

Fishery Data Series No. 02-27

**Surveys of the Chinook Salmon Sport Fisheries of
the Muklung and Upper Wood Rivers, Alaska,
2000**

by

Jason Dye

December 2002

Alaska Department of Fish and Game

Division of Sport Fish



Symbols and Abbreviations

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Weights and measures (metric)		General		Mathematics, statistics, fisheries	
centimeter	cm	All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.	alternate hypothesis	H _A
deciliter	dL	All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
gram	g	and	&	catch per unit effort	CPUE
hectare	ha	at	@	coefficient of variation	CV
kilogram	kg	Compass directions:		common test statistics	F, t, χ^2 , etc.
kilometer	km			confidence interval	C.I.
liter	L			correlation coefficient	R (multiple)
meter	m			correlation coefficient	r (simple)
metric ton	mt			covariance	cov
milliliter	ml			degree (angular or temperature)	°
millimeter	mm			degrees of freedom	df
		Copyright	©	divided by	÷ or / (in equations)
Weights and measures (English)		Corporate suffixes:		equals	=
cubic feet per second	ft ³ /s	Company	Co.	expected value	E
foot	ft	Corporation	Corp.	fork length	FL
gallon	gal	Incorporated	Inc.	greater than	>
inch	in	Limited	Ltd.	greater than or equal to	≥
mile	mi	et alii (and other people)	et al.	harvest per unit effort	HPUE
ounce	oz	et cetera (and so forth)	etc.	less than	<
pound	lb	exempli gratia (for example)	e.g.,	less than or equal to	≤
quart	qt	id est (that is)	i.e.,	logarithm (natural)	ln
yard	yd	latitude or longitude	lat. or long.	logarithm (base 10)	log
Spell out acre and ton.		monetary symbols (U.S.)	\$, ¢	logarithm (specify base)	log ₂ , etc.
		months (tables and figures): first three letters	Jan, ..., Dec	mideye-to-fork	MEF
Time and temperature		number (before a number)	# (e.g., #10)	minute (angular)	'
day	d	pounds (after a number)	# (e.g., 10#)	multiplied by	x
degrees Celsius	°C	registered trademark	®	not significant	NS
degrees Fahrenheit	°F	trademark	™	null hypothesis	H ₀
hour (spell out for 24-hour clock)	h	United States (adjective)	U.S.	percent	%
minute	min	United States of America (noun)	USA	probability	P
second	s	U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	probability of a type I error (rejection of the null hypothesis when true)	α
Spell out year, month, and week.				probability of a type II error (acceptance of the null hypothesis when false)	β
Physics and chemistry				second (angular)	"
all atomic symbols				standard deviation	SD
alternating current	AC			standard error	SE
ampere	A			standard length	SL
calorie	cal			total length	TL
direct current	DC			variance	Var
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

FISHERY DATA SERIES NO. 02-27

**SURVEYS OF THE CHINOOK SALMON SPORT FISHERIES OF THE
MUKLUNG AND UPPER WOOD RIVERS, ALASKA, 2000**

by

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December 2002

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TABLE OF CONTENTS

	Page
LIST OF TABLES	ii
LIST OF FIGURES	ii
ABSTRACT	1
INTRODUCTION	1
Objectives.....	3
METHODS	4
Data Collection.....	7
Angler Counts	7
Angler Interviews	7
Chinook Salmon Harvest.....	8
Data Analysis.....	8
Angler Effort and Catch Rate.....	8
Angler Characteristics	9
Biological Composition.....	9
Assumptions	9
RESULTS	11
Upper Wood River.....	11
Muklung River	11
Biological Composition.....	11
DISCUSSION	11
ACKNOWLEDGEMENTS	15
LITERATURE CITED	15

LIST OF TABLES

Table		Page
1.	Sport effort (angler-days), and harvest and catch of chinook salmon in the Wood River Lakes System, 1977-2000.	3
2.	Historical aerial escapement counts of chinook salmon in the Muklung River, 1967-2000.	5
3.	Numbers of anglers counted by day during surveys of the upper Wood River and Muklung River, 17 June-30 July, 2000.	12
4.	Angler effort and catch statistics for chinook salmon, upper Wood River and Muklung River, 17 June-30 July, 2000.	13
5.	Number and percent of angler trips, by angler and gear type, during the chinook salmon sport fisheries on the upper Wood River and Muklung River, 2000.	14
6.	Numbers of chinook salmon, by age, sampled at the Muklung River, 2000.	15

LIST OF FIGURES

Figure		Page
1.	The Wood River Lakes system, Alaska.	2
2.	Historical harvest of chinook salmon and angler effort in the Wood River Lakes system from the Statewide Harvest Survey, 1977-2000.	4
3.	The upper Wood River and Muklung River creel survey areas, 2000.	6

ABSTRACT

Creel surveys of the upper Wood River and Muklung River sport fisheries for chinook salmon were conducted in 2000. Anglers were counted and interviewed, and harvested chinook salmon were sampled. At the upper Wood River, 42 anglers were counted and 33 were interviewed. Surveyed anglers expended 64.6 angler-hours, but no chinook salmon were caught or harvested. Most were guided anglers from nearby lodges. At the Muklung River, 72 anglers were counted and 99 were interviewed. Total effort for these anglers was 237.5 angler-hours. They caught 87 and harvested 10 chinook salmon. Overall CPUE was 0.29 chinook salmon/h (SE = 0.12); the highest CPUE of 0.51 chinook salmon/h was during the final week of the survey, 24-30 July. Most anglers at the Muklung River were guided.

Key words: Wood River, Muklung River, Southwest Alaska, chinook salmon, *Oncorhynchus tshawytscha*, creel survey.

INTRODUCTION

The upper Wood River and its tributary the Muklung River are located approximately 30 km (20 miles) north of the community of Dillingham, Alaska (Figure 1). Both rivers host small recreational fisheries for chinook salmon *Oncorhynchus tshawytscha*, coho salmon *O. kisutch*, rainbow trout *O. mykiss*, and other species. Their close proximity to the communities of Dillingham and Aleknagik make these waters easily accessible to local anglers. Anglers typically access the fishery by boat from Dillingham or from the Lake Aleknagik boat ramp. In addition, fishing guides from lodges take their guided clients to both rivers. Local residents have become concerned that use of these rivers and harvest of chinook salmon by sport anglers have increased to the possible detriment of the small chinook salmon populations in the area.

Data on sport fisheries of the upper Wood River and the Muklung River are limited. There have been no onsite studies, but some estimates of harvest and effort are available from the Statewide Harvest Survey. Harvest from the entire Wood River Lakes system averaged 91 chinook salmon annually from 1984-1999, excluding years of no harvest and 1988 and 1994, years of unusually high harvest (Mills 1985-1994; Howe et al. 1995, 1996, 2001a-d; Table 1; Figure 2); but site-specific estimates for the upper Wood River and the Muklung River are not available. Effort in the Wood River Lakes system has been variable since 1977, but increased substantially in 1989 (Table 1; Figure 2). Escapement data consist of aerial surveys of the Muklung River beginning in 1967. These counts have been highly variable, ranging from 60 fish in 1990 to 2,260 fish in 1981 (Table 2). The mean escapement index was 762 chinook salmon for all years since 1967, and the average for 1995-2000 (four years of data) was 424 fish (Table 2).

Due to public concern over sport fishing in these waters and low recent escapement indices for chinook salmon, the department submitted two regulatory proposals to the Alaska Board of Fisheries (BOF) for review in January 2001. Both proposals were adopted by the Board during that meeting. One proposal reduced the annual bag limit in the Wood River drainage from five to two chinook salmon and the other reduced the daily bag limit from three fish (one fish >28 in) to one fish (no size limit); the open season for chinook salmon remained 1 May through 31 July (ADF&G 2000).

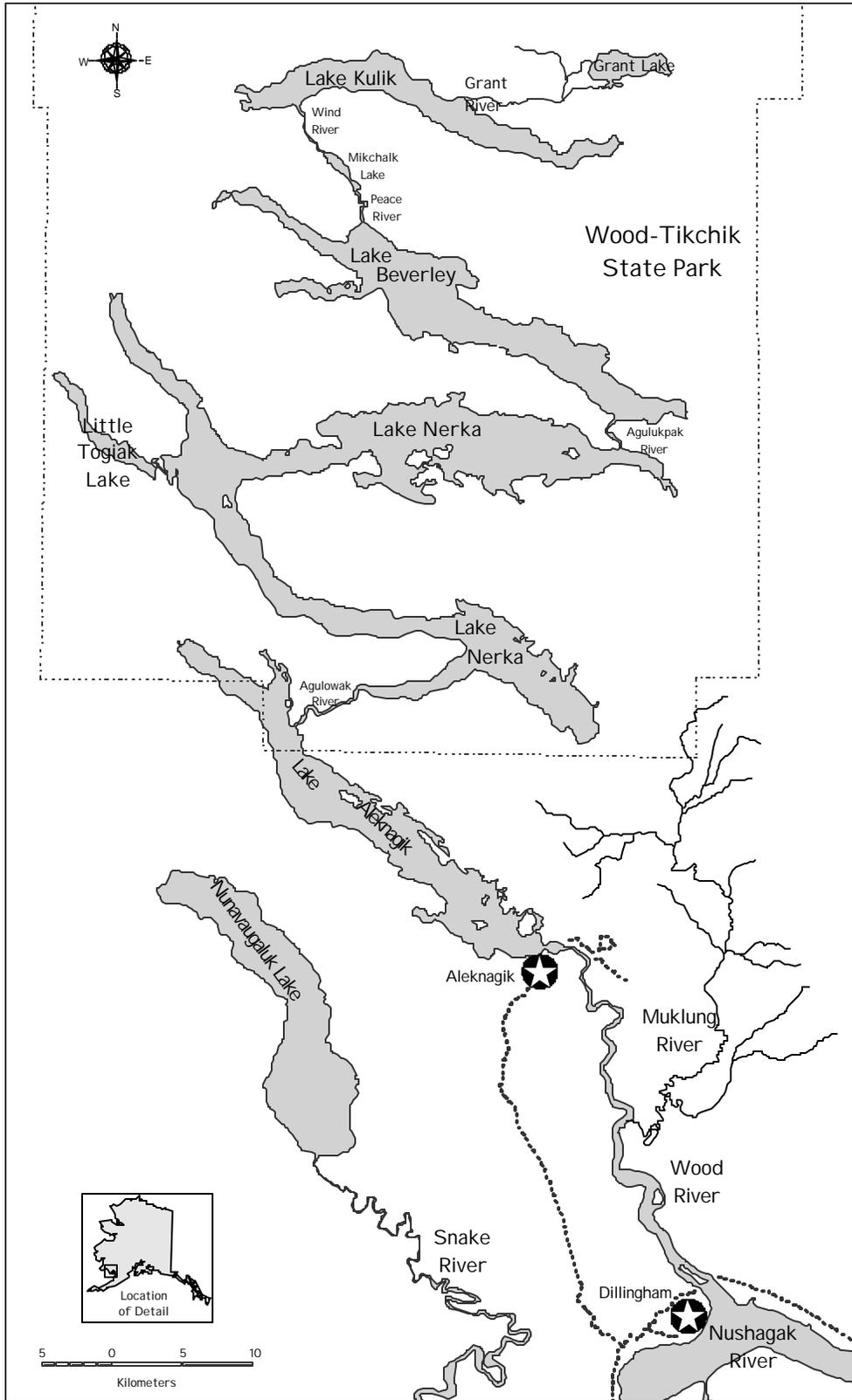


Figure 1.-The Wood River Lakes system, Alaska.

Table 1.-Sport effort (angler-days), and harvest and catch of chinook salmon in the Wood River Lakes System, 1977-2000.

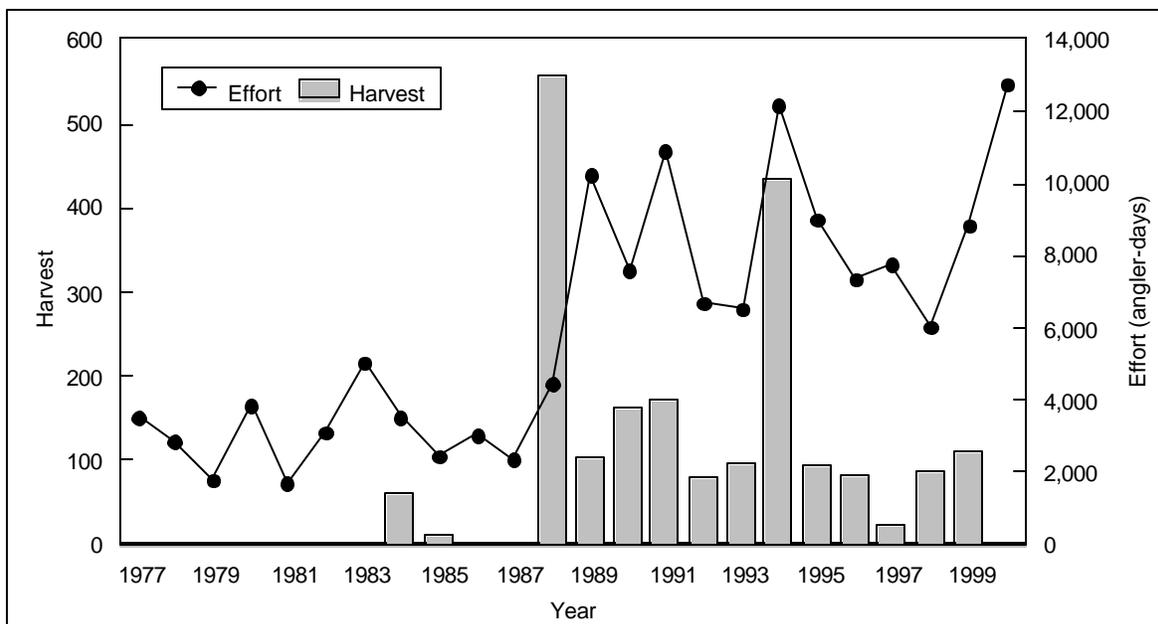
Year	Effort	Harvest	Catch
1977	3,549	0	
1978	2,843	0	
1979	1,745	0	
1980	3,884	0	
1981	1,701	0	
1982	3,139	0	
1983	5,040	0	
1984	3,497	62	
1985	2,460	14	
1986	3,012	0	
1987	2,325	0	
1988	4,457	557	
1989	10,272	104	
1990	7,618	160	436
1991	10,853	173	253
1992	6,647	80	416
1993	6,482	97	565
1994	12,144	435	475
1995	9,022	93	245
1996	7,366	85	363 ^a
1997	7,716	23	1,140 ^a
1998	6,010	87	988 ^a
1999	8,808	113	947 ^a
2000	12,756	0	145 ^a

Source: (Mills 1979-1994; Howe et al. 1995-1996, 2001a-d; Walker et al. *In prep*).

^a Catch for 1996-2000 was obtained from a query of the SWHS database.

OBJECTIVES

This project was a feasibility study in 2000. The goal of the study was to collect onsite data to provide an index of angler effort and catch rates of the chinook salmon fishery in the upper Wood River and in the Muklung River. These data were used to help address the BOF proposals for the chinook salmon fisheries and to evaluate objective criteria for estimating fishery statistics in the future. Therefore, statistics provided by this project had no criteria for accuracy or precision because this was the first year of the study.



Source: Mills 1979-1994, Howe et al. 1995, 1996, 2001a-d, Walker et al. *In prep.*

Figure 2.-Historical harvest of chinook salmon and angler effort in the Wood River Lakes system from the Statewide Harvest Survey, 1977-2000.

The objectives for the 2000 survey of the chinook salmon sport fishery in the upper Wood and Muklung rivers were to:

1. Index angler effort in the survey area during each sampled day;
2. Index catch rate (catch per unit effort, CPUE) in the survey area during each sampled day; and
3. Index spawning escapement of chinook salmon in the Muklung River.

METHODS

A systematic survey of the chinook salmon sport fishery was conducted on the upper Wood River from Lake Aleknagik downstream to its confluence with the Muklung River, and on the lower 20 km of the Muklung River (Figure 3). The survey consisted of counts of anglers, angler interviews, and collection of biological data from harvested chinook salmon. The study was stratified by week, and each river was treated as a separate survey area. Five days, Thursday through Monday, were sampled each week from 17 June through 30 July 2000. Each sample day was from 1000 to 1830 hours and was 7 h in length, excluding time for angler counts and lunch breaks.

Table 2.-Historical aerial escapement counts of chinook salmon in the Muklung River, 1967-2000.

<u>Year</u>	<u>Index Count</u>
1967	350
1968	750
1969	520
1970	590
1971	280
1972	150
1973 ^a	
1974	1,010
1975	660
1976	840
1977	940
1978	1,170
1979	950
1980	1,600
1981	2,260
1982	790
1983	1,830
1984	1,300
1985	1,250
1986	230
1987	160
1988	430
1989 ^a	
1990	60
1991 ^a	
1992 ^a	
1993 ^a	
1994 ^a	
1995	210
1996 ^a	
1997 ^b	1,240
1998	150
1999 ^c	95
2000 ^a	
Overall Average	762
1995, 1997-1999 Average	424

Source: (Weiland et al. 1999; Glick et al. 2000).

^a No survey conducted.

^b Survey conditions were excellent, with very clear and low water.

^c Survey conditions were poor, and survey was slightly late in the season.

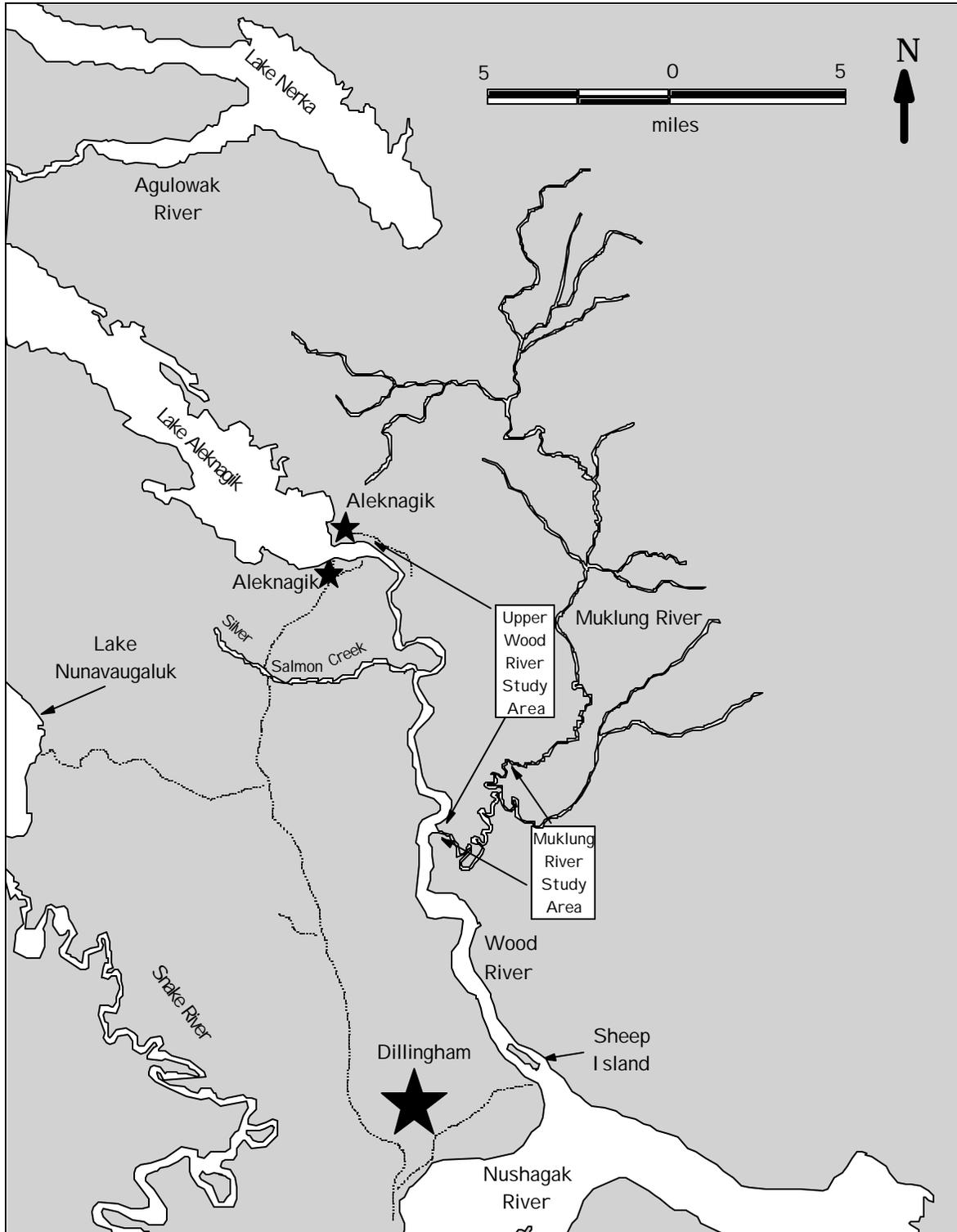


Figure 3.-The upper Wood River and Muklung River creel survey areas, 2000.

We tried to design the survey to obtain a consistent proportional sample of the fishery throughout the progression of the survey. There were no data documenting prime angling times on the upper Wood or Muklung rivers. Therefore, the study design and sample schedule were selected to correspond to seasonal, weekly, and daily peaks in the sport fishery for chinook salmon observed on nearby rivers (Coggins *Unpublished*; Dunaway 1994; Dunaway and Bingham 1991; Dunaway and Fleischman 1995; Ferris and Cherry *Unpublished*; Wightman and Cherry *Unpublished*). We assumed this sampling schedule hit peak periods of angling.

These previous studies were also used for selecting the days of the week to sample. We were careful to avoid sampling on predictably low-use days such as lodge “change days,” days on which lodge clients arrive and depart. Based on our experience with lodges in other areas, we anticipated that weekend days and Fridays were likely to have relatively high use by unguided local anglers and only moderate to low use by lodge-based guided anglers; and that weekday days were likely to have relatively low use overall, with most effort coming from lodge-based guided anglers. Therefore, sample days were selected to capture some weekend angling yet include weekdays likely to see normal guided use to hopefully achieve a representative sample of the overall fishery.

Aerial index surveys for the Muklung River were planned between 31 July and 9 August 2000, in which counts of live and dead chinook salmon were to be made from fixed wing aircraft. However, aerial index counts were not conducted during 2000 due to poor weather conditions, and personnel and aircraft shortages.

DATA COLLECTION

Angler Counts

A single angler count was made each sample day at a fixed time to index daily angler effort on each river. Two technicians began the count in a single boat on the upper Wood River and continued up the Muklung River. The start time for counts was 1000 hours because we thought this time would include peak daily angling activity. Angler counts commenced exactly at the time scheduled and took no more than 70 minutes to complete.

The technicians counted all active anglers while driving a boat at a constant rate of speed through the fishery. Active anglers were defined as individuals fishing and included those handling rods and tackle, repositioning a boat, landing a fish, repairing gear, or assisting another angler. Active anglers did not include people solely operating boats, eating lunch, or engaging in other activities not associated with angling.

Angler Interviews

After completing the count, the technician traveled (roved) throughout the fishery via motorboat to interview anglers participating in the fishery. Both complete-trip and incomplete-trip anglers were interviewed. Complete-trip anglers were those who had suspended fishing for the day; incomplete-trip anglers had not finished fishing for the day. Interviews queried anglers for catch, harvest, effort (time duration), angler-type (guided, unguided, guides), and terminal tackle (flies, lures, bait, etc.) information. Demographic data were also collected, including gender, and residency that was defined as local Alaskan (Alaskan resident living in Dillingham, Aleknagik, Portage Creek, Ekwok, New Stuyahok, or Koliganek), nonlocal Alaskan, non-Alaskan, US citizen, and non-US citizen. These data provided estimates of catch and harvest rates.

Technicians attempted to distribute interview effort uniformly among all angling groups and throughout the survey areas. Thus, technicians sampled a uniform, and usually high (> 70%), proportion of anglers present on a given sampling day.

Chinook Salmon Harvest

Sport-harvested chinook salmon encountered during angler interviews were sampled for biological data. When possible, all chinook salmon retained by interviewed anglers were sampled. Harvested chinook salmon were measured for MEF length to the nearest millimeter and weighed to the nearest 0.25 kilogram. Sex was determined based on external characteristics. In addition, three scales were removed from the preferred area¹ and mounted on an adhesive-coated card.

Standard procedures were used to determine ages of sampled chinook salmon (Jearld 1983). The European system of age designation was used, where the number of freshwater winter annuli precedes the decimal and the number of marine winter annuli follows. Total age from the brood year is the sum of the two numerals plus one.

DATA ANALYSIS

Angler Effort and Catch Rate

For each survey area, weekly and total estimates of CPUE were calculated. First, CPUE for each interviewed angler was calculated:

$$cpue_{hi} = \frac{c_{hi}}{e_{hi}}, \quad (1)$$

where, c_{hi} equals the number of fish caught (both kept and released) by the i^{th} angler interviewed during the h^{th} week of the survey, and e_{hi} is the effort of the angler.

Then the weekly mean CPUE was estimated by:

$$\overline{cpue}_h = \frac{\sum_{i=1}^{m_h} cpue_{hi}}{m_h}, \quad (2)$$

where, m_h equals the number of anglers interviewed within each week of the survey.

Variance of the weekly mean CPUE was estimated as:

$$\hat{V}[\overline{cpue}_h] = \frac{\sum_{i=1}^{m_h} (cpue_{hi} - \overline{cpue}_h)^2}{m_h(m_h - 1)}. \quad (3)$$

The standard error (SE) was estimated as the square root of the variance. Confidence intervals (95%) were estimated using the percentile bootstrap method (Efron and Tibshirani 1993) to compare CPUE among weeks. If possible, CPUE of complete- and incomplete-trip anglers was also compared. If the rates did not differ, then data were combined to improve precision.

¹ The left side of the fish approximately two rows above the lateral line and on a diagonal line downward from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (Welander 1940).

Harvest per unit of effort (HPUE) was estimated similarly, replacing harvest (only fish kept) for catch.

Angler Characteristics

The proportion of angler trips for each survey area as defined by categories of terminal gear type and/or angler type was calculated as:

$$p_z = \frac{m_z}{m}, \quad (4)$$

where m_z equals the number of interviewed anglers whose trips were categorized as z ; and m equals the total number of classifiable anglers interviewed. No estimates of sampling variance were calculated.

Biological Composition

Although we planned to estimate proportions and lengths of chinook salmon by age and sex, all samples were combined to estimate overall mean length and weight because of the small sample size. Numbers of sampled chinook salmon by sex and age were tallied and presented in a table.

ASSUMPTIONS

Assumptions necessary for unbiased point and variance estimates obtained by the above procedures included:

1. Interviewed anglers accurately reported their fishing time and number of chinook salmon kept and released;
2. Technicians accurately classified anglers, and interviewed anglers accurately reported their residency, trip type, and the terminal gear type used during their fishing trip;
3. The distribution of angler effort within the angling day did not vary substantially during the course of the survey (necessary for CPUE to be an unbiased index of fish abundance, and for the single angler count to be an unbiased index of angler effort);
4. Catch rate and duration of fishing trip were independent (necessitated by the use of a roving method of interviewing, since anglers with longer fishing trips would have a greater probability of being intercepted for interview);
5. Catchability of chinook salmon did not vary substantially during the course of the survey (necessary for CPUE to be an unbiased index of fish abundance).

There are no direct ways of evaluating or testing any of the assumptions. For assumptions 1 and 2, anglers were expected to have fairly good recollection of the total number of fish caught and to accurately report their fishing trip characteristics. In addition, technicians were trained to record data accurately.

For the remaining assumptions, this survey was designed to obtain a consistent proportional sample of the fishery throughout the progression of the survey. Accordingly, weekly estimates of CPUE should have been unbiased indices of abundance of chinook salmon as they passed through each fishery (Bernard et al. 1998). Because all days of the week and all hours of the angling day were NOT sampled with equal probability, estimates of CPUE were not unbiased

estimates of the catch rate of the fishery as a whole. However, because the hours of the day and the days of the week sampled were consistent throughout the survey, estimates of CPUE should have been reflective of gross overall changes in fish abundance, with the provision that catchability remained constant.

Counts were not used to estimate angler effort for the fishery because all possible count times were not surveyed. Counts provided an unbiased index of angler effort during the days and times sampled if the distribution of angler effort throughout the sampling day did not vary during the course of the survey. If the within-day distribution of angler effort did vary during the course of the survey, for example anglers shifted from morning to evening fishing, then the angler count would not be an unbiased index of angler effort. Counts were considered instantaneous and representative of angler effort when conducted.

Interviews obtained by roving a fishery can result in length of stay (LOS) bias. This bias could be substantial because the probability of interviewing anglers is proportional to the length of their daily fishing trip. This is especially true if anglers tend to quit fishing after filling their daily bag limit. In this case, the LOS bias due to obtaining interviews by roving the fishery would result in underestimates of CPUE. However, because exit locations and methods of access to this fishery are extensive, interviewing anglers at access locations at the end of the fishing trip was not feasible. Similarly, because the entire fishing day was not covered, anglers who exited the fishery prior to the start of each sampling day could not be interviewed. If successful anglers, especially local residents, tended to leave early in the fishing day, possibly before the sampling day began, and fishing success varied such that on days with high catch rates the probability of interviewing successful anglers decreased, then the estimates of CPUE would not accurately reflect changes in catch rates.

The general nature of the fishery may have reduced the likelihood of severe LOS bias and its effects. Based on our experience, we believe that most anglers in this fishery probably fished throughout the angling day. Rather than leaving after reaching the bag limit early in the day, anglers in this type of fishery turn instead to catch-and-release fishing. This is because guided anglers from local lodges generally spend the entire day fishing in the area; and local residents participate in the fishery for the experience, not just to fill a bag limit. Additionally, the comparatively non-restrictive daily bag limit at the time of the study (three per day, one >28 in) further reduced the likelihood of severe LOS biases.

Because all angling days were not covered, data describing characteristics of angler-trips by terminal gear and angler-type are reflective of the fishery on the sampled days and periods only. Because different types of anglers may have fished during days of the week and/or during hours of the day not sampled, estimates of angler-trips by angler-type may not be representative of the whole fishery.

The sampling design was expected to yield a proportional sample of the harvest through the progression of the fishery. The resultant data were treated as if collected from a simple random sample.

RESULTS

UPPER WOOD RIVER

Counts on the upper Wood River ranged from a maximum of 10 anglers on 3 July to a low of zero anglers on 20 days of the survey. A total of 42 anglers were counted (Table 3) and 33 anglers were interviewed. They expended a total of 64.6 angler-hours of effort and caught no chinook salmon (Table 4). Of the interviewed anglers, 52% were guided, 36% were Alaskan residents, 33% were local Alaskan residents, and 21% used bait (Table 5).

MUKLUNG RIVER

Counts on the Muklung River ranged from 7 anglers on 4 July and 17 July to a low of zero anglers on many days of the survey. A total of 72 anglers were counted (Table 3) and 99 anglers were interviewed. Total effort was 237.5 angler-hours, catch was 87 chinook salmon and harvest was 10 chinook salmon. Overall CPUE was 0.29 fish/hr (SE = 0.12), ranging from a low of 0.0 fish/hr during the first days of the survey (17-18 June) to a high of 0.51 fish/hr (SE = 0.16) during the final week of the survey (24-30 July; Table 4).

Of anglers interviewed, 54% were guided, 31% were Alaskan residents, 23% were local Alaskan residents, and 37% used bait (Table 5).

Biological Composition

During the survey, 11 harvested chinook salmon were sampled from the sport fishery on the Muklung River. Average MEF length of fish sampled from the sport harvest was 794 mm and average weight was 7.7 kg. Seven of the sampled fish were female, one was male, and sex was not determined for three fish (Table 6). The predominant age groups among all fish sampled from the sport fishery were age 1.4 and 1.5 (Table 6). Ten chinook salmon captured by the department were also sampled. Average MEF length of these fish was 698 mm. Three fish were female and sex was unknown for seven (Table 6). The predominant age groups of these fish were 1.3 and 1.4 (Table 6). The largest chinook salmon sampled was 1,020 mm and the smallest was 400 mm.

DISCUSSION

The 2000 chinook salmon survey was the first onsite study the department has conducted of these fisheries. Therefore, data collected during this study are baseline and will be used to design future studies. Angler effort on both the upper Wood and Muklung rivers was very low during 2000. However, some peak angling times may have been missed because the fishery is highly dependent on tides and our sampling times did not take tides into account.

The majority of anglers fishing the upper Wood and Muklung rivers during 2000 were guided anglers and most were non-Alaskans who accessed the fishery by boat from nearby lodges. However, 11 anglers interviewed on the upper Wood River and 23 interviewed on the Muklung River were unguided local Alaskans. This indicates that although these fisheries are primarily accessed by anglers from lodges located in the Wood River Lakes area, they are also important to unguided local anglers.

Table 3.-Numbers of anglers counted by day during surveys of the upper Wood River and Muklung River, 17 June-30 July, 2000.

Date	Upper Wood River	Muklung River
17-Jun	0	2
18-Jun	0	0
19-Jun	0	0
22-Jun	0	2
23-Jun	0	0
24-Jun	0	2
25-Jun	0	4
26-Jun	0	2
29-Jun	5	0
30-Jun	6	5
1-Jul	0	4
2-Jul	0	0
3-Jul	10	0
4-Jul	1	7
6-Jul	0	4
7-Jul	0	0
8-Jul	0	0
9-Jul	0	2
10-Jul	4	4
13-Jul	3	0
17-Jul	0	7
20-Jul	0	5
21-Jul	0	5
22-Jul	0	2
23-Jul	0	4
24-Jul	2	3
27-Jul	3	3
28-Jul	0	0
29-Jul	3	0
30-Jul	5	5
Total	42	72

Age composition of chinook salmon harvested in the Muklung River appears to be consistent with the age composition of chinook salmon harvested in the nearby Nushagak River during 2000. Age classes 1.4 and 1.5 made up the majority of the chinook salmon sport harvest from both the Muklung (62%) and Nushagak rivers (69%; Dye *In prep*).

Data collected during the 2000 survey were successful in documenting baseline information. However, we recommend that the data be used to design a more rigorous survey to collect comprehensive estimates of effort, catch, and harvest. To more effectively capture peak angling periods, schedules for future monitoring of the sport fishery in the upper Wood and Muklung rivers should be based on tidal stage.

Table 4.-Angler effort and catch statistics for chinook salmon, upper Wood River and Muklung River, 17 June-30 July, 2000.

Week	Survey Dates	Upper Wood River ^a		Muklung River								
		Anglers Counted	Angler-Hours	Anglers Counted	Angler-Hours	Catch	Weekly CPUE	SE	Harvest	Weekly HPUE	SE	Percent Retained
1	6/17-18	0	0.0	2	0.0	0	0.00	0.00	0	0.00	0.00	0.00
2	6/19-25	0	0.0	8	16.5	4	0.11	0.08	0	0.00	0.00	0.00
3	6/26-7/1	11	2.0	11	27.5	5	0.16	0.07	0	0.00	0.00	0.00
4	7/3-9	11	0.5	13	67.5	24	0.24	0.10	4	0.06	0.03	16.70
5	7/10-16	7	0.0	4	12.0	6	0.50	0.17	0	0.00	0.00	0.00
6	7/17-23	0	2.0	23	70.0	19	0.46	0.25	5	0.08	0.03	26.00
7	7/24-30	13	60.1	11	44.0	29	0.51	0.16	1	0.02	0.02	0.03
Total	6/17-7/30	42	64.6	72	237.5	87	0.29	0.12	10	0.02	0.01	11.50

^a No chinook salmon were caught by surveyed anglers on the Upper Wood River.

Table 5.-Number and percent of angler trips, by angler and gear type, during the chinook salmon sport fisheries on the upper Wood River and Muklung River, 2000.

Characteristic	Upper Wood River		Muklung River	
	Angler Trips	Percent	Angler Trips	Percent
ANGLER TYPE				
Guided	17	52	53	54
Unguided	16	48	46	46
RESIDENCY				
Alaskan Residents	12	36	31	31
Local Alaskan Residents ^a	11	33	23	23
Nonlocal Alaskan Residents ^b	1	3	8	8
Non-Alaskan Residents	21	64	68	69
U.S. Resident	33	100	99	100
Non-U.S. Resident	0	0	0	0
SEX				
Male	28	85	87	88
Female	5	15	12	12
TACKLE TYPE				
Spin	26	79	91	92
Fly	7	21	8	8
Spin and Fly	0	0	0	0
Bait	7	21	37	37
TYPE OF INTERVIEW				
Complete Trip	8	24	4	4
Incomplete Trip	25	76	95	96
Total Angler Trips	33		99	

^a Alaskan resident living in Dillingham, Aleknagik, Portage Creek, Ekwok, New Stuyahok, or Koliganek.

^b All other Alaskan residents.

Although bag limits for chinook salmon in the Wood River drainage were reduced to one per day and two per year by the Board of Fisheries, periodic surveys of the upper Wood and Muklung River chinook salmon fisheries should continue to ensure effective management of these small but important sport fisheries. With greater understanding of these fisheries, the department will be able to plan for research and will be more prepared to deal with management issues in the future.

Table 6.-Numbers of chinook salmon, by age, sampled at the Muklung River, 2000.

	Age					Total
	1.2	1.3	1.4	1.5	1.6	
<u>Sampled from the Sport Harvest</u>						
Females	1		1	4	1	7
Males			1			1
Sex Unknown		1	1	1		3
All Samples	1	1	3	5	1	11
Percent	9	9	27	45	9	100
<u>Sampled from the Test Fishery</u>						
Females	1	1	1			3
Males						0
Sex Unknown	1	2	2	2		7
All Samples	2	3	3	2	0	10
Percent	20	30	30	20	0	100

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