Job No. R-3-6

The Fishery Management Reports series was established in 1989 by the Division of Sport Fish for the publication of an overview of management activities and goals in a specific geographic area, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: <http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm>. This publication has undergone regional peer review.

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*This document should be cited as:*

*Brase, A. L. J. 2009. Sport Fishery Management Plan for Chinook salmon in the Chena and Salcha Rivers. Alaska Department of Fish and Game, Fishery Management Report No. 09-11, Anchorage.*

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## ABSTRACT

The Chena and Salcha rivers in the Yukon River drainage support large spawning populations and popular sport fisheries for Chinook salmon *Oncorhynchus tshawytscha*. Total Chinook salmon escapements to these rivers are monitored annually via counting towers located on each river. These towers are operated upstream from the sport fisheries from late June through early to mid-August and provide daily estimates of escapement. Biological Escapement Goals (BEG) of 2,800–5,700 Chinook salmon for the Chena River, and 3,300–6,500 Chinook salmon for the Salcha River were established in 2001 and serve as the management targets. This report describes a management plan for these two fisheries with the objective of managing sport harvest to achieve the BEG for each river. The plan provides a prescription for fishery management actions based on projections of final escapement from counting tower data on or after Day 20 of the run relative to the BEG range for each river. The first day salmon are seen at the counting tower is considered Day 1 of the run and the run typically lasts around 40 days with the midpoint on Day 20. Historical run time data suggest that by Day 20 projections accurately predict escapements relative to meeting or not meeting the BEG and allow a sufficient number of days in the run to provide additional harvest opportunity or conservation potential. Potential management actions include closing the fishery if it is likely that the lower end of the BEG range will not be met; restricting the fishery to catch-and-release fishing only if there is a small chance of not achieving the lower end of the BEG range; maintaining the status quo regulations if projections indicate escapements will fall within the BEG range; liberalizing the regulations to allow a daily bag limit of two large Chinook salmon if it is likely escapement will exceed the upper end of the BEG range; and, liberalizing the regulations to allow a daily bag limit of three large Chinook salmon if it is likely escapement will greatly exceed the upper end of the BEG range.

Key words: biological escapement goal, Chena River, Chinook salmon, fishery management plan, king salmon, Salcha River, sport fishery, run timing.

## BACKGROUND AND HISTORICAL PERSPECTIVE

### CHENA RIVER

The Chena River, a tributary of the Tanana River, is a relatively slow moving, run-off, tannic-stained river that flows through the city of Fairbanks (Figure 1). It is approximately 160 miles long and supports one of the largest Chinook salmon *Oncorhynchus tshawytscha* populations in the Alaskan portion of the Yukon River drainage, with average annual returns of over 4,800 fish from 2004 to 2008 (Table 1). Adult Chinook salmon enter the Yukon River during or shortly after breakup, and migrate into the Tanana River to arrive in the Lower Chena River (920 miles from the Bering Sea) between late June and the second week of July. They move up the Chena River to spawning areas which are primarily upriver from the sport fishery. The run ends in late July or early August. Chum salmon *O. keta* also spawn in the Chena River and are caught incidentally by anglers targeting Chinook salmon.

There has been a Chinook salmon sport fishery at the Chena River since before statehood and it remained relatively small throughout the 1980s. Estimated harvests between 1983 and 1992 ranged from 0 to 375 fish, then increased dramatically in the mid-1990s (Table 2). The 5-year average catch (2002–2006) was 2,243 fish and average harvest was 448 fish. The Chena River Chinook salmon sport fishery continues to be relatively small, especially when compared with fisheries in Southcentral and Southeast Alaska; however, it remains very popular as it is one of the few opportunities to catch large fish near Fairbanks. Most sport anglers release their catch (80% released; 2002–2006 average) as the salmon flesh is quite deteriorated by the time the fish have traveled the 1000+ miles from the Bering Sea (Table 2).

The daily bag and possession limits for Chinook salmon in the Tanana River drainage have changed minimally since the 1960s, varying from a daily bag and possession limit of 2 to 1 fish, and either no length restrictions to only 1 fish greater than 16 or 20 inches long (Appendix A). The current

regulation for Chinook salmon in the Tanana River drainage is a daily bag and possession limit of one fish 20 inches or more in total length. This regulation has been in effect since 2001.

The Chena River salmon fishery is closed upriver of a marker located 300 feet downriver of the Moose Creek dam (river mile 45 near the city of North Pole ), this includes catch and release fishing. All Chinook salmon spawning is thought to occur upriver of the dam. In the summer of 1967 the Chena River caused severe flooding in downtown Fairbanks. The flood was the impetus to begin construction in 1973 on the dam to divert any future high water events away from populated areas. The dam was completed in 1979 and is operated and maintained by the US Army Corps of Engineers. There has been some concern raised about the effect the dam may have on Chena River salmon passage. Unlike a “typical” dam, the Moose Creek dam is designed to allow water to pass freely through three floodgates at normal river stages. Fish passage is unimpeded until the river rises, creating flood danger to property downstream. When flow exceeds 8,000 cubic feet per second (cfs), the floodgates are partially closed to maintain that flow rate downstream from the dam. Water is diverted along the floodway to the Tanana River. The floodgates have seldom been lowered while adult Chinook salmon were passing through the structure, and then only for short periods of time. A fishway built into the side of the structure is designed to allow fish passage if a large volume of water is backed up behind the dam. Because the water rarely gets high enough to flow down the fishway, its potential to pass migrating salmon is essentially untested.

## **SALCHA RIVER**

The Salcha River is located approximately 40 miles east of Fairbanks via the Richardson Highway. A tributary of the Tanana River, it is a relatively clear rapid-runoff system, approximately 120 miles long originating in the Tanana Hills to the north (Figure 2). Numerous recreational cabins are located along the lower 70 miles of the river.

The Salcha River supports the largest Chinook salmon run in the Tanana River drainage, with average annual returns of over 8,600 fish from 2004–2008 (Table 1). Adult Chinook salmon enter the Yukon River during or shortly after breakup, and migrate into the Tanana River to appear at the mouth of the Salcha River (965 miles from the Bering Sea) between late June and the second week of July. They move up the Salcha River to spawning areas. The run ends in late July or early August. Chum salmon are caught incidental to the Chinook salmon in the Salcha River.

Similar to the Chena River, there has been a Chinook salmon sport fishery at the Salcha River since before statehood. The salmon fishery is accessible from the Richardson Highway where it crosses the river and a state campground located upstream of the Richardson Highway Bridge. Boaters launch at the campground and travel downstream to fish at the confluence of the Tanana and Salcha rivers.

Until 1989 the Salcha River Chinook salmon fishery had a higher profile and higher Chinook salmon harvests than were seen on the Chena River. Estimated harvests between 1983 and 1992 ranged from 47 to 871 fish (Table 2). Catch and harvest did not increase as dramatically in the Salcha as in the Chena, but harvests have exceeded 1,000 fish in 3 of the past 15 years. The 5-year average catch (2002–2006) was 1,550 fish and average harvest was 509 fish.

The salmon fishery (all species) on the Salcha River is closed above a marker located about 2 1/2 miles upriver from the Richardson Highway Bridge (about 5 miles upstream from the confluence of the Salcha and Tanana rivers). Most of the spawning occurs upstream of this area.

## FISHERY MANAGEMENT AND PERFORMANCE

### CHENA RIVER

Chena River Chinook and chum salmon escapements have been annually assessed since 1986 by mark-recapture experiments and/or a counting tower located at the Moose Creek dam. Counting conditions at the dam can be highly variable depending on river height and water turbidity. For example, in 2005 the Chena River was extremely high and turbid for most of the Chinook salmon run therefore escapement could not be estimated (Brase and Doxey 2006). In contrast, 2004 and 2006 had good counting conditions throughout the majority of the run and a good estimate of escapement was produced (Brase and Doxey 2006, Brase *in prep*).

From 1990 to 2000 the Chena River Chinook salmon sport fishery was managed using a guideline harvest allocation for the sport fishery. The guideline sport harvest objective set by the BOF was 300–600 Chinook salmon. In addition, an aerial survey escapement goal of 1,700 fish was established by ADF&G in 1992. In-season management for the guideline harvest objectives was next to impossible because there was no mechanism for day-to-day enumeration of the harvest. Similarly, aerial escapement surveys were conducted post season. In 1993 Sport Fish Division staff translated the aerial survey escapement goal into a comparable actual escapement abundance of 6,300 fish, and this value was used as an inseason management target in association with the counting tower project that began in 1992.

In 2000, an escapement goal committee was formed to evaluate and calculate escapement goals for Chena and Salcha River Chinook salmon and other Yukon River drainage salmon stocks. The escapement goal committee process was designed to set escapement ranges which maximize potential yield. The committee recommended a biological escapement goal (BEG) range of 2,800–5,700 Chinook salmon for the Chena River based on an analysis of run reconstruction data related to brood year returns.

In 2001 the BOF amended the *Chena and Salcha River King Salmon Sport Harvest Management Plan* (5 AAC 70.060, 2002) to manage harvest so that escapements fall within the BEG ranges set by ADF&G. The BEGs are evaluated and modified as needed on a 3-year cycle in synchrony with the 3-year BOF meeting cycle during which they address fisheries issues within the Yukon River drainage. The guideline harvest ranges for the sport fishery were also repealed at this time.

### SALCHA RIVER

The Salcha River Chinook and chum salmon runs have been annually assessed since 1987 using aerial surveys, mark-recapture experiments and/or a counting tower located near the Richardson Highway Bridge (Table 1). The Salcha River counting tower is currently operated by staff from Bering Sea Fishermen's Association (BSFA) with funding from the US/Canada Yukon River Pacific Salmon Treaty. BSFA closely follows the project design and methodology established by Sport Fish Division for this project, and Sport Fish Division provided some logistical support during start-up in 1999 and 2000. BSFA staff report Chinook salmon passage counts to both Sport and Commercial Fish Divisions at the end of each shift so that ADF&G can calculate and track cumulative passage (Brase and Doxey 2006).

Counting conditions on the Salcha River can be highly variable depending on water height and river turbidity. However, from 2004 to 06 the Salcha River experienced consistently good counting conditions (Brase and Doxey 2006, Brase *in prep*). In addition, the Salcha River counting tower

typically operates longer than the Chena River tower and therefore has a more complete representation of Chinook salmon run timing.

From 1990 to 2000 the Salcha River Chinook salmon sport fishery was managed using a guideline harvest allocation for the sport fishery. The guideline sport harvest objective set by the BOF was 300–700 Chinook salmon. In-season management for the guideline harvest objectives was next to impossible because there was no mechanism for day-to-day enumeration of the harvest.

Like the Chena River, the Salcha River is currently managed under the *Chena and Salcha River King Salmon Sport Harvest Management Plan* (5 AAC 70.060, 2002). Similar to the process already described under the Chena River Chinook Salmon section of this report, the escapement goal committee recommended and the BOF adopted a Salcha River Chinook salmon BEG of 3,300–6,500 fish in 2001.

## **RECENT REGULATORY ACTIONS**

In 2000 an emergency order (EO) was issued that restricted sport anglers from retaining any Chinook salmon in the Tanana River drainage due to Lower Yukon River indicators of poor run strength. In 2001, a similar EO was issued, however it was rescinded in mid-July when the escapement was projected to be above the upper limit of the BEG range. In 2003 and 2004 the Chinook salmon runs were stronger than anticipated and EOs were issued to liberalize the bag and possession limits from 1 to 3 Chinook salmon per day in the Chena and Salcha rivers (Appendix B). These emergency orders, in concert with management actions on the mainstem Yukon and Tanana river subsistence, commercial and personal use fisheries have enabled the Chena and Salcha rivers' Chinook salmon BEG goals to be met or exceeded every year since 1990 (Figure 3).

Typically more sport anglers target Chinook salmon on the Salcha River than on the Chena River, this may be because of the greater water clarity, the larger run size or the ease of access to good fishing locations. In 2006 an EO was issued to liberalize Chinook salmon bag and possession limits from 1 to 2 fish on the Salcha only, as the Chena River showed insufficient strength to liberalize the sport limits (Brase 2006).

## **FISHERY MANAGEMENT OBJECTIVE AND PROTOCOL**

The fishery management objective for the Chena River and Salcha River is to:

- 1) manage the Chinook salmon sport fisheries to achieve the BEG range associated with each river.

In the past there has not been a specified date and/or abundance of fish that was consistently used as a trigger point to restrict or liberalize the sport fishery. Nor was there a threshold for liberalizing the fishery from 2 or 3 Chinook salmon (background daily bag and possession limit is 1 fish 20 inches or more in total length).

Current inseason management considers the day that the cumulative total escapement past the counting tower meets or exceeds 100 Chinook salmon to be Day 7 of the run. This number is based off of post season analysis of run timing from years in which there is a complete set of daily counts which illustrates that a cumulative count of 100 fish roughly corresponds to the day when 1% passage has occurred, which on average is Day 7 (Day 1 = the first day fish are observed at the tower). In both the Chena and Salcha rivers the Chinook salmon run typically lasts around 40 days with the midpoint on Day 20 (Tables 3 & 4, Figures 4 & 5).

A retrospective analysis indicated that projections of total run size by Day 20 were accurate enough to determine whether escapements would have fallen within the BEG range, fallen short of the lower end, or exceeded the upper end of the BEG range. By using the “trigger points” presented in the following matrix, acceptable management decisions could have been made by Day 20 of the run (Tables 3 & 4). Therefore the following decision matrix will guide management actions in the Chena and Salcha sport fisheries:

<b>Sport Fish Management Action</b>	<b>Projected Chinook salmon escapement on Day 20 of the run</b>	
	<b>Chena</b>	<b>Salcha</b>
Close sport fishery	< 2,800	<3,300
Catch and release only	2,800–3,300	3,300–3,800
No Change	3,301–6,699 (BEG = 2800–5700)	3,801–7,499 (BEG = 3300–6500)
Increase bag and possession limit by 1 fish/ day	≥ 6,700	≥ 7,500
Increase bag and possession limit by 2 fish/ day	≥ 10,000	≥ 8,500

This plan is intended to guide the fisheries manager and provide the basis for management actions in the Chena and Salcha rivers Chinook salmon fisheries. If escapement projections after Day 20 of the run indicate that management actions either to liberalize or restrict the sport fishery should be taken to meet the escapement goals, the above sport fish management actions should be considered provided that a sufficient number of days remain in the run to provide additional harvest opportunity or conservation potential and provided the quality of the data are sufficient (i.e., few or no missed days of counting). Conversely, if actual escapement prior to Day 20 is in excess of the upper end of the BEG range, the daily bag and possession limit may be increased to 2 fish/day or more. Or, restrictions to the fishery may be imposed if subsistence fishery closures occur as a result of lower Yukon and/or Tanana rivers run strength indicators (e.g., test net catches, Pilot Station sonar counts, etc.). This management plan and the recommended actions will be reviewed in conjunction with the BOF cycle and will be updated if the Chinook salmon BEG for either the Chena or Salcha rivers is modified or if the characteristics of the sport fisheries change.

The escapements in the Chena and Salcha rivers are sufficiently correlated so that inferences regarding attainment of BEGs for both rivers can be made even if good data is available from only one of the rivers. If high water disrupts the counts in one of the rivers, but not the other, the escapement projections and estimates for the river in which an accurate estimate can still be made are considered an index of the Chinook escapement in the other river, and are used as a measure of run strength versus the BEG (Brase 2006). Therefore, depending on the quality of the data prior to either one of the rivers’ counts being interrupted, a management action could be taken for both rivers based on the escapement in the one river where fish are still being counted.

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## **TABLES AND FIGURES**

Table 1.—Abundance estimates and methods of estimation for Chinook salmon in the Chena and Salcha rivers, 1986–2008.

Year <sup>a</sup>	Chena		Salcha	
	Abundance	Method	Abundance	Method <sup>b</sup>
1986	9,065	M-R	-	-
1987	6,404	M-R	4,771	M-R
1988	3,346	M-R	4,562	M-R
1989	2,666	M-R	3,294	M-R
1990	5,603	M-R	10,728	M-R
1991	3,025	M-R	5,608	M-R
1992	5,230	M-R	7,862	M-R
1993	12,241	Tower	10,007	Tower
1994	11,877	Tower	18,399	Tower
1995	9,680	M-R	13,643	Tower
1996	7,153	M-R	7,570	M-R
1997	13,390	Tower	18,514	Tower
1998	4,745	Tower	5,027	Tower
1999	6,485	Tower	9,198	Tower
2000	4,694	M-R	4,595	Tower
2001	9,696	Tower	13,328	Tower
2002	6,967	M-R	4,644	Tower
2003	8,739 <sup>c</sup>	Tower	11,758 <sup>d</sup>	Tower
2004	9,645	Tower	15,761	Tower
2005	no estimate <sup>e</sup>	Tower	5,988	Tower
2006 <sup>f</sup>	2,936 <sup>f</sup>	Tower	10,400 <sup>f</sup>	Tower
2007 <sup>f</sup>	3,564 <sup>f</sup>	Tower	5,631 <sup>f</sup>	Tower
2008 <sup>f</sup>	3,212 <sup>f</sup>	Tower	5,300 <sup>g</sup>	Tower
BEG Range	2,800–5,700		3,300–6,500	
10 year Average 1998-2007	6,387		8,641	
5-Year Average 2003-07	6,224		9,924	
2008 as % 5 Yr Average	52%		53%	

<sup>a</sup> Data from: Barton (1987a-b and 1988); Barton and Conrad (1989); Burkholder (1991b); Evenson (1991-1993; 1995-1996); Evenson and Stuby (1997); Skaugstad (1988, 1989, 1990a-b, 1992, 1993, and 1994); Stuby and Evenson (1998); Stuby (1999, 2000, 2001); Doxey (2004); Doxey et al. (2005); Brase and Doxey (2006), Brase (*in prep*).

<sup>b</sup> M-R = Mark Recapture experiment.

<sup>c</sup> Likely 11,100 Chinook salmon when expanded for non-counting days.

<sup>d</sup> Likely 15,500 Chinook salmon when expanded for non-counting days.

<sup>e</sup> No estimates were produced due to extreme high water events throughout run. Chena River Chinook salmon escapement was likely within the BEG range of 2,800–5,700 fish.

<sup>f</sup> Preliminary results.

<sup>g</sup> Should be considered a minimum count due to high and/or turbid water conditions.

Table 2.—Sport catch and harvest of Chinook salmon in the Chena and Salcha rivers, 1983–2007.

Year	Chena River		Salcha River	
	Catch	Harvest	Catch	Harvest
1983	N/A	31	N/A	808
1984	N/A	0	N/A	260
1985	N/A	37	N/A	871
1986	N/A	212	N/A	525
1987	N/A	195	N/A	244
1988	N/A	73	N/A	236
1989	N/A	375	N/A	231
1990	406	64	680	291
1991	258	110	515	373
1992	71	55	86	47
1993	2,545	733	1,788	601
1994	1,308	993	971	714
1995	1,095	662	4,091	1,448
1996	3,692	1,280	3,298	1,136
1997	3,186	1,039	2,639	719
1998	779	299	549	121
1999	2,004	442	1,237	445
2000	222	71	197	72
2001	1,579	536	707	108
2002	1,920	178	1,157	269
2003	3,012	976	3,752	1,127
2004	4,571	762	1,514	481
2005	503	57	582	351
2006	1,208	265	747	317
2007	824	78	1,575	471
10-Year Average 1997-2006	1,898	463	1,308	401
5-Year Average 2002-2006	2,243	448	1,550	509
2007 as % 5-Year Average	37%	17%	102%	93%

Data from: Mills 1980 1981a-b, 1982–1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006 a-b, 2007, *in prep a.*

Table 3.—Projections of total escapement of Chena River Chinook salmon using 1993–1994, 1997–1999 averages for run timing. These projections were calculated as if they were being used for inseason management, with the first day of a cumulative count over 100 fish considered to be Day 7 of the run.

Day of Run	Average % of Total Chinook Passage (1993–1994 & 1997–1999)										
	1993	1994	1997	1998	1999	2001 <sup>b</sup>	2003	2004	2006	2007	
1											
2			26,780		4,463				22,317	4,463	
3			39,848	9,962	6,641	9,962			33,207	6,641	
4		0	33,599	25,199	31,199	16,799	5,600	16,799	27,999	5,600	
5	0	12,813	12,813	16,230	16,352	5,125	5,125	5,125	8,542	3,417	
6	10,833	10,833	12,036	12,438	11,291	6,687	2,407	7,222	4,012	6,419	
7	11,657	9,898	9,238	10,778	8,390	7,698	1,320	10,118	9,898	9,238	
8	16,010	11,445	11,445	11,173	6,015	8,720	16,350	6,268	14,261	9,265	
9	15,631	11,805	11,150	10,931	7,449	9,819	14,429	5,028	14,283	11,805	
10	16,829	16,163	6,356	7,325	6,668	19,785	10,654	2,785	10,574	7,991	
11	11,773	23,997	4,323	4,726	5,200	16,082	7,373	1,542	8,535	5,631	
12	10,309	27,892	6,182	3,310	6,664	13,672	4,954	957	6,217	3,830	
13	9,031	27,702	7,883	2,680	7,054	12,200	4,012	909	5,934	3,761	
14	8,795	26,775	7,698	2,358	8,103	11,000	4,819	1,797	5,583	3,881	
15	9,333	25,856	7,530	1,992	7,904	10,752	4,644	4,367	5,311	3,941	
16	10,354	23,959	7,413	1,680	8,160	12,117	4,870	4,978	5,397	3,882	
17	11,472	21,972	8,802	1,486	8,872	11,331	5,899	4,844	5,195	4,297	
18	12,211	19,934	9,422	1,504	8,856	11,557	6,785	4,812	4,901	4,324	
19	12,756	18,516	10,996	1,443	9,577	10,989	8,879	4,908	4,801	4,234	
20	12,543	16,460	10,826	1,347	8,869	10,622	8,938	5,227	4,442	4,296	
21	12,964	15,746	13,118	1,347	8,851	10,895	9,946	6,444	4,224	4,296	
22	12,471	16,011	13,877	1,935	8,559	11,625	10,773	7,599	4,024	4,241	
23	12,790	15,826	14,217	2,291	8,320	11,678	11,762	8,102	3,893	4,191	
24	12,460	15,268	14,012	2,388	8,015	11,716	11,052	8,297	3,713	4,080	
25	12,816	14,500	14,326	2,447	7,647	11,646	10,494	8,624	3,570	3,967	
26	13,076	14,123	14,722	2,615	7,534	11,658	10,219	9,042	3,527	3,918	
27	13,204	13,827	14,811	2,902	7,447	11,499	10,005	9,286	3,461	3,956	
28	13,309	13,567	14,822	3,327	7,344		9,809	9,663	3,393	3,984	
29	13,234	13,302	14,633	3,612	7,223		9,603	9,695	3,322	3,982	

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Table 3.–Page 2 of 2.

<b>Day of Run</b>	<b>Average % of Total Chinook Passage(1993–1994 &amp; 1997–1999)</b>	<b>1993</b>	<b>1994</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2001<sup>b</sup></b>	<b>2003</b>	<b>2004</b>	<b>2006</b>	<b>2007</b>
30	89.98%	13,025	13,007	14,436	3,843	7,094		9,375	9,719	3,263	3,921
31	91.71%	12,883	12,791	14,243	4,049	6,993		9,248	9,830		3,867
32	93.35%	12,796	12,601	14,063	4,191			9,162	9,940		3,805
33	94.97%	12,657	12,433	13,880	4,262			9,157	9,863		3,759
34	96.06%	12,573	12,345	13,811	4,442			9,098	9,883		3,704
35	96.73%	12,538	12,259	13,762	4,459				9,857		
36	97.73%	12,419	12,143	13,634	4,419				9,867		
37	97.99%	12,409	12,120	13,628	4,512				9,938		
38	98.11%	12,427	12,105	13,621					9,969		
39	98.57%	12,386	12,053						9,977		
40	98.68%										
	<b>Escapement</b>	12,241	11,877	13,390	4,745	6,485	9,696	8,739	9,645	2,936	3,576
	<b>Surplus (# of fish above upper end of BEG range)</b>	6,541	6,177	7,690	0	785	3,996	3,039	3,945	0	0
	<b>Management Action</b>	increased to 2 fish/day on July 17	increased to 2 fish/day on July 22	no action	catch & release only	no action	started closed then reopened on July 20	increased to 3 fish/day on July 12	increased to 3 fish/day on July 15	no action	no action

<sup>a</sup> Minimum estimate of escapement, likely run was closer to 11,100 fish.

<sup>b</sup> BEG established 2800–5700 Chinook salmon.

Table 4.—Projections of total escapement of Salcha River Chinook salmon using 1993–1995, 1997–2000, 2004–2006 averages for run timing. These projections were calculated as if they were being used for inseason management, with the first day of a cumulative count over 100 fish considered to be Day 7 of the run.

Day of Run	Average % of Total Chinook Passage (1993-1995, 1997-2000, & 2004-2006)										
	1993	1994	1995	1997	1998	1999	2000	2004	2005	2006	
1											
2											25,561
3								1,991			19,907
4			7,465	8,958	8,958		4,479	997,288	2,986		14,929
5		14,986	5,620	5,620	5,620	937	14,049	11,239	5,620		9,366
6	9,932	15,135	9,932	12,770	10,405	6,621	13,716	10,878	8,040		13,243
7	8,107	9,548	17,475	6,485	9,368	6,305	5,945	6,666	6,305		7,566
8	6,646	19,162	16,700	4,090	6,248	4,772	5,453	4,658	5,226		6,703
9	6,545	22,954	27,060	3,486	7,978	4,183	8,211	3,641	4,570		6,778
10	4,545	22,092	28,741	7,947	6,475	4,259	7,002	2,493	3,740		4,545
11	4,716	31,372	28,340	6,164	6,827	5,524	4,541	1,954	4,884		2,947
12	5,304	34,738	29,481	4,606	5,722	5,304	3,136	2,931	3,745		5,246
13	5,935	37,743	28,431	3,962	4,620	6,532	2,439	4,505	3,782		6,866
14	6,551	36,355	24,568	4,121	4,451	6,780	1,991	3,678	3,796		9,859
15	5,975	30,106	21,980	5,259	4,445	8,649	1,567	2,949	3,569		12,584
16	7,138	30,013	20,085	6,374	4,781	10,410	2,678	3,095	3,671		12,610
17	8,579	27,656	17,928	10,363	4,528	10,394	3,620	4,407	3,630		11,566
18	9,380	25,729	16,768	10,498	3,906	9,883	3,263	5,878	3,545		11,962
19	9,445	25,129	15,960	11,370	3,977	9,640	3,200	8,270	4,359		11,767
20	9,597	23,807	15,190	12,023	4,141	10,224	3,325	9,084	4,554		11,656
21	9,358	22,006	14,318	12,287	3,735	10,208	3,164	11,359	5,123		12,843
22	8,867	21,512	13,728	12,395	3,569	10,085	3,136	11,420	5,564		13,838
23	8,650	21,682	14,934	13,795	3,597	10,170	3,195	11,485	5,456		13,558
24	9,410	20,925	14,749	14,635	3,710	10,111	3,197	11,560	5,368		13,138
25	9,475	20,730	14,513	15,254	4,014	9,998	3,175	12,339	5,442		12,712
26	9,702	20,379	14,253	15,515	4,282	9,848	3,154	12,775	5,412		12,183
27	9,830	20,050	14,212	16,252	4,501	9,770	3,267	13,140	5,342		11,882

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Table 4.–Page 2 of 2.

Run	Average % of Total Chinook Passage	1993	1994	1995	1997	1998	1999	2000	2004	2005	2006
	Day of (1993–1995, 1997–2000, & 2004–2006)										
28	90.89%	9,958	19,744	14,089	16,313	4,662	9,675	3,303	13,495	5,416	11,590
29	92.99%	9,943	19,463	13,968	16,687	4,755	9,589	3,248	14,281	5,368	11,361
30	94.50%	9,988	19,180	13,963	17,074	4,908	9,477	3,237	15,281	5,358	11,211
31	95.58%	9,933	19,059	13,979	17,386	4,915	9,446	3,214	15,357	5,364	11,147
32	96.23%	10,001	18,985	13,946	17,590	4,957	9,382	3,245	15,511	5,374	11,078
33	96.98%	10,014	18,872	13,895	17,654	4,973	9,344	3,232	15,667	5,469	10,999
34	97.74%	9,986	18,734	13,820	17,646	4,971	9,301	3,213	15,662	5,574	10,925
35	98.33%	9,959	18,644	13,785	17,724	5,006	9,292		15,688	5,681	10,860
36	98.91%	9,958	18,566	13,737	17,838	4,985	9,265		15,662	5,778	10,799
37	99.19%	9,975	18,528	13,718	17,969	5,014	9,258		15,702	5,852	10,769
38	99.40%	9,986	18,507	13,710	18,100	5,015	9,251		15,711	5,861	10,746
39	99.53%	9,999	18,485	13,692	18,250	5,026	9,242		15,726	5,871	10,732
40	99.68%	9,998	18,464	13,672	18,260				15,719	5,914	10,716
	<b>Escapement</b>	10,007	18,339	13,643	18,514	5,027	9,198	4,595	15,761	5,988	10,400
	<b>Surplus (# of fish above upper end of BEG range)</b>	3,507	11,839	7,143	12,014	0	2,698	0	9,261	0	3,900
	<b>Management Actions</b>	increased to 2 kings/day on July 23	increased to 2 kings/day on July 22	no action	no action	catch & release only	no action	closed	increased to 3 kings/day on July 15	no action	increased to 2 kings/day on July 27

<sup>a</sup> Minimum estimate of escapement due to high water during counting tower operations.

<sup>b</sup> Minimum estimate of escapement, likely run was closer to 15,500 fish.

<sup>c</sup> BEG established 3300–6500 Chinook salmon.

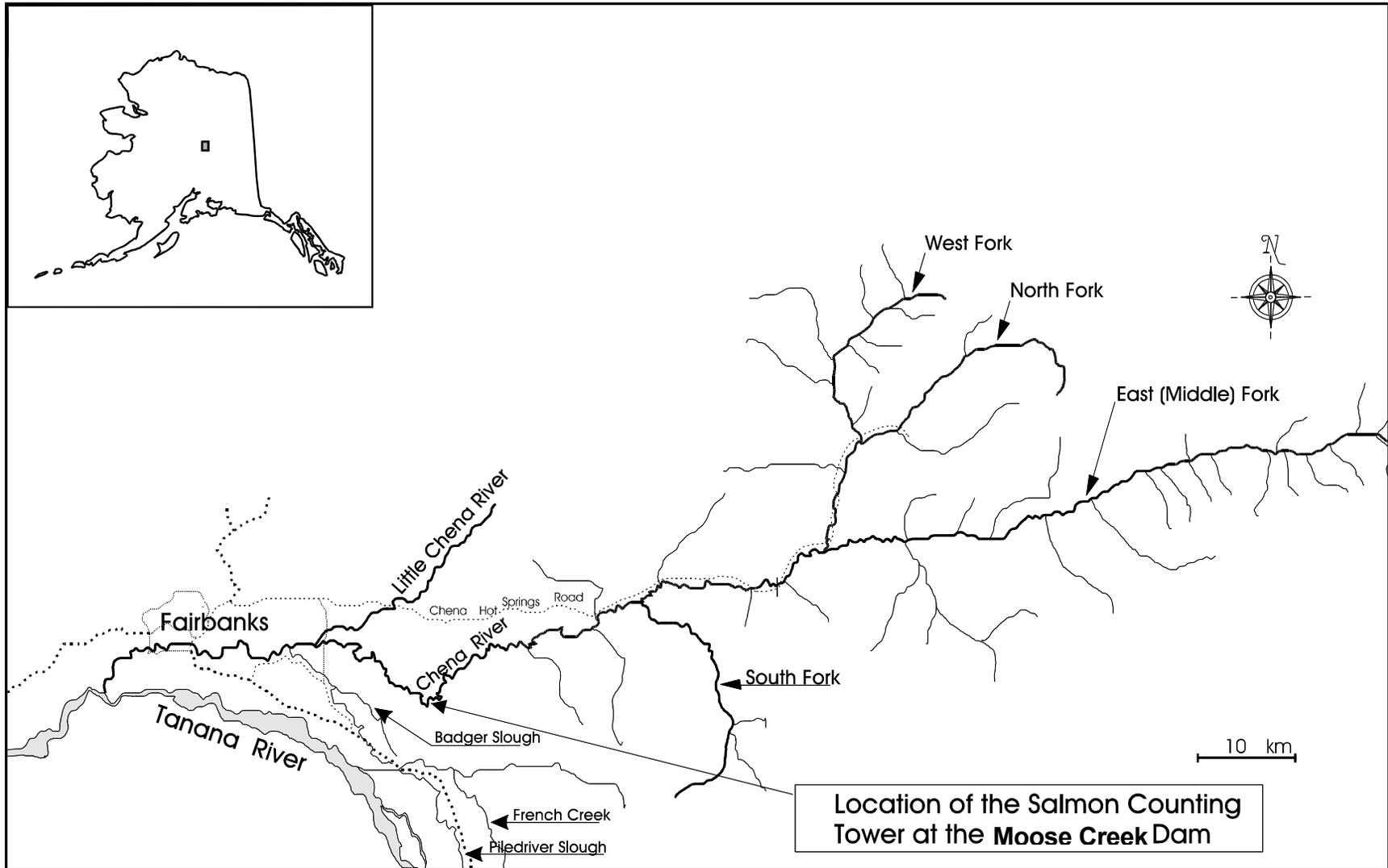


Figure 1.—Chena River drainage with location of counting tower.

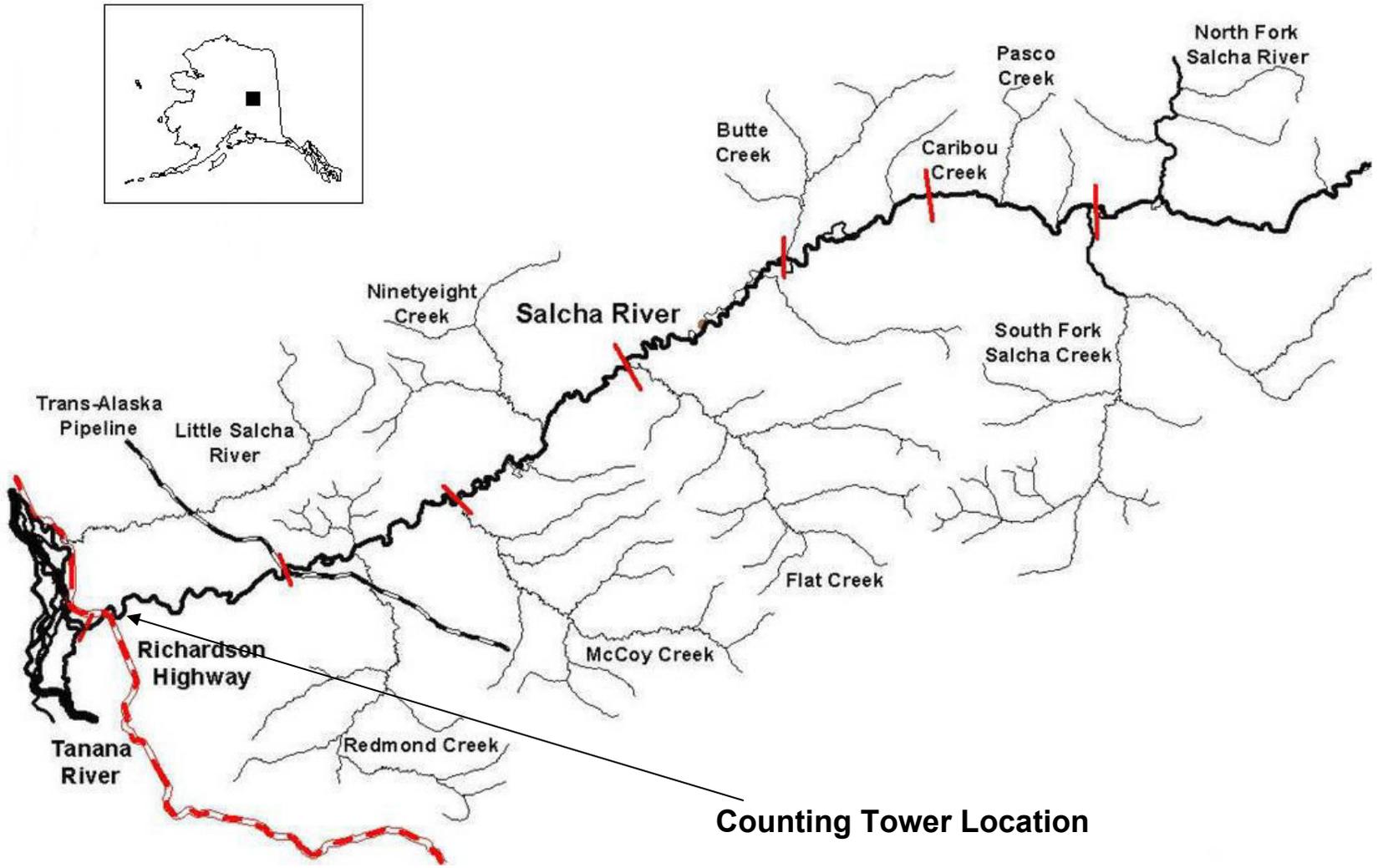


Figure 2.-Salcha River drainage with location of counting tower.

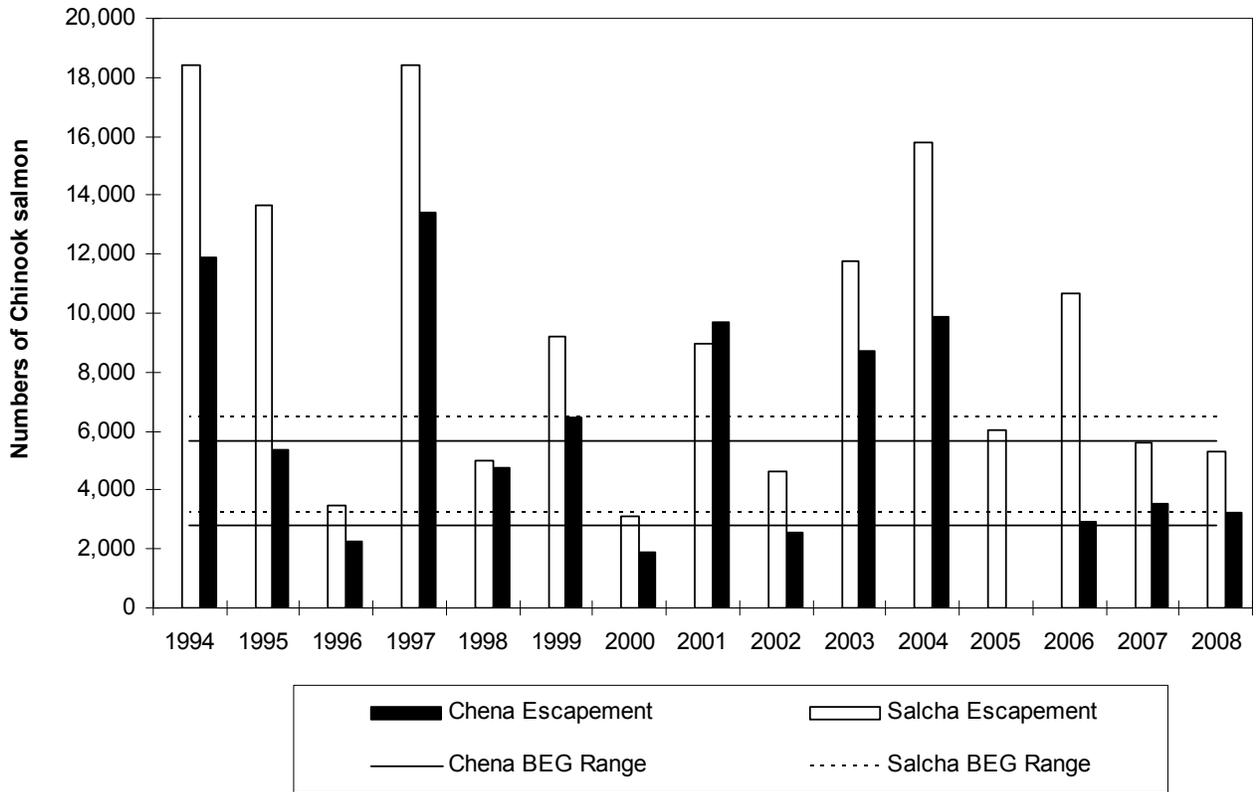


Figure 3.—Comparison of estimated Chinook salmon escapements to the Chena and Salcha rivers and the respective escapement goal ranges, 1994–2008.

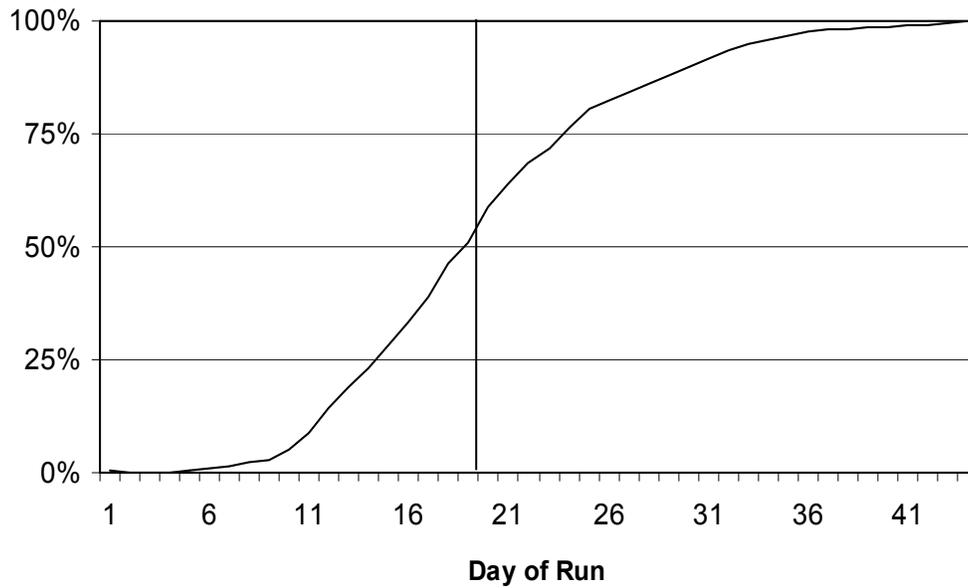


Figure 4.—Day of run average cumulative percent frequency for Chena River Chinook salmon (1993–1994, 1997–1999 average).

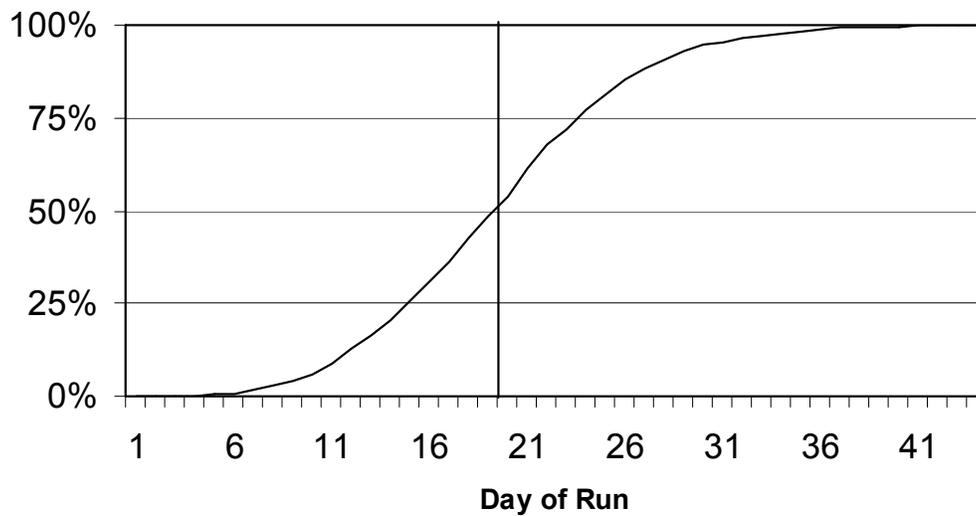


Figure 5.—Day of run average cumulative percent frequency for Salcha River Chinook salmon (1993–1995, 1997–2000, 2004–2005 average).



**APPENDIX A**  
**REGULATORY HISTORY OF CHINOOK SALMON IN THE**  
**TANANA RIVER DRAINAGE**

## 1962

### Initial regulations after Statehood

- Salcha River–Closed to salmon fishing
- Remainder Tanana Drainage–Daily salmon bag limit is 3 per day over 16 inches in length and no more than two may be Chinook salmon.

## 1964

- Little Salcha River–Closed to salmon fishing
- Salcha River–From confluence with Tanana to Redmond Creek–Daily bag and possession limit is 2 salmon, of which only 1 may be a Chinook salmon. Salmon fishing is closed upstream of Redmond Creek. Fishing is prohibited from the Richardson Highway Bridge.
- Remainder of Tanana Drainage–Daily salmon bag limit is 3 per day over 16 inches in length and no more than two may be Chinook salmon.

## 1970

- Removed provision about Little Salcha River being closed to salmon fishing
- Salcha River–From confluence with Tanana to Redmond Creek–Daily bag and possession limit is 2 salmon, of which only 1 may be a Chinook salmon. Salmon fishing is closed upstream of Redmond Creek. Fishing is prohibited from the Richardson Highway Bridge.
- Remainder of Tanana Drainage–Daily salmon bag limit is 3 per day over 16 inches in length and no more than two may be Chinook salmon.

## 1973

- Salcha River–From confluence with Tanana to Redmond Creek–Daily bag and possession limit is 2 salmon, of which only 1 may be a Chinook salmon. Salmon fishing is closed upstream of Redmond Creek. Fishing is prohibited from the Richardson Highway Bridge.
- Remainder Tanana Drainage–Daily salmon bag limit is 3 per day over 16 inches in length and no more than one may be a Chinook salmon.

## 1975

- Salcha River–From confluence with Tanana to Redmond Creek–Daily bag and possession limit is 2 salmon, of which only 1 may be a Chinook salmon. Salmon fishing is closed upstream of Redmond Creek. Fishing is prohibited from the Richardson Highway Bridge.

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- Chena River–Closed to salmon fishing upstream of its confluence with the Little Chena River;
- Goodpaster River and drainage–Closed to the taking of salmon.
- Remainder Tanana Drainage–Daily salmon bag limit is 3 per day over 16 inches in length and no more than one may be a Chinook salmon.

## 1983

- Salcha River–From confluence with Tanana to Redmond Creek–Daily bag and possession limit is 2 salmon, of which only 1 may be a Chinook salmon. Salmon fishing is closed upstream of Redmond Creek. Fishing is prohibited from the Richardson Highway Bridge.
- Chena River–Closed to salmon fishing upstream of its confluence with the Little Chena River;
- Goodpaster River and drainage–Closed to the taking of salmon.
- Remainder Tanana Drainage–Salmon less than 16 inches in length–daily bag & possession limit is 10 fish. Salmon 16 inches or more in length–daily bag & possession limit is 3 fish per day and no more than one may be a Chinook salmon.

## 1985

- Salcha River–Salmon fishing is closed upstream of Redmond Creek. Fishing is prohibited from the Richardson Highway Bridge.
- Goodpaster River and drainage–Closed to the taking of salmon.
- Chena River–Closed to salmon fishing upstream of a department marker located 300 feet downstream from the Chena River Flood Control Structure.
- Remainder Tanana Drainage–Daily bag & possession limit for Chinook salmon is 1 per day, no size limit.

## 1988

- Salcha River–Salmon fishing is closed upstream from a department marker located approximately 2.5 miles upstream of the Richardson Highway Bridge. Fishing is prohibited from the Richardson Highway Bridge.
- Goodpaster River and drainage–Closed to the taking of salmon.
- Chena River–Closed to salmon fishing upstream of a department marker located 300 feet downstream from the Chena River Flood Control Structure.

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- Remainder Tanana Drainage–Chinook salmon less than 16 inches in length–daily bag & possession limit is 10 fish. Chinook salmon 16 inches or more in length–daily bag & possession limit is 1 fish.

## 1990

- Salcha River–Salmon fishing is closed upstream from a department marker located approximately 2.5 miles upstream of the Richardson Highway Bridge. Fishing is prohibited from the Richardson Highway Bridge.
- Goodpaster River and drainage–Closed to the taking of salmon.
- Chena River–Closed to salmon fishing upstream of a department marker located 300 feet downstream from the Chena River Flood Control Structure.
- Remainder Tanana Drainage–Chinook salmon less than 16 inches in length–daily bag & possession limit is 10 fish. Chinook salmon 16 inches or more in length–daily bag & possession limit is 1 fish.
- Chinook salmon recreational fishery harvest ranges in regulation: Chena River 300–600 fish, Salcha River 300–700 fish.

## 1992

- Salcha River–Salmon fishing is closed upstream from a department marker located approximately 2.5 miles upstream of the Richardson Highway Bridge. Fishing is prohibited from the Richardson Highway Bridge.
- Goodpaster River and drainage–Closed to the taking of salmon.
- Chena River–Closed to salmon fishing upstream of a department marker located 300 feet downstream from the Chena River Flood Control Structure.
- Chatanika River–Closed to Chinook salmon fishing upstream of a department marker located approximately 1 mile upstream from the Elliot Highway Bridge.
- Remainder Tanana Drainage–Chinook salmon daily bag & possession limit is 1 fish, no size limit.
- Chinook salmon recreational fishery harvest ranges in regulation: Chena River 300-600 fish, Salcha River 300–700 fish.

## 1993

- Salcha River–Salmon fishing is closed upstream from a department marker located approximately 2.5 miles upstream of the Richardson Highway Bridge. Fishing is prohibited from the Richardson Highway Bridge.
- Goodpaster River and drainage–Closed to the taking of salmon.

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- Chena River–Closed to salmon fishing upstream of a department marker located 300 feet downstream from the Chena River Flood Control Structure.
- Chatanika River–Closed to Chinook salmon fishing upstream of a department marker located approximately 1 mile upstream from the Elliot Highway Bridge.
- Toklat River–Closed to all sport fishing (including Chinook salmon) August 15 through May 15.
- Remainder Tanana Drainage–Chinook salmon daily bag & possession limit is 1 fish, no size limit.
- Chinook salmon recreational fishery harvest ranges in regulation: Chena River 300-600 fish, Salcha River 300-700 fish.

## 1998

- Salcha River–Salmon fishing is closed upstream from a department marker located approximately 2.5 miles upstream of the Richardson Highway Bridge. Fishing is prohibited from the Richardson Highway Bridge.
- Goodpaster River and drainage–Closed to the taking of salmon.
- Chena River–Closed to salmon fishing upstream of a department marker located 300 feet downstream from the Chena River Flood Control Structure.
- Chatanika River–Closed to salmon fishing upstream of a department marker located approximately 1 mile upstream from the Elliot Highway Bridge.
- Delta River–Closed to salmon fishing.
- Toklat River–Closed to all sport fishing (including Chinook salmon) August 15 through May 15.
- Remainder Tanana Drainage–Chinook salmon daily bag & possession limit is 1 fish, no size limit.
- Chinook salmon recreational fishery harvest ranges in regulation: Chena River 300–600 fish, Salcha River 300–700 fish.

## 2001

- Salcha River–Salmon fishing is closed upstream from a department marker located approximately 2.5 miles upstream of the Richardson Highway Bridge. Fishing is prohibited from the Richardson Highway Bridge.
- Goodpaster River and drainage–Closed to the taking of salmon.
- Chena River–Closed to salmon fishing upstream of a department marker located 300 feet downstream from the Chena River Flood Control Structure.

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- Chatanika River–Closed to salmon fishing upstream of a department marker located approximately 1 mile upstream from the Elliot Highway Bridge.
- Delta River–Closed to salmon fishing.
- Toklat River–Closed to all sport fishing (including Chinook salmon) August 15 through May 15.
- Remainder Tanana Drainage–The daily bag & possession limit for Chinook salmon 20 inches or more in length is 1 fish. The daily bag & possession limit for Chinook salmon less than 20 inches in length is 10 fish.
- Removed Chinook salmon recreational fishery harvest ranges from regulation.
- Chena and Salcha River Chinook salmon management plan in regulation: The recreational fisheries in the Chena and Salcha Rivers must be managed to achieve established biological escapement goals.

## 2007

- Salcha River–Salmon fishing is closed upstream from a department marker located approximately 2.5 miles upstream of the Richardson Highway Bridge. Fishing is prohibited from the Richardson Highway Bridge.
- Goodpaster River–Catch and release fishing allowed for Chinook salmon June 1–August 31 from the confluence of the Tanana River to a department marker located approximately 25 miles upstream.
- Chena River–Closed to salmon fishing upstream of a department marker located 300 feet downstream from the Chena River Flood Control Structure.
- Chatanika River–Closed to salmon fishing upstream of a department marker located approximately 1 mile upstream from the Elliot Highway Bridge.
- Delta River–Closed to salmon fishing.
- Toklat River–Closed to all sport fishing (including Chinook salmon) August 15 through May 15.
- Remainder Tanana Drainage–The daily bag & possession limit for Chinook salmon 20 inches or more in length is 1 fish. The daily bag & possession limit for Chinook salmon less than 20 inches in length is 10 fish.
- Chena and Salcha River Chinook salmon management plan in regulation: The recreational fisheries in the Chena and Salcha Rivers must be managed to achieve established biological escapement goals.

**APPENDIX B**  
**EMERGENCY ORDERS ISSUED IN LTRMA 1992–2008**

Appendix B.—Emergency orders issued affecting Lower Tanana River Management Area Chinook salmon sport fisheries, 1992–2008.

Year	E. O. Number	Explanation
1992	3-S-06-92	Closes the Tanana River and its tributaries to sport fishing for salmon, effective July 24–August 14, 1992.
1993	3-KS-05-93	Increases daily bag and possession limit of Chinook salmon in the Chena River from 1 to 2 fish/ day, effective July 17–December 31, 1993.
	3-KS-06-93	Increases daily bag and possession limit of Chinook salmon in the Salcha River from 1 to 2 fish/ day, effective July 23–December 31, 1993.
1994	3-KS-02-94	Increases daily bag and possession limit of Chinook salmon in the Chena and Salcha rivers from 1 to 2 fish/ day, effective July 22–December 31, 1994.
1995	<b>No Emergency Orders Issued</b>	
1996	<b>No Emergency Orders Issued</b>	
1997	<b>No Emergency Orders Issued</b>	
1998	3-S-03-98	Restricts Chena, Salcha, and Chatanika rivers to catch and release for Chinook and chum salmon, effective July 23–August 15, 1998.
1999	<b>No Emergency Orders Issued</b>	
2000	3-KS-05-00	Closes the Tanana River drainage to sport fishing for Chinook and chum salmon, effective July 17–August 20, 2000.
	3-KS-07-00	Closes the Yukon River drainage to sport fishing for Chinook and chum salmon, effective July 19–August 14, 2000.
2001	3-KS-04-01	Prohibits retention of Chinook salmon by sport anglers in the Tanana River drainage, effective July 7–December 31, 2001.
	3-KS-06-01	Reopens Chena and Salcha rivers for Chinook salmon retention, effective July 20, 2001, the remainder of the Tanana River drainage remains closed through December 31, 2001.
2002	3-KS-03-02	Reduces sport fish bag limit to either one Chinook salmon <u>or</u> one chum salmon per day in the entire Yukon River drainage, effective June 19–December 31, 2002.
2003	3-KS-02-03	Reduces sport fish bag limit to either one Chinook salmon <u>or</u> one chum salmon per day in the entire Yukon River drainage, effective May 30–December 31, 2003.
	3-KS-04-03	Rescinds 3-KS-02-03 and restores daily bag and possession limits for Chinook and chum salmon in all waters of the Yukon River drainage, effective July 11, 2003.

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Year	E. O. Number	Explanation
	3-KS-05-03	Increases the Chinook salmon daily bag and possession limit to three fish in the Chena and Salcha rivers, and in the Tanana River within a 1/2 mile radius of the mouths of the Chena and Salcha rivers, effective July 12, 2003.
2004	3-KS-01-04	Reduces sport fish bag limit to either one Chinook salmon <u>or</u> one chum salmon per day in the entire Yukon River drainage, effective May 3–December 31, 2004.
	3-KS-04-04	Rescinds 3-KS-01-04 and restores daily bag and possession limits for Chinook and chum salmon in all waters of the Yukon River drainage, effective June 28, 2004.
	3-KS-07-04	Increases the Chinook salmon sport bag and possession limit to three fish 20 inches or greater in length in all waters of the Chena and Salcha rivers open to salmon fishing, and in the Tanana River within a 1/2 mile radius of the mouths of the Chena and Salcha rivers, effective July 15, 2004.
2005	<b>No Emergency Orders Issued</b>	
2006	3-KS-02-06	Increases the sport fish bag and possession limit for king salmon 20 inches or greater in length to two fish in all waters of the Salcha River open to salmon fishing and the Tanana River within a 1/2 mile radius of the mouth of the Salcha River, effective July 27, 2006.
2007	<b>No Emergency Orders Issued</b>	
2008	3-KS-01-08	Reduces the daily bag and possession limit for king salmon to one king salmon in all waters of the Yukon River drainage effective July 3, 2008.