Fishery Data Series No. 05-42

Evaluation of the Effectiveness of Fish Wheels and Dipnetting in Capturing Steelhead Returning to the Copper River in 2004

by
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August 2005

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

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

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

Mathematics, statistics

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

FISHERY DATA REPORT NO. 05-42

EVALUATION OF THE EFFECTIVENESS OF FISH WHEELS AND DIPNETTING IN CAPTURING STEELHEAD RETURNING TO THE COPPER RIVER IN 2004

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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-10-20, Job No. R-3-2(d).

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This document should be cited as:
Savereide, J. W. 2005. Evaluation of the effectiveness of fish wheels and dipnetting in capturing steelhead returning to the Copper River in 2004. Alaska Department of Fish and Game, Fishery Data Series No. 05-42, Anchorage.

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ABSTRACT

A subsistence-style fish wheel and dip nets fished from a drifting river boat were used in the mainstem of the Copper River, Alaska to evaluate and contrast their effectiveness in capturing adult steelhead *Oncorhynchus mykiss* migrating to upriver overwintering and spawning areas. Comparisons between the gear types were evaluated using CPUE information. From 26 August to 2 September 2004 the fish wheel was operated a total of 132 h and captured 8 steelhead, whereas 30.8 h were spent dipnetting and 4 steelhead were captured. Total CPUE was 1.45 (SE=0.31) steelhead per 24 hours of effort for the fish wheel and 3.12 (SE=0.29) for dipnetting. Direct comparison of total CPUE suggested that dipnetting was more effective at capturing steelhead than fish wheels, however, because of factors such as the ability to sample over a 24 h-period and the high cost of boat fuel and maintenance associated with dipnetting, fish wheels were judged to be the preferred capture gear.

Key words: Steelhead, *Oncorhynchus mykiss,* Copper River, Gulkana River, Dickey Lake, fish wheel, dipnetting, run-timing patterns, spawning distribution, Hanagita Lakes.

INTRODUCTION

The Copper River is a glacially dominated system located in Southcentral Alaska and is the second largest river in Alaska in terms of average discharge. It flows south from the Wrangell, Chugach, Alaska, and Talkeetna mountain ranges and empties into the Gulf of Alaska, slightly east of Prince William Sound (Figure 1). The Copper River drainage (61,440 km^2) supports spawning populations of steelhead *Oncorhynchus mykiss*, Chinook salmon *O. tshawytscha*, sockeye salmon *O. nerka*, and coho salmon *O. kisutch* as well as various freshwater fish.

Copper River steelhead are thought to represent the northernmost stocks of steelhead in North America (Burger et al. 1983). Steelhead are an anadromous form of rainbow trout and similar to other salmonid species living on the edges of their distribution, the populations in the Copper River drainage are thought to be relatively sparse and unproductive (Flebbe 1994). Adult steelhead pass through commercial, subsistence, personal use (PU) and sport fisheries on the way to their spawning grounds. No information is available to describe the overall run size or the inriver abundance that enters inriver fisheries. Steelhead harvests reported by subsistence fishers and catch reports from sport fishers suggest that undocumented spawning stocks exist.

Information on Copper River steelhead has been sporadically collected since the 1960s. Steelhead ascending the Hanagita River were sampled as early as 1963 in the sport fishery located at the outlet of Hanagita Lake (Williams 1964). In the 1980s steelhead were captured from the Copper River near Copperville and fitted with radio transmitters that led researchers to document a few spawning locations within the Tazlina and Gulkana River drainages (Burger et al. 1983). Researchers from the University Alaska-Fairbanks conducted studies along the Middle Fork Gulkana River on steelhead and rainbow trout spawning populations, habitat and juvenile feeding ecology (Stark 1999; Brink 1995). From 1998-2001, ADF&G Sport Fish Division collected information on what were considered to be two of the most significant steelhead spawning stocks in the Copper River drainage: the Hanagita Lake and Dickey Lake stocks. The latter studies demonstrated that these two stocks are genetically distinct and relatively small (< 450 fish combined). Genetic samples were also collected from Hungry Hollow Creek, an adjacent tributary to the Dickey Lake area, where 63 steelhead were sampled as they passed downstream through a weir after spawning. Comprehensive information on Copper River steelhead is generally lacking because sound and thorough scientific studies are relatively difficult to conduct due to characteristics of the populations (i.e., spawning stocks are small and seasonally present) and the vastness and remoteness of the Copper River drainage.

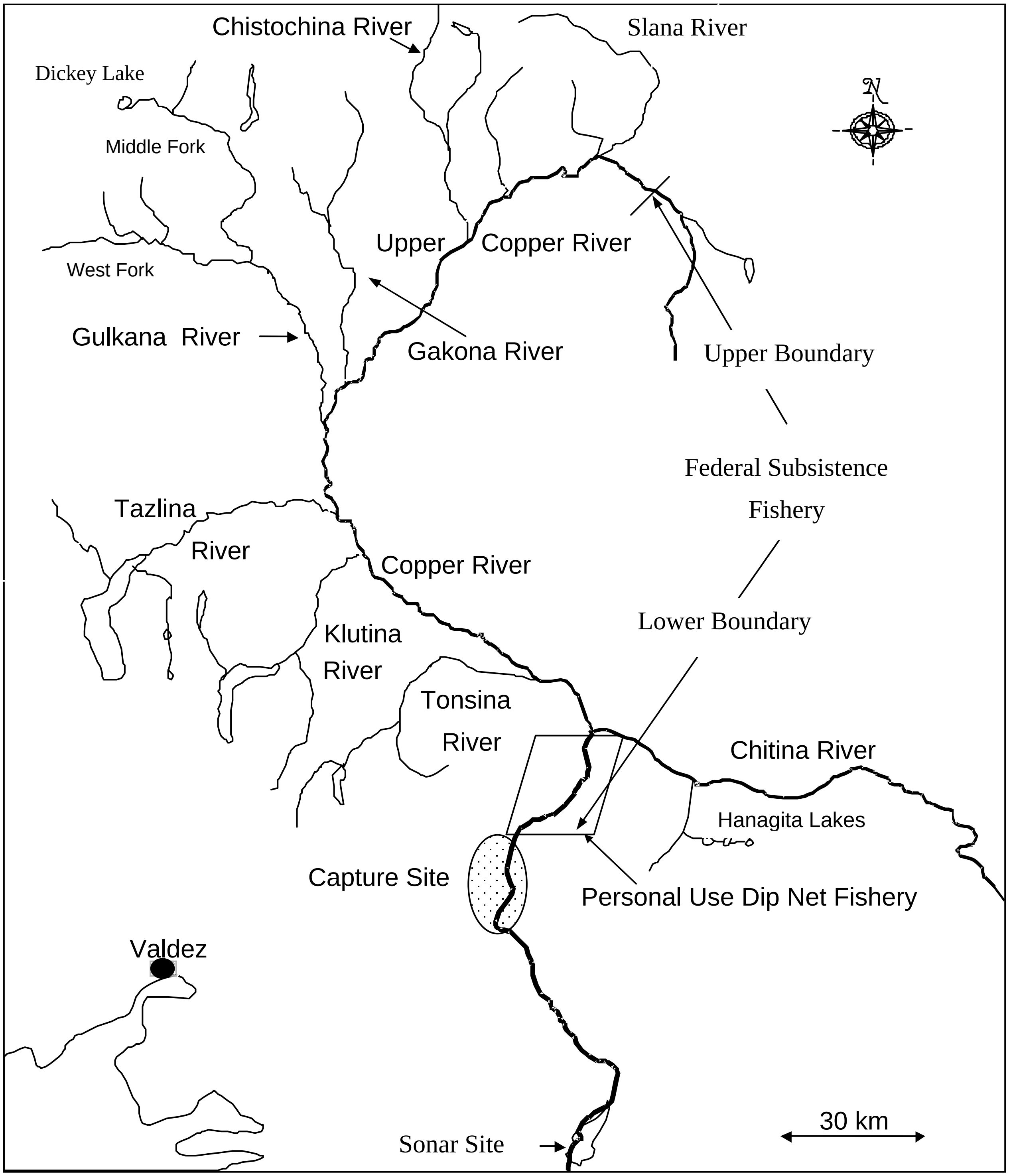

Figure 1.–Map of the Copper River drainage demarcating the capture site, Dickey and Hanagita lakes, and boundaries of the subsistence and PU fisheries.

Current information on steelhead harvests is based on subsistence fish wheel and PU annual harvest reports. These reports indicate that annual harvest of steelhead has ranged between 14 and 114 fish (ADF&G *Unpublished*). Catch information from returned permits indicates steelhead have been caught as far upstream as the Slana River and migrate up the Copper River from mid-August to early-October. Some additional subsistence harvests of steelhead (likely post-spawning fish) have been reported from late May to late June. During late May of 2000-2003, the potential harvest of an extended subsistence salmon fishing season on out-migrating adult steelhead was examined by fishing two test fish wheels near Tazlina (Eric Veach, National Park Service, Wrangell-St. Elias National Park; personal communication). In 2001 and 2003 combined, only 1 steelhead and 181 salmon were captured. However, in 2002, catches of salmon were small (3 sockeye) due to later run timing of salmon, but a total of 4 steelhead were captured. These observations demonstrate that the potential for a substantial steelhead harvest exists if subsistence fishing effort is large. In 2005, there are 119 fish wheels registered on the Copper River that fish from 1 June through 30 September.

In 2005, a 2-year (2005-2006) cooperative project (FIS 05-502) between the Office of Subsistence Management (OSM), Native Village of Eyak (NVE), National Park Service-Wrangell/St. Elias (NPS), Bureau of Land Management (BLM), and ADF&G, will be conducted with the goal of using radiotelemetry to estimate the proportion of steelhead that migrate to the Dickey Lake and Hanagita Lake spawning areas. The relative contribution of the Dickey and Hanagita Lake stocks, for which total returns have previously been estimated, to the drainage-wide steelhead spawning escapement will provide insight into the relative abundance of steelhead returning to the Copper River drainage. In addition, this study will estimate inriver run timing and document significant spawning and overwintering locations of steelhead upstream of the PU fishery in the Chitina Subdistrict (Figure 1).

Because no prior work had been conducted capturing steelhead downstream of the PU fishery, there was a lack of information on effective capture techniques that would ensure the proposed FIS 05-502 project objectives were achievable. Therefore, in the fall of 2004, a feasibility study was conducted to evaluate two capture methods (fish wheels and dipnetting from a drifting river boat). The study was conducted from 26 August thru 2 September when according to previous subsistence harvest records steelhead were likely to be migrating past the capture site in adequate numbers to evaluate capture gears (Figures 2 and 3). Information collected in this study will be used to refine the study design of the FIS project by determining: 1) which capture method(s) to use; 2) where and when the gear types are most effectively fished; and, 3) whether or not the required sample size (130 steelhead each year) could be achieved.

OBJECTIVES

The objectives of this study were to:

1. evaluate the effectiveness of a fish wheel in capturing steelhead below the PU fishery operated over an 8-day period up to 24-h per day by collecting detailed CPUE information to maximize flexibility in making comparisons by gear, time, and location;
2. evaluate the effectiveness of dipnetting from a drifting boat in capturing steelhead below and near the lower boundary of the PU fishery operated a minimum of 4 h per day (2-hrs during morning hours and 2-hrs during evening hours) over an 8-day period by collecting detailed CPUE information to maximize flexibility in making comparisons by gear, time, and location; and,
3. measure all captured steelhead for length (MEF and FL) to describe size composition of catch in 25-mm length categories for each gear type.

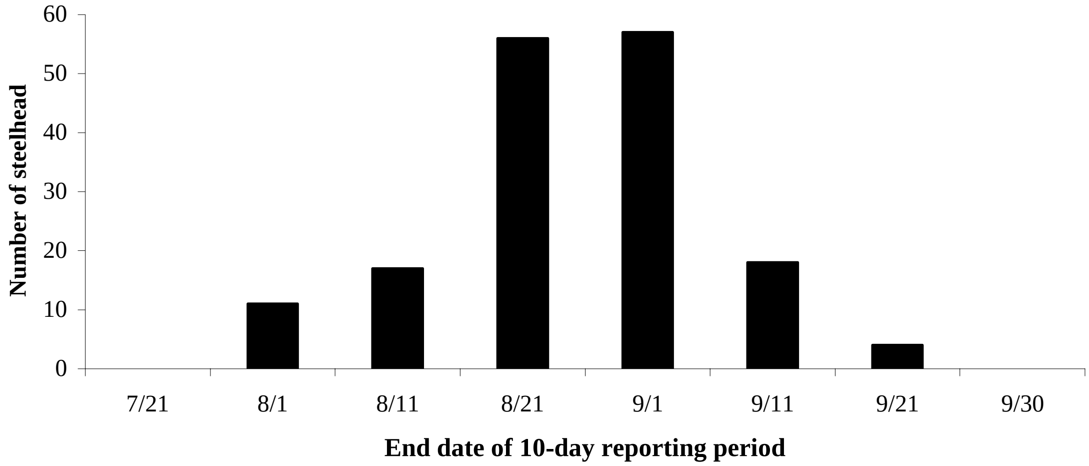

Figure 2.–Total number of steelhead reported harvested by dipnetters in the Chitina subdistrict PU fishery from 1991 to 1997. Harvest data were summarized over a 10- to 11-day period.

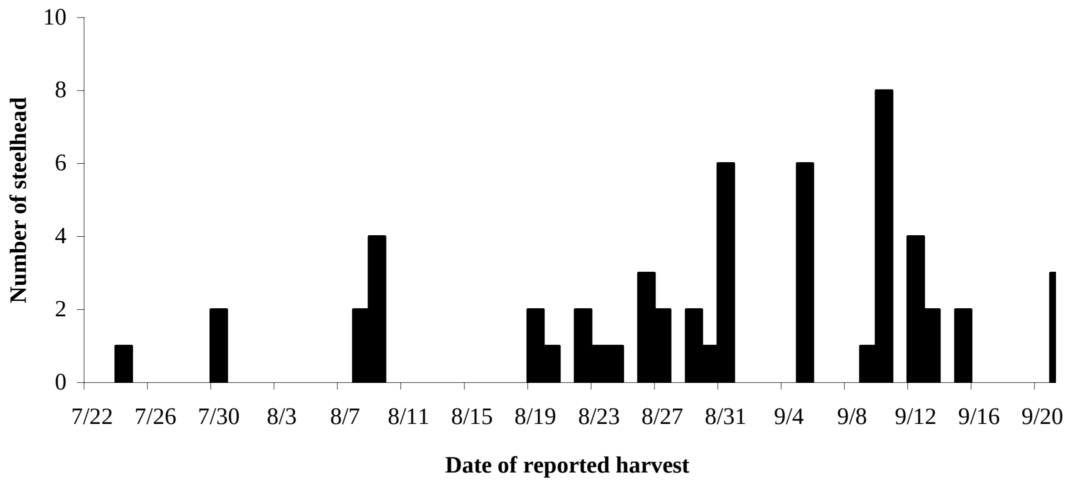

Figure 3.–Total number of steelhead reported harvested from 1996 to 2002 from subsistence fish wheels operated in the Glennallen subdistrict above the McCarthy Road Bridge and near the Chitina Airport.

METHODS

CAPTURE METHODS

Fish wheels

Steelhead were captured using a fish wheel positioned nearshore and with dip nets fished from a drifting riverboat. The fish wheel (Fish wheel 4) was designed and built to help monitor Chinook salmon escapement in the Copper River by NVE and LGL Alaska Research Associates (LGL). The fish wheel's construction in 2003 and installation and operation in 2004 followed the methods used in the Chinook salmon escapement study (Smith 2003). The fish wheel operated up to 24 hours a day with one live tank (4.3 m long x 1.5 m deep x 0.6 m wide) located on each side with four 2.44 m (8-foot) baskets that fished in a minimum of 2.44 m (8 feet) of water. Escapement panels, designed to reduce the catch of sockeye salmon during Chinook salmon capture operations (Smith 2003) were closed when the fish wheel was operated. To ensure steelhead spent a minimal amount of time in the live tanks and were not over crowded by incidental catches of sockeye and coho salmon, the fish wheel was checked a minimum of three times a day. Captured steelhead were transferred to a sampling cradle located on a platform at the stern of the fish wheel.

The fish wheel was initially positioned adjacent to the east bank directly above field camp (Figure 4) in an area known to produce substantial Chinook salmon catches while dipnetting during radiotelemetry studies done in 1999-2001 (Evenson and Wuttig 2000; Wuttig and Evenson 2001; Savereide and Evenson 2002). However, the water velocity at this fishing site was insufficient to continually turn the fish wheel. Therefore, after 11 hours of fishing over 1.5 days the fish wheel was moved to another established location on the west bank (Figure 4). Over the remaining 6 days, except for one evening when the water dropped substantially overnight, the fish wheel fished 24 hours a day.

Dipnetting

Dip nets were commercially manufactured and constructed from solid-core aluminum tubing. Dip net heads were rectangular-shaped (122 cm wide x 88 cm high) and were attached to tubular fiberglass handles (3-4 m long x 1.3 cm diameter). The attached net bags were constructed with knotted nylon (8.9-10.2 cm stretch measure) and are 1.3 m deep. Plastic shovel handles capping the fiberglass handles facilitated handling and allowed crewmembers to maintain orientation of the net head perpendicular to the direction of the drifting riverboat.

Dipnetting took place in the morning and evening after the fish wheel was checked. Each shift lasted a minimum of 2 h or until 1.5 h of fishing time had been accrued.. A three-person crew conducted dip net capture operations. One crewmember piloted the boat and two crewmembers positioned in the bow of the boat operated dip nets. At the start of each drift, the boat was positioned nearshore with the bow facing upstream. Distances the boat was drifted from shore varied depending on water levels. Typically drifts were conducted 1-10 m from shore, but were occasionally conducted as far as 25 m offshore. The boat was idled downstream, stern first, such that the velocity of the boat was slightly faster than the current at the bottom of the water column. This ensured that the dip nets remained open or "bagged" when facing downstream.

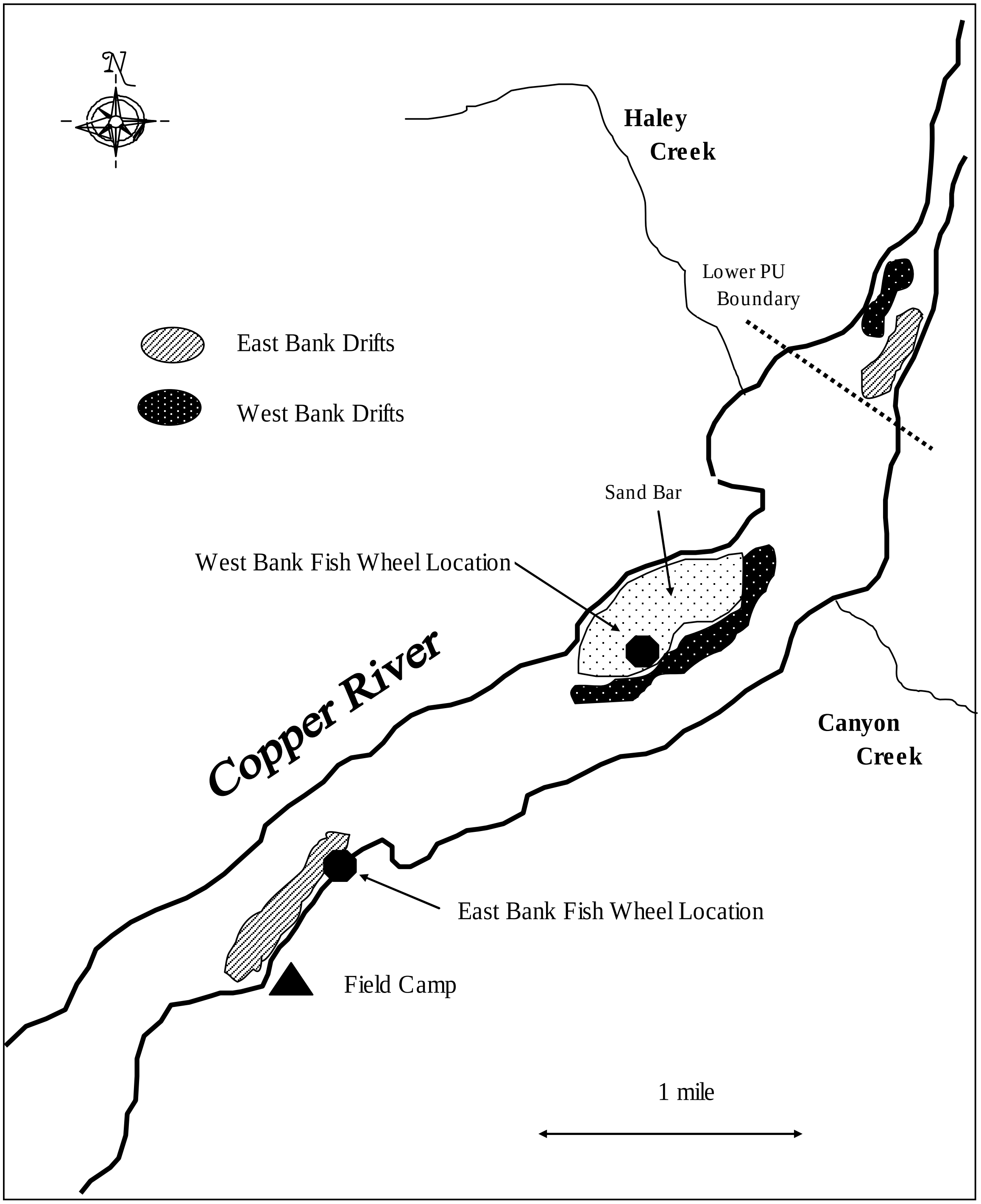

Figure 4.–Map of the Copper River demarcating the fish wheel and dip net capture locations, lower PU fishery boundary, and field camp, 2004.

The dip nets were positioned vertically in the water column from each side of the boat so that the flat edge of the dip net lightly bounced off the river bottom. Captured steelhead were placed into a plastic sampling tub located inside the boat for sampling.

Dipnetting was conducted in two areas established during the Chinook salmon radiotelemetry studies (Evenson and Wuttig 2000; Wuttig and Evenson 2001; Savereide and Evenson 2002) and two areas within the PU fishery (Figure 4).

DATA COLLECTION

For every steelhead captured, data collected and recorded included:

1) measurement of fish length to the nearest 5 mm (MEF and FL);
2) partial removal of the left ventral fin to prevent resampling;
3) type of capture gear;
4) date and time of capture; and,
5) capture location (e.g., east or west bank and reach drifted).

CPUE information tabulated for each gear type fished included:

1) start and stop times of each fishing period and/or duration of drift;
2) location where capture gear was deployed; and,
3) total catch (steelhead) and incidental catch (sockeye and coho) by period and/or drift.

The field project leader also kept a detailed, daily field journal. Information collected included:

1) number of fish (all species) captured per day;
2) time period and duration of gear fished per day;
3) weather and water conditions;
4) hours worked per day per crew member; and,
5) any other relevant observations or details to improve the study design or field work such as a listing of camp, sampling, and equipment needs.

Recorded data were transferred to Excel spreadsheets for analysis and archival.

CPUE ANALYSIS

CPUE summary statistics were calculated for each gear type for the following categories:

1. total steelhead catch;
2. steelhead by length category;
3. by time periods (e.g., day versus night) to examine for temporal patterns; and,
4. by bank (east or west).

CPUE was estimated as a ratio (Cochran 1977) of catch to fishing effort for the desired time period (e.g., hour, day, evening hours, 8-day period), gear type, and bank:

$$CPUE_{i,g,t,l} = \sum_{d=1}^{n_{g,t,l}} c_{i,g,t,l,d} \Big/ \sum_{d=1}^{n_{g,t,l}} s_{g,t,l,d} \qquad (1)$$

with variance:

$$\hat{V}(CPUE_{i,g,t,l}) = \frac{n_{g,t,l}\sum_{d=1}^{n_{g,t,l}}\left(c_{i,g,t,l,d}^2 - 2CPUE_{i,g,t,l}c_{i,g,t,l,d}s_{g,t,l,d} + CPUE_{i,g,t,l}^2 s_{g,t,l,d}^2\right)}{(n_{g,t,l}-1)\left(\sum_{d=1}^{n_{g,t,l}} s_{g,t,l,d}\right)^2} \qquad (2)$$

where:

$c_{i,g,t,l,d}$ = catch of category *i* using gear *g* during time period *t* at location *l* for observation *d* (d=1 to $n_{g,t,l}$);

$s_{g,t,l,d}$ = fishing time (d) using gear *g* during time period *t* at location *l* for observation *d*; and,

$n_{g,t,l}$ = number of observations for gear *g* during time period *t* at location *l* .

CPUE statistics for combinations of catch categories or temporal periods were calculated using equations 1 and 2 and substituting the appropriate sample size for $n_{g,t,l}$. Comparisons of CPUE statistics between gear or time periods were performed using a t-test with appropriate variance formulas for non-independent ratio estimates (Cochran 1977).

RESULTS

From 26 August to 2 September, the fish wheel operated a total of 132 h over 8 d and captured 8 steelhead, 417 coho salmon, and 1,085 sockeye salmon. Dipnetting for 30.8 h over 8 d yielded 4 steelhead, 249 coho salmon, and 368 sockeye salmon. Total CPUE was 1.45 (SE=0.31) steelhead per 24 hours of fishing effort for the fish wheel and 3.12 (SE=0.29) for dipnetting. Catch and effort by day varied for all species and gear (Appendix A). Captured steelhead ranged from 535 mm FL to 750 mm FL (Figure 5). Due to the small number of steelhead captured, CPUE statistics by length category were not calculated. Catch and CPUE summary statistics by time period and location reflect no discernable patterns in migratory timing or bank orientation (Table 1). Comparisons of CPUE statistics at different locations and time periods revealed no significant differences between the two capture methods (Table 2).

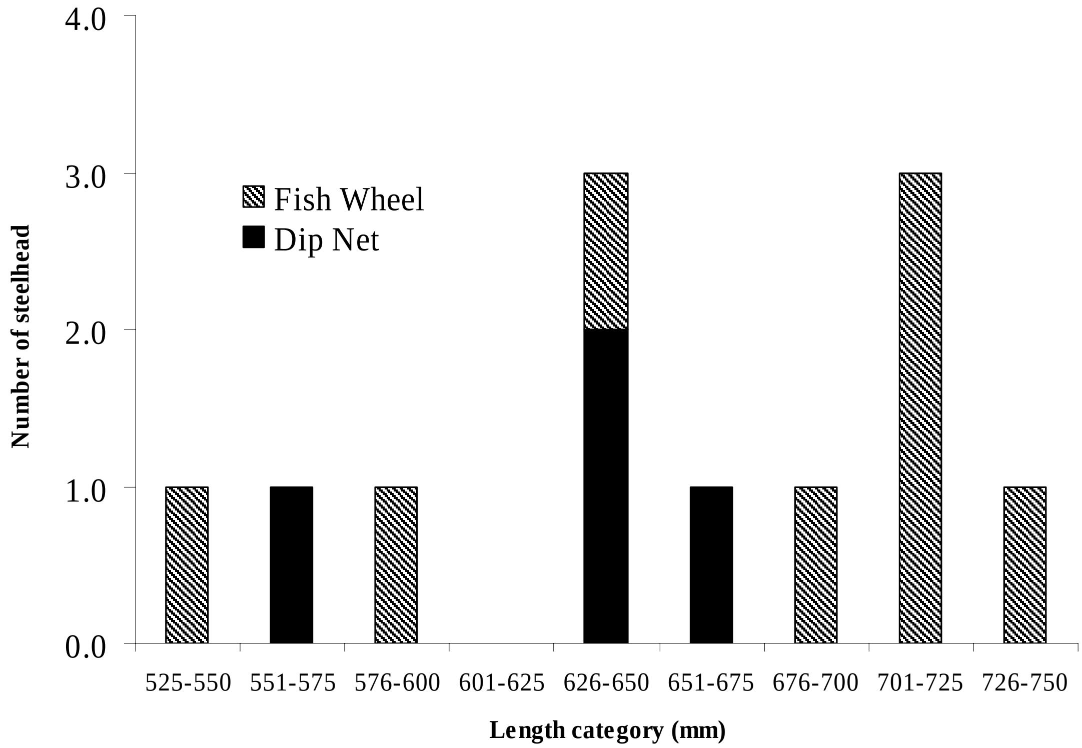

Figure 5.–Number of steelhead captured by fish wheel and dip net by 25 mm length category (FL) in the Copper River, 2004.

Table 1.–Fish wheel and dip net effort, catch, and CPUE (steelhead per day) summary statistics over an 8-day period in the Copper River, 2004.

	Fish Wheel				Dip Net			
	Days Fished	Catch	CPUE	SE	Days Fished	Catch	CPUE	SE
Total	5.50	8	1.45	0.04	1.28	4	3.12	0.07
East Bank	0.71	1	1.41	0.04	0.66	3	4.54	0.12
West Bank	4.79	7	1.46	0.05	0.62	1	1.61	0.07
AM Shifts	2.35	3	1.28	0.03	0.67	3	4.51	0.13
PM Shifts	3.15	5	1.59	0.07	0.62	1	1.62	0.07

Table 2.–Results of t-tests of equal CPUE between gear (fish wheel and dip net) by location (east and west bank) and time period (a.m. shifts and p.m. shifts) in the Copper River, 2004.

	Comparison				
	Total	East	West	AM	PM
t	0.07	0.13	6.2E-03	0.14	1.4E-03
d.f.	7	7	7	7	7
P-value	0.95	0.90	1.00	0.89	1.00

DISCUSSION

The goal of this study was to collect information to aid in developing a sampling design that will enable the capture of 130 adult steelhead in the Copper River over the course of the 2005 and 2006 fall migration in proportion to their actual passage. Relative to that goal, this study yielded two important findings: CPUE of steelhead with both fish wheels and dip nets was low, and fish wheels are likely a more cost-effective and labor-efficient gear at capturing steelhead than are dip nets.

Although mean CPUE estimates for the fish wheel and for dipnetting were statistically similar, and the point estimate for dipnetting was actually slightly larger than for the fish wheel, estimates were calculated for a 24 hour day and, in the case of dipnetting, are not indicative of what could be captured by a single crew during an 8-hr workday. During this study, the fish wheel operated for a total of 5.5 d and dipnetting was only conducted for 1.28 d. However, the crew-hours expended with each gear was similar. The fish wheel can operate unattended for extended periods, whereas dip nets must be continually operated by the crew. In other words, an 8-hour shift of dipnetting equates to about 4-5 h of fishing effort (by a crew of three) whereas an 8-hour shift with the fish wheel equates to 24 hours of fishing effort with the same crew. Therefore, in this study total catch by gear was probably a better indicator of gear efficiency than CPUE and suggested that a single fish wheel was about twice as efficient as dipnetting.

Based on the results of this study it is recommended for the 2005 and 2006 studies that, at a minimum, two fish wheels be operated continuously, one on each bank, for a six week period from mid August to late September. However, based on historic catches in the Glennallen subdistrict subsistence fishery (Figure 3), consideration should be given to begin sampling in early August. In addition to their greater catch ability, fish wheels are preferred to dipnetting because they are cheaper to operate and they allow for sampling all phases of the migration in that they operate continually on both banks of the river.

Over the 8-day sampling period both capture methods caught substantial numbers of sockeye and coho salmon. Steelhead emigration from the Situk River, AK coincides with the onset of an ebb tide typically between 2400 and 0600 hours (Johnson 1996). If steelhead migrating into the Copper River display a similar pattern then its possible they are migrating past the capture site in pulses or groups associated with their entry into the river. Interestingly, the day the fish wheel captured five steelhead was the day the fish wheel captured four times more coho salmon than any other day. At this time of the year the sockeye run is decreasing and the coho run is increasing. It’s possible that steelhead tend to migrate with the pulses of coho salmon. CPUE statistics by time period indicated no distinct pattern in steelhead migration but this was likely an artifact of the small sample size. To determine whether or not migratory patterns or pulses exist, and to sample effectively if they do, fish wheels that operate 24-hours a day are preferred over dipnetting.

Based on the low catch of steelhead in this study, it is questionable whether the target sample size (130 steelhead each year) for the 2005 and 2006 studies can be achieved by sampling with fish wheels alone (assuming a similar total run size). Total catch in this study with one fish wheel was 8 steelhead when fishing the majority (5.5 d) of an eight consecutive day period. Assuming a second fish wheel would have been equally effective over the same period, total catch would have been 16 steelhead or 12.3% of the target sample size. Although in this study only a fraction of the run was sampled (8 days of a run that lasts approximately 56 days), sampling was designed to cover what was thought to be the peak of the run (corresponding to roughly 25% or more of the run). However, in this study it is believed that the steelhead run may have been later than normal due to extremely high water levels and sampling may not have included the peak of the migration. The water levels on the Copper River in 2004 were equal or higher than previous record levels by mid-June and essentially remained that way until mid-September. Catches of steelhead in this study seemed to be correlated with catches of coho salmon *Oncorhynchus kisutch* which also were thought to have a later run timing than average (T. Taube, Sport Fish Biologist, ADF&G, Glennallen; personal communication). If the run was later than average, it is possible that a smaller fraction of the run was sampled than was assumed, in which case the target sample size may be achievable.

Because total catch of steelhead was low, there was little information to evaluate catch efficiency by bank or time of day. If dipnetting will be added as a capture method in 2005 and 2006, sampling will need be confined to daylight hours, and should be conducted similarly to sampling in this study (sample in morning and evening along both banks). For planning purposes, the CPUE observed in this study should be assumed for the same relative periods in 2005 and 2006. Increasing dipnetting effort to allow dipnetting over the entire run will add considerable cost to the project. Project planners should consider approaches to incorporate dipnetting as an additional sampling method, but at a less intensive level than was done in this study in order to increase sample size. At a minimum, dipnetting should be conducted in the event that a fish wheel(s) becomes inoperable.

ACKNOWLEDGEMENTS

The Native Village of Eyak (NVE) provided the subsistence-style fish wheel and two personnel experienced with deploying and maintaining a fish wheel in the Copper River. Their involvement was crucial to the project’s success. Partial funding was provided by the U.S. Fish and Wildlife Service through the Federal Aid in Sport Fish Restoration Act (16 U.S.C. 777-777K) under Project F-10-20, Job No. R-3-2(d). The efforts of field personnel Tim Viavant, Loren St. Amand, Jeremy Stevens (NVE), Graham Predeger (NVE), Tom Taube, Mark Stadtmiller, and Dan Reed were greatly appreciated. Allen Bingham assisted with operational planning and Dan Reed assisted with the data analysis and review of the report. Sara Case finalized the report for publication.

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APPENDIX A:
DAILY CPUE

Appendix A.–Fish wheel and dipnetting effort, catch, and CPUE (catch/hour) by day of steelhead, sockeye, and coho from the Copper River, Alaska from 26 August to 2 September, 2004.

Fish Wheel

		Catch			CPUE (catch/hour)		
Date	Hours Fished (Effort)	Steelhead	Sockeye	Coho	Steelhead	Sockeye	Coho
26-Aug	5.00	0	5	0	0.00	1.00	0.00
27-Aug	9.00	1	8	2	0.11	0.89	0.22
28-Aug	13.33	0	96	11	0.00	7.20	0.83
29-Aug	22.17	0	182	24	0.00	8.21	1.08
30-Aug	13.75	1	116	25	0.07	8.44	1.82
31-Aug	23.75	0	237	47	0.00	9.98	1.98
1-Sep	24.00	0	106	60	0.00	4.42	2.50
2-Sep	21.00	6	335	248	0.29	15.95	11.81
Total	132.00	8	1,085	417	1.45	197.27	75.82

Dipnetting

		Catch			CPUE (catch/hour)		
Date	Hours Fished (Effort)	Steelhead	Sockeye	Coho	Steelhead	Sockeye	Coho
26-Aug	3.88	0	28	0	0.00	7.21	0.00
27-Aug	3.70	0	61	11	0.00	16.49	2.97
28-Aug	3.70	0	33	13	0.00	8.92	3.51
29-Aug	3.82	1	81	29	0.26	21.22	7.60
30-Aug	3.90	1	53	16	0.26	13.59	4.10
31-Aug	3.88	0	26	18	0.00	6.70	4.64
1-Sep	3.92	2	49	72	0.51	12.51	18.38
2-Sep	3.98	0	37	90	0.00	9.29	22.59
Total	30.78	4	368	249	3.12	286.91	194.13