

Fishery Data Series No. 25-52

**Monitoring the Coho Salmon Sport Fishery on the
Naknek River Drainage, 2023**

by

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and

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November 2025

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Mathematics, statistics	
centimeter	cm	Alaska Administrative Code	AAC	<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	H_A
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
hectare	ha	at	@	catch per unit effort	CPUE
kilogram	kg	compass directions:		coefficient of variation	CV
kilometer	km	east	E	common test statistics	(F, t, χ^2 , etc.)
liter	L	north	N	confidence interval	CI
meter	m	south	S	correlation coefficient	
milliliter	mL	west	W	(multiple)	R
millimeter	mm	copyright	©	correlation coefficient	
		corporate suffixes:		(simple)	r
Weights and measures (English)		Company	Co.	covariance	cov
cubic feet per second	ft ³ /s	Corporation	Corp.	degree (angular)	°
foot	ft	Incorporated	Inc.	degrees of freedom	df
gallon	gal	Limited	Ltd.	expected value	E
inch	in	District of Columbia	D.C.	greater than	>
mile	mi	et alii (and others)	et al.	greater than or equal to	≥
nautical mile	nmi	et cetera (and so forth)	etc.	harvest per unit effort	HPUE
ounce	oz	exempli gratia	e.g.	less than	<
pound	lb	(for example)		less than or equal to	≤
quart	qt	Federal Information Code	FIC	logarithm (natural)	ln
yard	yd	id est (that is)	i.e.	logarithm (base 10)	log
		latitude or longitude	lat or long	logarithm (specify base)	log ₂ , etc.
Time and temperature		monetary symbols		minute (angular)	'
day	d	(U.S.)	\$, ¢	not significant	NS
degrees Celsius	°C	months (tables and figures): first three letters	Jan, ..., Dec	null hypothesis	H_0
degrees Fahrenheit	°F	registered trademark	®	percent	%
degrees kelvin	K	trademark	™	probability	P
hour	h	United States	U.S.	probability of a type I error	
minute	min	(adjective)		(rejection of the null hypothesis when true)	α
second	s	United States of America (noun)	USA	probability of a type II error	
		U.S.C.	United States Code	(acceptance of the null hypothesis when false)	β
Physics and chemistry		U.S. state	use two-letter abbreviations (e.g., AK, WA)	second (angular)	"
all atomic symbols				standard deviation	SD
alternating current	AC			standard error	SE
ampere	A			variance	
calorie	cal			population	Var
direct current	DC			sample	var
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
(negative log of)					
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

FISHERY DATA SERIES NO. 25-52

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NAKNEK RIVER DRAINAGE, 2023**

by

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ABSTRACT

The sport fishery for coho salmon (*Oncorhynchus kisutch*) on the Naknek River was examined from 1 to 31 August 2023 by creel survey and angler interviews. Index counts of anglers fishing between Pauls Creek and Trefon's Cabin ranged from 13 on 1 August to 55 on 18 August, with an average of 32 per survey day for the study period. Information was collected on angler-days of effort by type of angler (guided vs. unguided), residency (local, Alaska resident, non-Alaska U.S. resident, or foreign nonresident), catch and harvest rates of coho salmon, as well as sex, length, and weight of coho salmon in the sport harvest. A sport harvest of 257 coho salmon was reported from angler interviews, with 17 coho salmon released during the sample period in the study area. Most anglers (93.4%) utilized guided services and were mostly non-Alaska U.S. residents (94.1%). Interviews were conducted with 169 anglers to ascertain catch, harvest, and demographic information. Of 172 sampled sport-harvested coho salmon, the overall average mid eye to tail fork length was 548 mm, and the mean weight was 2.8 kg. These data provided real-time information for management of the sport fishery as well as needed information on the composition of the harvest during the month of August. Data collected from onsite surveys will be used to document use patterns and design regulations that will accommodate growth of the sport fishery while maintaining angling opportunity.

Keywords: coho salmon, silver salmon, *Oncorhynchus kisutch*, creel survey, Naknek River, Bristol Bay management area, sport fishery, catch, effort, harvest, creel

INTRODUCTION

The Naknek River is located on the Alaska Peninsula near the communities of Naknek, South Naknek, and King Salmon. The nearby airport in King Salmon provides easy access and contributes to the popularity of the Naknek River sport fisheries, which target coho salmon (*Oncorhynchus. kisutch*), chum salmon (*O. keta*), sockeye salmon (*O. nerka*), rainbow trout (*O. mykiss*), and Chinook salmon (*O. tshawytscha*). The Naknek River has the highest angler effort of any river in the Bristol Bay Management Area (BBMA), averaging 13,353 angler-days annually during 2016–2020 (Borden and Adickes 2022). It is also one of the most popular coho salmon fisheries in the BBMA (Figure 1). Anglers may anticipate catching coho salmon in the lower Naknek River from late July through September. The coho salmon fishery usually peaks during the first 2 weeks of August and most angling effort occurs during the month of August.

The Alaska Department of Fish and Game (ADF&G) Statewide Harvest Survey (SWHS¹) estimates of sport harvest of coho salmon from the Naknek River from 2012 to 2021 ranged from a high of 6,026 coho salmon in 2014 to a low of 1,490 in 2020 (Table 1). The estimated 2021 sport harvest of coho salmon from the Naknek River was 2,302, which fell below the 5-year average (2016–2020) of 3,903 (Table 1). Although ADF&G utilizes the SWHS to monitor major sport fisheries, the SWHS does not provide in-depth information on inseason estimates of sport effort, catch, and harvest at specific locations within a general location. The SWHS does not assess angler gear, residency, and whether an angler is guided or not; and it does not gather biological data from sport harvested fish. Because these are of interest to coho salmon management, regular creel surveys are necessary to collect this information.

¹ Alaska Sport Fishing Survey database [Internet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 16, 2022) <http://www.adfg.alaska.gov/sf/sportfishingsurvey/>.

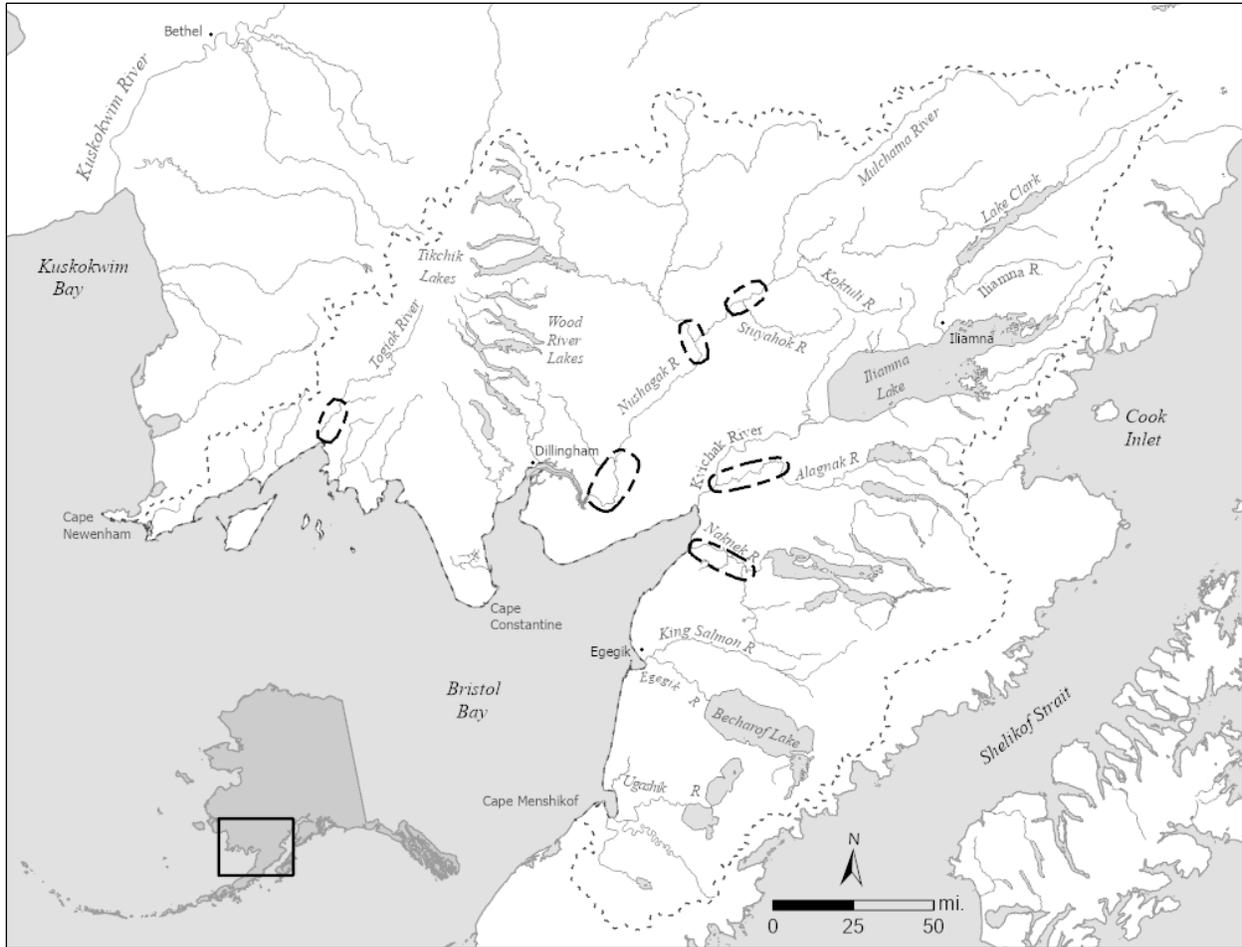


Figure 1.—Popular coho salmon sport fisheries (delineated with black dashes) in the Bristol Bay Management Area (delineated with dots).

Table 1.—Coho salmon commercial, subsistence, and sport harvests from the Naknek River, 1995–2023, with the 1971–1994 average.

Year	Harvest			Total
	Commercial ^a	Subsistence ^a	Sport ^b	
1995	1,105	1,791	1,788	4,684
1996	3,601	1,482	4,754	9,837
1997	718	1,457	3,879	6,054
1998	1,587	1,592	2,547	5,726
1999	303	856	3,672	4,831
2000	952	937	3,549	5,438
2001	3	740	4,795	5,538
2002	0	943	4,756	5,699
2003	42	812	6,393	7,247
2004	2,142	566	7,333	10,041
2005	3,314	1,224	2,714	7,252
2006	5,163	720	4,015	9,898
2007	2,180	1,104	4,218	7,502
2008	7,059	1,437	5,830	14,326
2009	732	669	4,325	5,726
2010	901	645	4,970	6,516
2011	633	690	2,879	4,202
2012	431	485	3,239	4,155
2013	467	399	2,987	3,853
2014	646	573	6,026	7,245
2015	1,253	796	3,942	5,991
2016	1,110	603	3,346	5,059
2017	4,754	1,346	5,521	11,621
2018	11,549	1,155	5,438	18,142
2019	1,418	552	3,718	5,688
2020	1,033	645	1,490	3,168
2021	1,053	909	2,302	4,264
2022	1,003	311	5,015	6,329
2023	1,126	359 ^c	1,820	2,946
Average				
1971–1994	13,406	1,237	2,559	17,201
1995–2020	2,042	932	4,159	7,132
2016–2020	3,973	860	3,903	8,736
2021–2023	1,061	526	3,046	4,513

Source: Borden and Adickes (2022); L. Borden and G. Hayden-Pless, Fisheries Biologists, Alaska Department of Fish and Game, Division of Sport Fish, Dillingham, unpublished data.

^a Commercial and subsistence harvest from Naknek-Kvichak District

^b Sport harvest from Naknek River and tributaries excluding Naknek Lake and tributaries.

^c Subsistence harvest preliminary

A creel survey was conducted by ADF&G to estimate sport effort, angler composition, catch and harvest rates, and biological data from sport harvested coho salmon that returned to the Naknek River in August 2023. ADF&G has used creel surveys extensively throughout southwest Alaska and on-site creel surveys of the Naknek River have been conducted sporadically since 1967 (Van Hulle et al. 1976; Gwartney, 1979, 1980; Gwartney and Russell 1978; Minard 1987, 1989; Minard and Brookover 1988; Dunaway 1990; Dunaway and Bingham 1991; Coggins 1992; Dunaway and Fleischman 1996; Gryska and Naughton 2001). Since 2001, a youth only fishery has been implemented, and several new lodges have been built along the Naknek River bringing with them an increase in angler effort on the river. Effort estimated by the SWHS is not quantified with respect to species and, therefore, the amount of new effort being targeted towards coho salmon is unknown. These factors were justification for a survey of the coho salmon sport fisheries in 2023.

Entering the 2023 coho season, sport regulations stipulated, in part, bag and possession limits for coho salmon on the Naknek River of 5 fish per day with no size limit, which are the same limits that have been in effect for coho salmon since 1972. There have been no inseason adjustments by emergency order to the Naknek River coho salmon fishery bag and possession limits since 1999. In 1999, the coho salmon runs were poor throughout Bristol Bay, and the coho salmon sport fishery was restricted by emergency order to 1 coho salmon per day beginning on 23 August.

OBJECTIVES

- 1) Index daily guided and unguided angler effort by sublocation (001 or 002) and in total for the Naknek River between Pauls Creek to Trefon's Cabin at Naknek Lake from 1 August to 31 August from count surveys.
- 2) Index daily and weekly catch and harvest rates of coho salmon in the Naknek River study area (Pauls Creek to Trefon's Cabin at Naknek Lake) from 1 August to 31 August from interviewed anglers.
- 3) Determine type (guided vs. unguided) and residency (local,² nonlocal Alaska resident, non-Alaska U.S. resident, or foreign nonresident) of interviewed anglers.
- 4) Estimate the sex, length, and weight compositions of coho salmon in the sport harvest, separately and in total, for both guided and unguided anglers in the Naknek River from 1 August to 31 August, such that the estimates are within 15 percentage points of the true values 95% of the time.

METHODS

STUDY AREA

The Naknek River flows west into Bristol Bay at the village of Naknek, about 90 km east of Dillingham. Roughly 25 km upstream from the mouth of the Naknek River lies the village of King Salmon, adjacent to the stretch of river where most of the sport fishing effort for coho salmon occurs. The study area is roughly 35 km long, extending from Pauls Creek upstream to the lake outlet marked by Trefon's Cabin (Figure 2). This study area was split into 2 sublocations due to the different angling methods utilized between the 2 sublocations. In Sublocation 001, from the lower boundary to Rapids Camp, anglers tend to focus on one bank then move throughout the

² Alaska resident living in King Salmon, Naknek, or the South Naknek area.

lower river. In Sublocation 002, from Rapids Camp to the upper boundary, the majority of anglers use a drift method.

STUDY DESIGN

Guided and Unguided Angler Counts

Angler counts were conducted 5 days per week, and 1 angler count was conducted during each sample day (Objective 1). Sampling days were randomly generated from each sampling week prior to the start of the project (Appendix A1). All counts were conducted at 10:30 AM, representing what is thought to be the peak time of angling activity, based on conversations with local anglers and guides, and took 1.5–2 hours to complete. One boat was used to conduct counts, beginning at the lower boundary of Sublocation 001 (mouth of Pauls Creek to Rapids Camp) and completing a continuous count to the upper boundary of Sublocation 002 (Rapids Camp to Trefon's Cabin). Safe, constant cruising speeds were maintained while maneuvering the river and counting active anglers; no stops were made until the count was completed. Active anglers were defined as those individuals handling rods and tackle, repositioning a boat, landing a fish, repairing gear, or assisting another angler, but not those who were solely operating boats or engaged in another activity not associated with angling. Guided and unguided anglers were differentiated by the presence or absence of green ADF&G guide decals on the boat. These counts provided an instantaneous representation (an index) of daily angler effort by guided and unguided anglers and by sublocation.

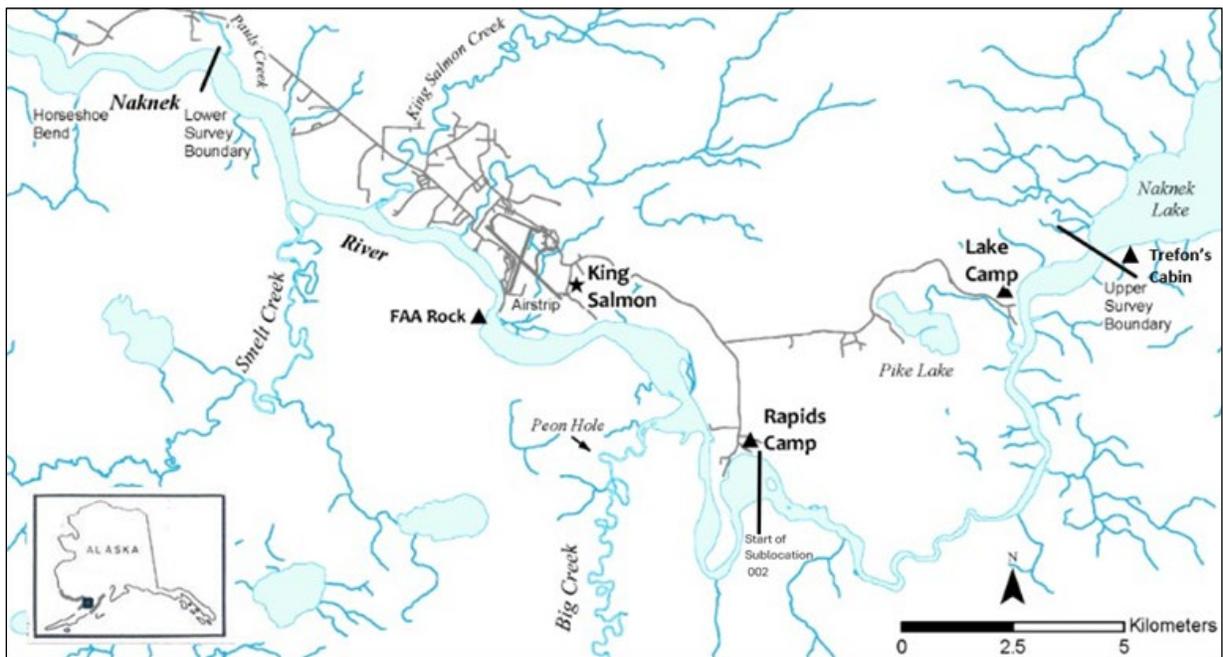


Figure 2.—Naknek River coho salmon study area and waypoints for sublocation boundaries.

Catch and Harvest Rates and Angler Composition by Interview

Staff roved the survey area each sample day and collected interviews from any anglers encountered who had completed their angling day. Roving surveys were chosen to gain as much diversity and obtain an accurate view of angling pressure and angler makeup as possible in an area that is a popular site for flyouts and where there are several fishing lodges present along the banks.

Individual interviews were conducted regardless of whether or not any fish were harvested. Anglers were asked a series of questions including length of time fished, duration of trip, number and species of fish caught and harvested, whether the services of a guide were utilized, and their residency category. Field technicians also collected biological data from all sport harvested coho salmon that were encountered during the interviews. This provided data on catch and harvest rates and composition (proportion) of anglers by type and residency during the sampling period (Objective 2).

Biological Composition of Harvested Fish

To complete Objective 3, sport harvested coho salmon from all interviewed anglers were measured for length to the nearest millimeter (mid eye to tail fork, METF), weighed to the nearest 0.1 kg, and sex was determined from external characteristics (developing kype on males, ovipositor on females). To avoid biasing the sample, all coho salmon retained by an angler or group of anglers was sampled (i.e., no subsampling of the creel). If the creel was incomplete, no samples were collected. The sampling design was expected to yield a proportional sample of the harvest throughout the duration of the fishery (i.e., an equal proportion of the harvest sampled each day). The resultant data were treated as if collected from a simple random sample.

DATA ANALYSIS

Effort Index from Angler Counts

The single angler count conducted each day provided an index of angler effort by sublocation in the study area during August 2023.

Angler Composition from Index Counts

At the end of the season, angler counts were used to estimate angler composition. The proportion of anglers categorized by type z (where z is either guided or unguided) was estimated as follows:

$$\hat{p}_z = \frac{m_z}{m} \quad (1)$$

where m_z equals the total number of anglers categorized as type z , and m equals the total number of anglers counted.

No estimates of the sampling variance were calculated because these proportions are merely descriptive in nature and cannot be used to make inferences about the fishery.

Catch and Harvest Rates from Angler Interviews

Daily and weekly estimates of catch per unit of effort (CPUE) by angler type from interview data were calculated as described below. A unit of effort is defined as an angler-day.

Daily CPUE on the i th day during the h th week by angler type g was calculated as follows:

$$CPUE_{ghi} = \frac{c_{ghi}}{n_{ghi}}, \quad (2)$$

where c_{ghi} equals the number of fish caught (both kept and released) on the i th day during the h th week of the survey by angler type g , and n_{ghi} is the number of completed-day anglers interviewed on the i th day during the h th week by angler type g .

Then the weekly estimate of CPUE during the h th week by angler type g was calculated as follows:

$$CPUE_{gh} = \frac{\sum_{i=1}^{m_h} cpue_{ghi}}{m_h}, \quad (3)$$

where m_h equals the number of days sampled in the study area during week h of the survey.

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

Assumptions

The assumptions necessary for unbiased estimates obtained by Equations 2–3 are as follows:

- 1) Interviewed anglers accurately report the number of coho salmon kept and released.
- 2) Division of Sport Fish staff accurately classify anglers into guided vs. unguided, and the interviewed anglers accurately report details of their fishing day.
- 3) Catch rate and duration of fishing trip are independent (DiCostanzo 1956). This is needed for a roving method of interviewing; anglers with longer fishing trips have a greater probability of being intercepted for interview.
- 4) The distribution of angler effort within the angling day does not vary substantially during the course of the survey season (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).

There are no direct ways of evaluating or testing any of the assumptions. For Assumptions 1 and 2, anglers are expected to have a good recollection of the total number of fish kept and released and to accurately report their fishing day characteristics (hours fished, trip duration, etc.) In addition, project staff are expected to accurately record interview data. Assumptions 3 and 4 should be valid if the number of interviews results in a census of completed-day anglers. If the number of interviews do not result in a census of completed-day anglers, then the interviews need to be collected daily in proportion to the total number of anglers present throughout the study. It is likely this assumption is held if the ratio of the angler count to the number of interviews performed on a given day remains stable throughout the study.

Biological Composition of Harvested Fish

The proportion of harvested coho salmon of category (sex, length, or weight class) u was estimated as follows:

$$\hat{p}_u = \frac{n_u}{n}, \quad (4)$$

where n_u equals the number of sampled coho salmon in category u , and n equals the total number of coho salmon sampled.

Variance of each proportion was estimated without the finite population correction factor because we will not have harvest estimates:

$$\text{var}(\hat{p}_u) = \frac{\hat{p}_u(1 - \hat{p}_u)}{n - 1} \quad (5)$$

Mean length- and weight-at-age of harvested coho salmon was estimated following standard procedures (Sokal and Rohlf 1981, Boxes 4.2 and 7.1, pages 56 and 139). The standard error was estimated as the square root of the variance estimate.

RESULTS

INDEX COUNTS

Angler Effort and Composition

During the 2023 sampling period (1 August–31 August), creel technicians completed 22 survey counts. Index counts of anglers fishing in the survey area ranged from a low of 13 on 1 August, reaching a peak of 55 on 18 August, with an average for the study period of 32 anglers per survey day (Figure 3, Table 2). Guided anglers made up 93.4% of the effort on average (Figure 4, Table 3). The peak effort within Sublocation 001 occurred in week 3 (20 August) with 29 anglers, but the peak effort within Sublocation 002 occurred during week 5 (29 August) with 37 anglers. Sublocation 002 had greater effort overall, making up 65.8% (456) of the total effort during August compared to 34.2% (237) in Sublocation 001 (Figure 3). Guided anglers made up 94.5% (431) of the observed effort in Sublocation 002 and 91.1% (216) in Sublocation 001.

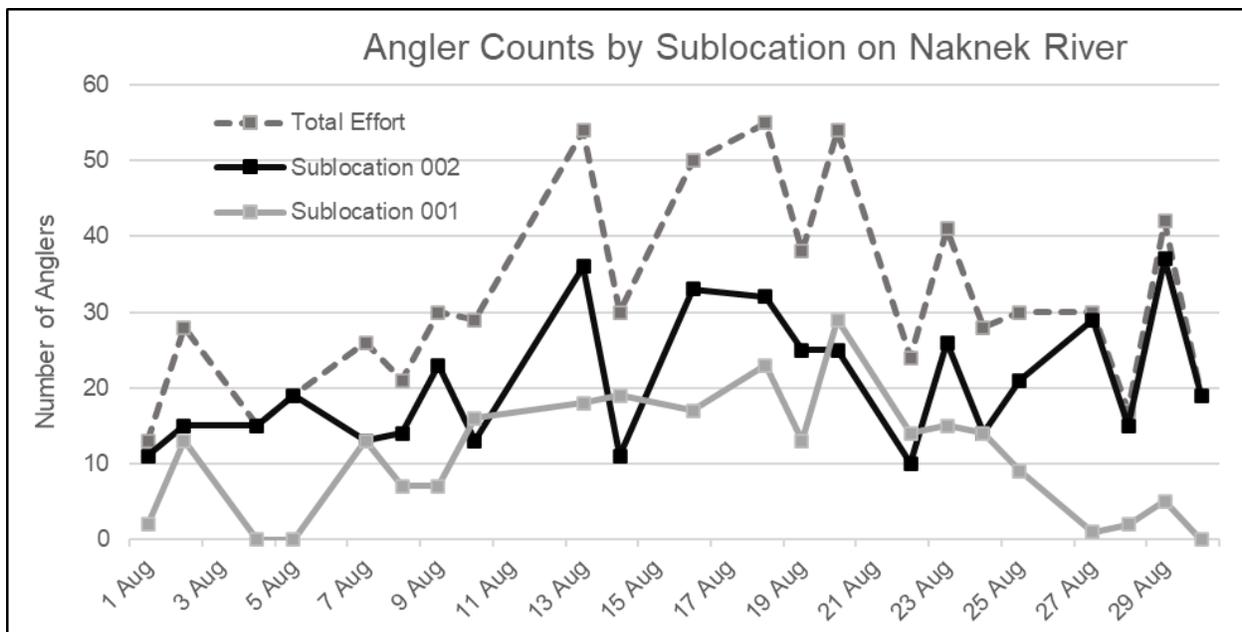


Figure 3.—Angler counts for Sublocation 001, Sublocation 002, and the total count by survey day in the Naknek River for the month of August 2023.

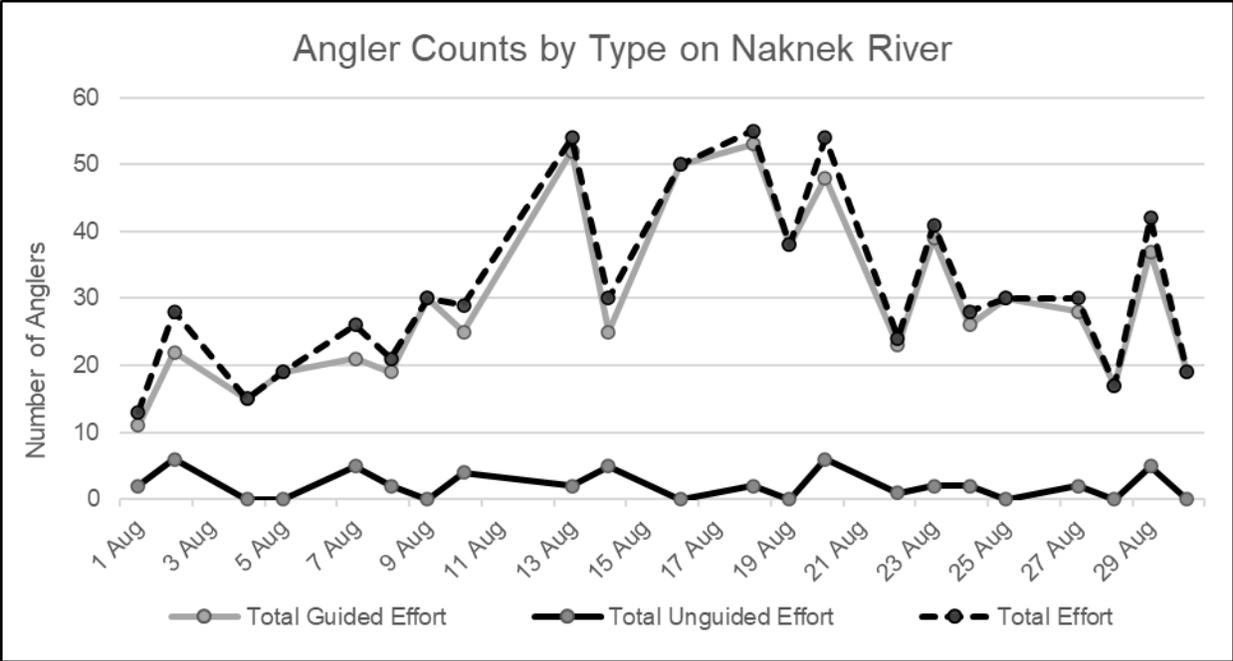


Figure 4.—Angler composition (guided, unguided, and total) from index surveys on the Naknek River in August 2023.

Table 2.–Summary of sampling information obtained on the Naknek River during the sampling period of 1 August–31 August 2023.

Week	Week date range	Surveys	Angler counts	Interviewed anglers	Alaska resident anglers	Coho salmon released	Coho salmon harvested	Mean daily observed effort for the week	Total observed effort	Angler-hours (rod hours)	CPUE ^a	HPUE ^b
1	1 Aug–5 Aug	4	75	24	0	3	20	18.8	131.3	168.0	0.8	0.7
2	6 Aug–13 Aug	5	160	28	0	0	36	32.0	224.0	175.7	1.2	1.2
3	14 Aug–20 Aug	5	227	39	3	10	61	45.4	317.8	234.5	2.0	1.7
4	21 Aug–27 Aug	5	153	61	2	2	123	30.6	214.2	431.0	2.2	2.2
5	28 Aug–30 Aug	3	78	17	2	2	17	26.0	182.0	128.0	1.4	1.2
Week average		–	–	–	–	–	–	30.6	213.9	227.4	1.5	1.4
Cumulative total		22	693	169	7	17	257	–	–	1,137.2	–	–

^a Number of fish caught per angler-day of effort.

^b Number of fish harvested per angler-day of effort.

Table 3.—Daily summary of sampling information obtained on the Naknek River during the sampling period of 1 August–31 August 2023.

Date	Week	Anglers counted on index surveys	Percent guided ^a	Percent unguided ^a	Total interviews	Total harvested	Total released	Total caught	Total caught <508 mm TL	Total caught >610 mm TL	Catch per angler-day	Harvest per angler-day
1 Aug	1	13	84.6	15.4	2	0	0	0	b	b	0.0	0.0
2 Aug	1	28	78.6	21.4	10	8	3	11	b	b	1.1	0.8
4 Aug	1	15	100.0	–	7	5	0	5	1	0	0.7	0.7
5 Aug	1	19	100.0	–	5	7	0	7	3	0	1.4	1.4
7 Aug	2	26	80.8	19.2	7	7	0	7	5	0	1.0	1.0
8 Aug	2	21	90.5	9.5	5	4	0	4	3	0	0.8	0.8
9 Aug	2	30	100.0	–	6	1	0	1	b	b	0.2	0.2
10 Aug	2	29	86.2	13.8	7	20	0	20	0	2	2.9	2.9
13 Aug	2	54	96.3	3.7	3	4	0	4	0	2	1.3	1.3
14 Aug	3	30	83.3	16.7	5	18	3	21	3	1	4.2	3.6
16 Aug	3	50	100.0	–	12	3	0	3	3	0	0.3	0.3
18 Aug	3	55	96.4	3.6	9	22	0	22	1	0	2.4	2.4
19 Aug	3	38	100.0	–	9	18	3	21	0	0	2.3	2.0
20 Aug	3	54	88.9	11.1	4	0	4	4	b	b	1.0	0.0
22 Aug	4	24	95.8	4.2	4	9	0	9	0	1	2.3	2.3
23 Aug	4	41	95.1	4.9	23	35	0	35	3	2	1.5	1.5
24 Aug	4	28	92.9	7.1	9	26	0	26	3	5	2.9	2.9
25 Aug	4	30	100.0	–	16	31	2	33	4	2	2.1	1.9
27 Aug	4	30	93.3	6.7	9	22	0	22	1	0	2.4	2.4
28 Aug	5	17	100.0	–	4	6	1	7	2	0	1.8	1.5
29 Aug	5	42	88.1	11.9	8	0	0	0	b	b	0.0	0.0
30 Aug	5	19	100.0	–	5	11	1	12	1	0	2.4	2.2
Total	–	693	93.4	6.6	169	257	17	274	33	15	–	–
Average	–	–	–	–	–	–	–	–	–	–	1.6	1.5

Note: Mid eye to tail fork (METF) lengths were converted to estimated total length (TL) to determine numbers in this size category.

^a From index count surveys.

^b No biological data were collected on this day due to either no coho salmon harvested or the harvested coho salmon were fileted before the technician was able to obtain a sample.

ANGLER INTERVIEWS

Angler Composition

During the 2023 sampling period (1 August–31 August), creel technicians conducted 169 interviews of anglers on the Naknek River. Only guided anglers were interviewed. Alaska resident anglers (both local and nonlocal) made up 4.1% of interviewed anglers (Table 2). Almost all interviewed anglers were non-Alaska U.S. residents (94.1%) followed by nonlocal residents of Alaska (3.0%). Nonresident foreign anglers made up 1.78%, and local residents³ were the smallest group of interviewed anglers at 1.18% (Table 4).

Table 4.—Summary of residency of interviewed anglers on the Naknek River during the sampling period of 1 August–31 August 2023.

Residency	Counts	Proportion (%)
Non-Alaska U.S. resident	159	94.1
Foreign nonresident	3	1.8
Nonlocal Alaska resident	5	3.0
Local resident	2	1.2

Catch and Harvest Rates

The catch and harvest rate assumptions were likely upheld because the ratio of the angler count to the number of interviews performed on a given day remained stable throughout the study.

Interviewed anglers reported 257 coho salmon harvested with only 172 fish available to sample.⁴ Reported catch for August was 274 coho salmon (Table 3). Mean weekly estimates of CPUE per angler ranged from 0.80 fish per day during week 1 to 2.23 fish per day during week 4 (Table 2). Over the entire study, CPUE per angler averaged 1.54 fish per day. Weekly estimates of HPUE per angler ranged from 0.73 fish per day in week 1 to 2.21 fish per day in week 4 (Table 2). Over the entire study, HPUE per angler averaged 1.41 fish per day (Table 2).

Length, Weight, and Sex Composition of Harvested Fish

During angler interviews, biological data were collected from a total of 172 coho salmon sport harvested from both sublocations. Of the sampled coho salmon, 59.9% (SE = 3.8%) were male and 40.1% (SE = 3.8%) were female, with a mean METF length of 548.2 mm (SE = 3.6) and a mean weight of 2.81 kg (SE = 0.06; Table 5). Of the 172 sampled coho salmon, 33 fish were smaller than 508 mm (20 in) METF length and 15 fish were larger than 610 mm (24 in; Table 3). The length bracket of 550–580 mm had the greatest sample number (Figure 5), along with the weight bracket of 2.9–3.8 kg (Figure 6).

³ Alaska resident living in King Salmon, Naknek, or the South Naknek area.

⁴ Fish were fileted before a sample could be obtained by the technicians.

Table 5.—Composition of sport harvested coho salmon sampled on the Naknek River, August 2023.

Harvest composition	Mean	SE	Counts	Proportion (%)	SE (%)
METF length (mm)	548.19	3.60			
Weight (kg)	2.81	0.06			
Male			103	59.90	3.80
Female			69	40.10	3.80

Note: METF = mid eye to tail fork length.

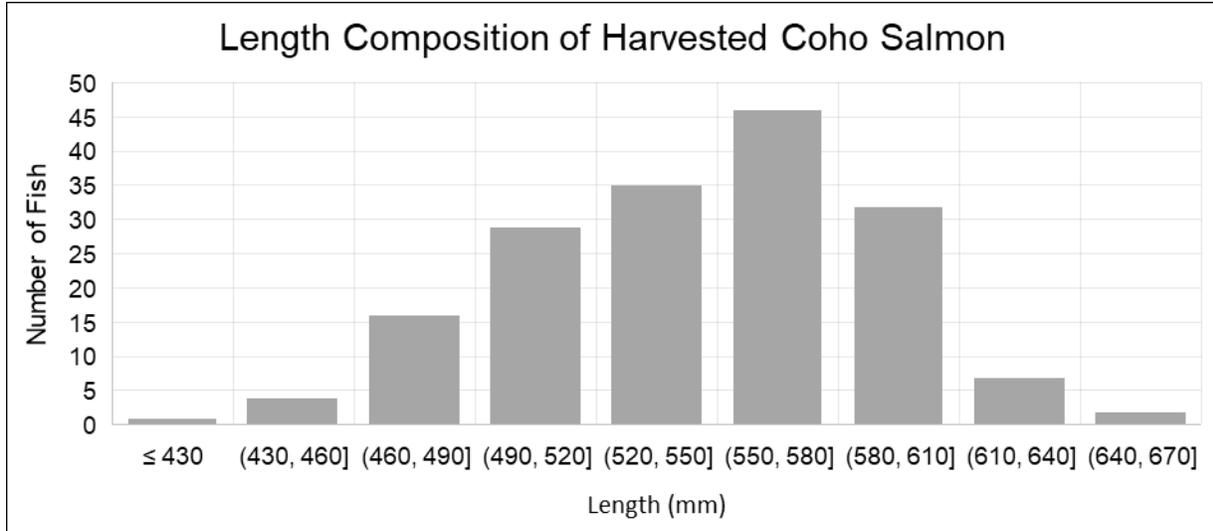


Figure 5.—Length of sampled sport harvested coho salmon on the Naknek River, August 2023.

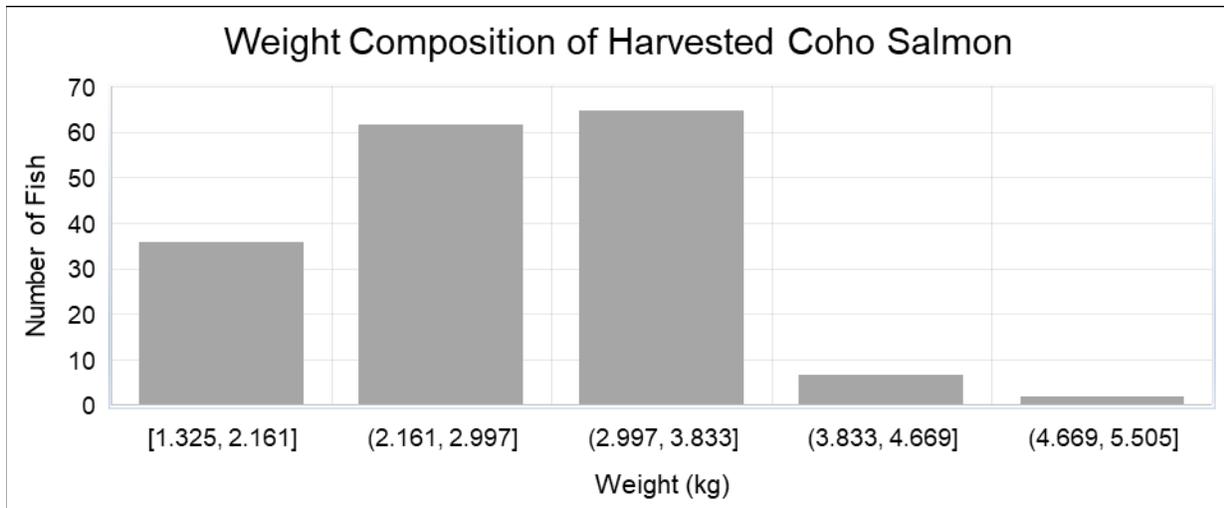


Figure 6.—Weight of sampled sport harvested coho salmon on the Naknek River, August 2023.

DISCUSSION

The Naknek River coho salmon sport fishery develops in late July and continues into September. The peak angler effort during August occurred during the 3rd week, whereas the largest CPUE occurred during the 4th week. This is consistent with historical run timing, with the peak fishing period normally ranging from 7 August to 21 August for coho salmon in this drainage (Borden and Adickes 2022). Current information on coho salmon sport harvest and effort on the Naknek River has relied on the SWHS for the past 24 years. In recent years, the fall season commercial salmon fishery has not been active and its impact on Naknek coho salmon has been modest to nonexistent. Most of the commercial take is incidental to the sockeye salmon fishery. Subsistence harvests of coho salmon have varied since 2016, reaching a high of 1,346 in 2017, and falling to a low of 311 in 2022 (Table 1). Since 2016, sport fish harvest has fluctuated from a high of 5,521 in 2017 to a low of 1,490 in 2020, averaging 3,903 coho salmon harvested annually from 2016 to 2020 (Table 1). The harvest of Naknek River coho salmon in 2022 was 5,015, but declined to 1,820 in 2023 (Table 1).

Unfortunately, coho salmon escapement estimates are still lacking for the Naknek River drainage. Difficulties surrounding the creation of a biological escapement goal (BEG) for the Naknek River are due in part to the commercial harvest occurring on stocks returning to 3 different major rivers, (Naknek, Kvichak, and the Alagnak Rivers), hindering apportionment to the Naknek River. The unknown composition of the commercial harvest with respect to these 3 stocks skews calculations for the spawner–return relationships needed to create a BEG. This adds to the difficulty in assessing fishery impacts on the total run and makes alternative assessments, such as a creel survey, paramount.

The last creel survey of the coho salmon sport fishery conducted on the Naknek River was in 1999. With the fishery’s popularity and a lack of escapement monitoring, it is critical to monitor the fishery in the drainage to better understand trends in the coho salmon run and to maintain angling opportunities. In previous creel surveys, objectives were similar, but the boundaries and time strata were different, along with methods, such as using exit locations versus roaming interviews (Gwartney 1976, 1978, 1979, and 1980; Minard 1987 and 1989; Minard and Brookover 1988; Dunaway 1990; Dunaway and Bingham 1991; Coggins 1992; Dunaway and Fleischman 1996; and Gryska and Naughton 2001), so direct statistical comparisons of CPUE and HPUE are not valid. Furthermore, previous studies calculated CPUE and HPUE per rod hour, whereas 2023 study results were calculated per angler-day (Table 6).

Comparisons of angler composition may also be difficult because this project took place in August, whereas previous studies included June and July and provided a larger sample size but included anglers targeting Chinook salmon as well. Furthermore, it is interesting to note that the majority of anglers counted during the 2023 survey were guided and the creel interviews indicated most were non-Alaska U.S. residents, whereas in the 1991, 1995, and 1999 studies during the coho salmon fishery, the majority of anglers were unguided non-Alaska U.S. residents (Gryska and Naughton 2001).

During the index survey, the majority of observed effort included guided anglers in Sublocation 002. It was noted by many interviewed anglers that while fishing for coho salmon, anglers would switch to angling for rainbow trout. This may explain why large numbers of anglers were found in Sublocation 002, where angling for rainbow trout is popular. The number of unguided anglers (46)

was small, making it difficult to know when or where unguided anglers would complete their day, so no angler interviews were conducted for unguided anglers.

The overall length and weight of harvested coho salmon appeared to be generally smaller than in previous studies. The 1999, 1995, and 1991 studies noted a mean METF length of 592 mm (SE = 2.6), 592 mm (SE = 2.0), and 581 mm (SE = 1.9), respectively, and a mean weight of 3.5 kg (SE = 0.04), 3.6 kg (SE = 0.05), and 3.5 kg (SE = 3.44), respectively. This study (2023) found a mean length and weight of 548 mm (SE = 3.60) and 2.8 kg (SE = 0.06). The 2023 male to female ratio of sampled sport harvested coho salmon was skewed toward males (60%), which is consistent with previous studies: 60%, 53%, and 57% in 1999, 1995, and 1991, respectively. Overall, it appears the Naknek River coho salmon August fishery may have changed from previous years, with a shift toward guided angling and perhaps a decline in coho salmon size. Given the popularity of the drainage to anglers, due to its various species and ease of access, it is advisable to continue periodic angler and creel surveys so that this important sport fishery will be well monitored. Greater understanding of the fishery and its participants will aid ADF&G in the management of this popular drainage.

Table 6.—Catch per unit effort (CPUE) in the coho salmon sport fishery, by temporal component, for 4 previous creel surveys in the Naknek River.

Year	Week date range	CPUE ^a	SE	Total average
1989	1–7 Aug	0.224	0.092	0.315
	8–14 Aug	0.427	0.276	
	15–21 Aug	0.306	0.084	
	22–31 Aug	0.305	0.100	
1991	1–7 Aug	0.526	0.065	0.337
	8–14 Aug	0.300	0.029	
	15–21 Aug	0.324	0.031	
	22 Aug–1 Sep	0.197	0.019	
1995	1–7 Aug	0.292	0.037	0.325
	8–14 Aug	0.507	0.072	
	15–21 Aug	0.203	0.037	
	22–31 Aug	0.297	0.045	
1999	1–7 Aug	0.077	0.022	0.178
	8–14 Aug	0.141	0.026	
	15–21 Aug	0.217	0.036	
	22–31 Aug	0.278	0.025	

Source: Dunaway (1990); Coggins (1992); Dunaway and Fleischman (1996); and Gryska and Naughton (2001).

^a CPUE is fish per angler-hour.

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APPENDIX A: ANGLER COUNT SCHEDULE

Appendix A1.–Preseason Naknek River creel survey sampling schedule, 2023.

Week	Date	Day	Sampled
1	1 Aug	Tuesday	X
	2 Aug	Wednesday	X
	3 Aug	Thursday	–
	4 Aug	Friday	X
	5 Aug	Saturday	X
	6 Aug	Sunday	–
2	7 Aug	Monday	X
	8 Aug	Tuesday	X
	9 Aug	Wednesday	X
	10 Aug	Thursday	X
	11 Aug	Friday	–
	12 Aug	Saturday	–
	13 Aug	Sunday	X
3	14 Aug	Monday	X
	15 Aug	Tuesday	–
	16 Aug	Wednesday	X
	17 Aug	Thursday	–
	18 Aug	Friday	X
	19 Aug	Saturday	X
	20 Aug	Sunday	X
4	21 Aug	Monday	–
	22 Aug	Tuesday	X
	23 Aug	Wednesday	X
	24 Aug	Thursday	X
	25 Aug	Friday	X
	26 Aug	Saturday	–
	27 Aug	Sunday	X
5	28 Aug	Monday	X
	29 Aug	Tuesday	X
	30 Aug	Wednesday	X
	31 Aug	Thursday	–

Note: “X” indicates a survey was either planned or conducted; en dash means no survey or sampling done.