Fishery Data Series No. 02-22

Copper River Delta Trout Assessment, 2000

by

Matt G. Miller

November 2002

Alaska Department of Fish and Game **Division of Sport Fish**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

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

Spell out acre and ton.

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s

Spell out year, month, and week.

Physics and chemistry

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

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
and	&
at	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
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
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

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	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
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.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
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
standard length	SL
total length	TL
variance	Var

FISHERY DATA SERIES NO. 02-22

COPPER RIVER DELTA TROUT ASSESSMENT, 2000

by

Matt G. Miller
Division of Sport Fish, Anchorage

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1599

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Matt G. Miller
Alaska Department of Fish and Game, Division of Sport Fish
333 Raspberry Road, Anchorage, AK 99518-1599, USA

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ABSTRACT

Adult cutthroat *Oncorhynchus clarki* and rainbow *O. mykiss* trout were captured in waters in the Special Trout Management Area recently established on the Copper River Delta using hook and line and minnow traps. Captured cutthroat trout and rainbow trout were measured (FL), had scales taken for age determination, and were examined for signs of sexual maturity. Cutthroat trout ≥250 mm FL were marked with uniquely numbered Floy tags.

We captured 13 cutthroat trout and 24 rainbow trout during five sampling trips (two multi-day trips for a total of 8 sampling days). Because a sample of 120 fish of each species was needed to estimate length and age composition in each of seven defined drainages, data analysis was not attempted for the 2000 season. However, this was an informative first year of the study: sampling trips revealed the large scope of the project and the resources required to achieve the objectives; and sampling methods were evaluated and provided direction for future efforts. Finally, historical data collected by various agencies were compiled into a single database.

Key words: cutthroat trout, *Oncorhynchus clarki*, rainbow and steelhead trout, *Oncorhynchus mykiss*, Carbon Mountain, sagittal otoliths, anadromous, Sheep Creek, Johnson Creek, Martin Lake, Martin River, Martin Glacier River, Lake Tokun.

INTRODUCTION

Chugach Alaska Corporation (CAC) has requested the construction of an access road to develop resources on their land near Carbon Mountain (Figure 1). In 1998, road construction began on the southeastern side of the Copper River near Mile 41 of the Copper River Highway. The proposed road corridor extends approximately 45 miles to the Bering River area, and crosses 29 miles of U.S. Forest Service (USFS) land, 3 miles of Eyak Village Corporation land, and about 9 miles of CAC land.

The road construction will require crossing over 250 streams and rivers, 48 of which have been identified as anadromous fish streams. Presence or absence surveys by USFS, the Prince William Sound Science Center (PWSSC), and Alaska Department of Fish and Game (ADF&G) Division of Habitat and Restoration have documented the presence of the following fish species in one or more of these streams: coho salmon *Oncorhynchus kisutch*, pink salmon *O. gorbuscha*, sockeye salmon *O. nerka*, chinook salmon *O. tshawytscha*, chum salmon *O. keta*, steelhead trout *O. mykiss*, Dolly Varden *Salvelinus malma*, and cutthroat trout *O. clarki*.

At the Alaska Board of Fisheries (BOF) meetings held in 1999, concern over the impact of recreational anglers on stocks of cutthroat trout in these pristine waters prompted the establishment of the Copper River Special Management Area for Trout (Figure 2). This management plan stipulates that only unbaited, single-hook, artificial lures are allowed in all fresh waters south of Miles Glacier, and east of the Copper River (excluding the Clear Creek drainage), and all waters draining into the Gulf of Alaska west of Cape Suckling. These waters are also designated as catch-and-release only for all trout. The proposed road corridor falls within this area.

Although past data collection efforts have helped establish the presence or absence of cutthroat and rainbow trout in some of the systems within the Trout Management Area, very little data have been collected documenting age and length. In order for ADF&G to manage for historical age and length distributions and monitor stock status, these data need to be collected.

This study will provide baseline data on the length, age, and distribution of adult cutthroat and rainbow trout in the Copper River Special Management Area for Trout. Results of the study will be used to

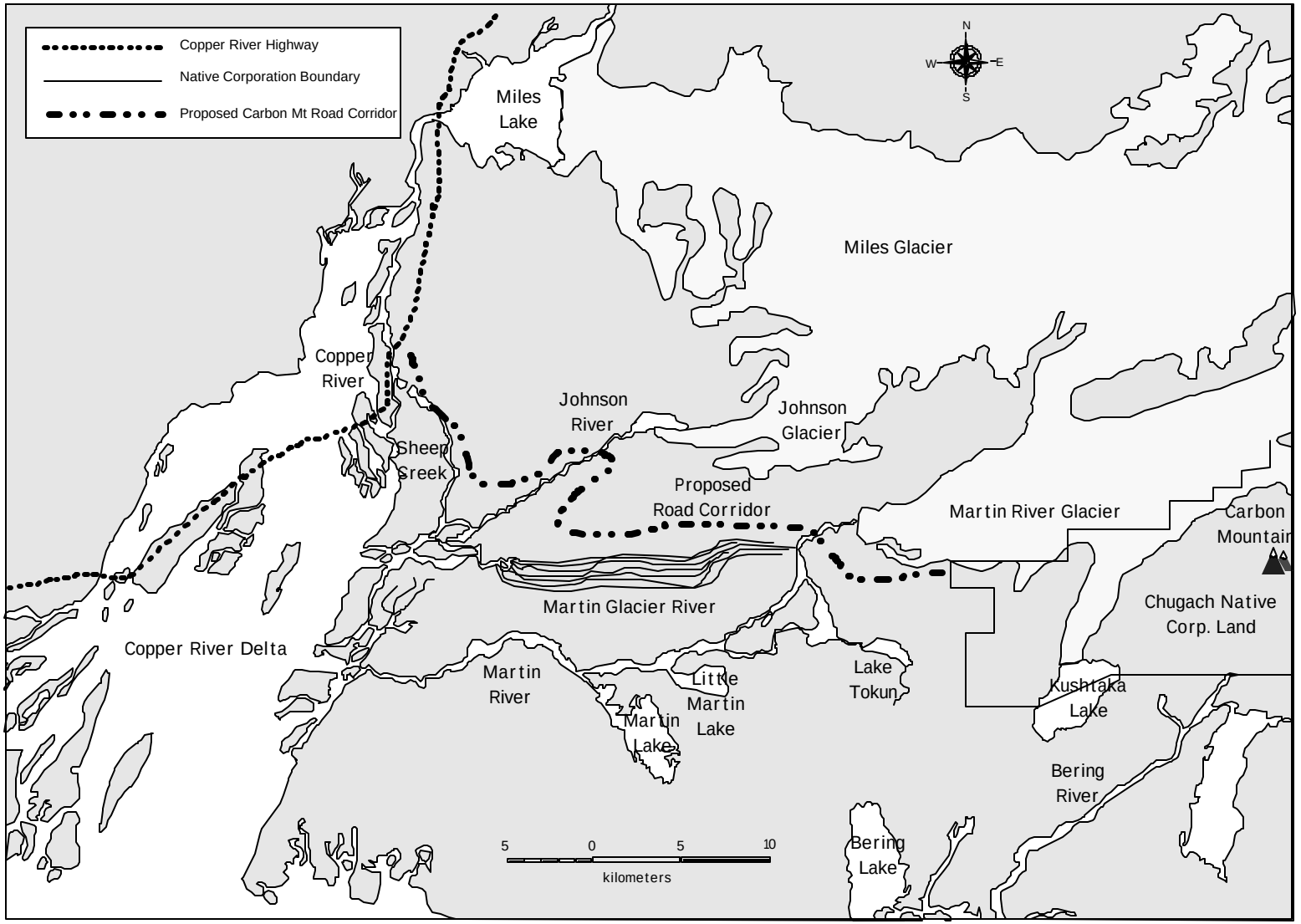

Figure 1.-Proposed Carbon Mountain Road corridor.

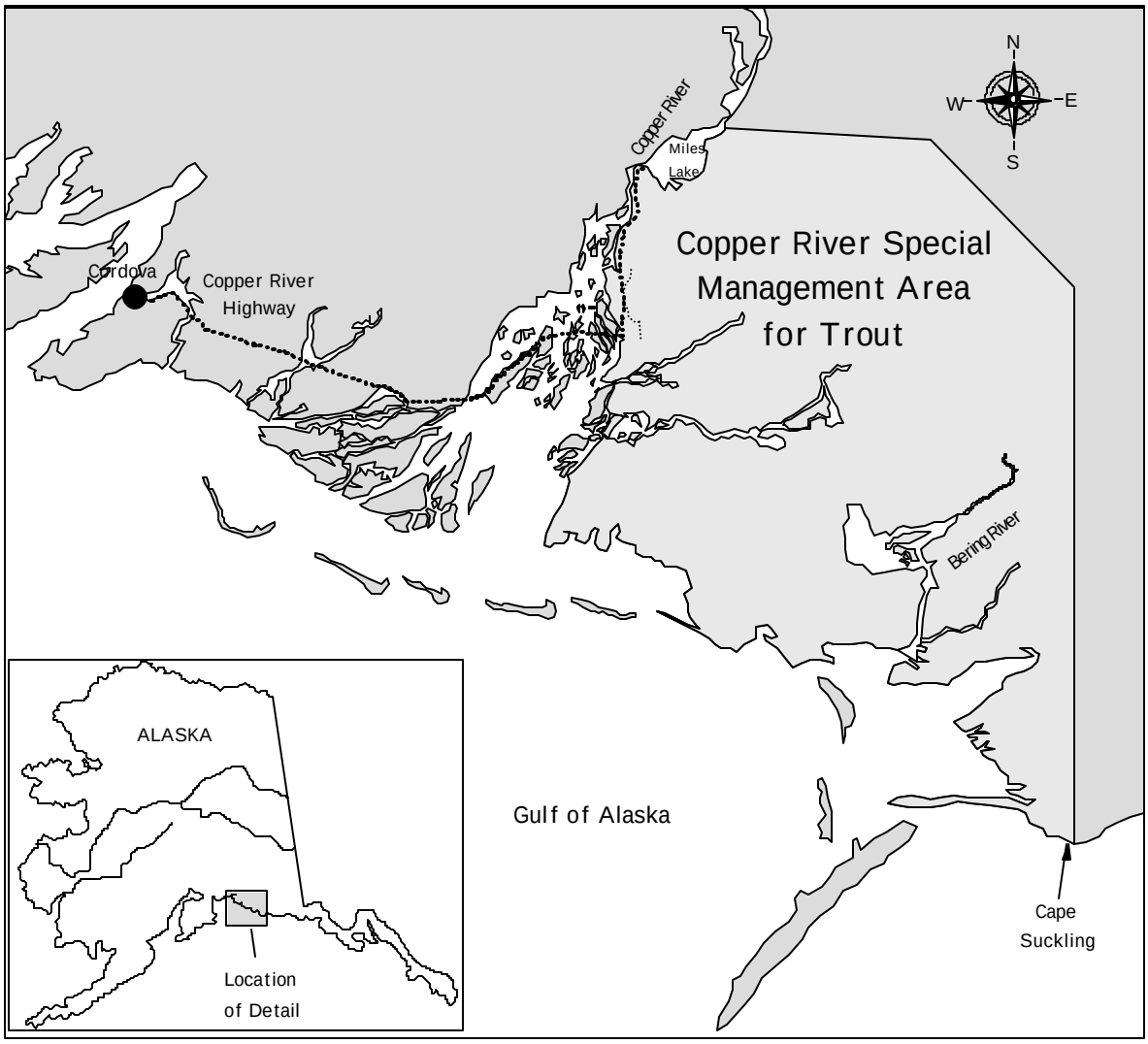

Figure 2.-Copper River Delta and Special Management Area for Trout.

direct research objectives for 2001 and 2002. Data will also provide better insight into abundance of cutthroat and rainbow trout, and other species such as Dolly Varden, and the potential for sport fisheries in the area. This information will help fishery managers draft regulations that provide for sustainable fisheries in the survey area.

Objectives for the 2000 field season were to:

1. Estimate the age and length compositions, and mean length-at-age of adult cutthroat and rainbow trout in seven areas of the Trout Management Area neighboring the proposed Carbon Mountain Road Corridor; and
2. Coalesce available USFS, PWSSC, and ADF&G reports, and unpublished data summaries pertaining to fishery surveys in the Trout Management Area; and compile data from these reports on the type and amount of survey effort expended and the catch and size of trout sampled by stream and/or geographic location when available.

The seven areas are: (1) clearwater tributaries along the proposed road corridor draining into Sheep Creek, (2) clearwater tributaries along the proposed road corridor draining into Johnson Creek, (3) clearwater tributaries along the proposed road corridor east of the Johnson River drainage and west of the Martin River, (4) Deadwood Lake and related clearwater tributaries east of the Martin River, (5) Lake Tokun, (6) Little Martin Lake, and (7) Martin Lake.

METHODS

SAMPLING LOCATIONS

Ten distinct sites were sampled in the Sheep Creek, Johnson Creek, and Martin Glacier River drainages, which encompassed areas 1, 2 and 3 (Table 1, Figure 3). Most of these sites were sampled more than once on airboat trips with the USFS. Because of gear and time restrictions, all samples from these trips were collected with hook and line.

Lake Tokun sites (area 5) were sampled on a two-day fly-in trip. Tokun Outlet Creek was sampled approximately half a mile from the lake to site 101 (Table 2, Figure 4) with hook-and-line gear. Further hook-and-line sampling occurred in the lake (sites 102 and 103), and in Tokun Creek at the southwest end of the lake. Minnow traps were set at the outlet (trap 104) and near a beaver lodge at the south end of the lake (traps 105 and 106) by Tokun Creek.

Martin Lake and Martin River sites in area 7 (Table 3, Figure 5) were sampled on a 3-day fly-in sampling trip in mid August. Martin River sampling consisted of floating downriver and sampling perspective sites with hook and line (sites 201-208). Creeks flowing into the lake on the south shore were sampled (sites 212-215), and three minnow traps were set near the cabin at the mouth of Martin Lake (sites 209-211).

Areas 4 and 6 were not sampled because of logistical problems. Locations sampled were documented with GPS readings, notes and markings on field maps, and photography. Data were recorded in such a way as to insure that sampling locations could be associated with each fish sampled.

DATA COLLECTION

Fish were captured using hook and line for large fish (>100 mm FL) and minnow traps for small fish (<100 mm FL). Catch by species and number of gear units (hook-and-line hours of sampling, trap-days/hours fished, etc.) for each gear type were recorded for each sampling day and location. Daily water and air temperatures were recorded at each sampling site. Water temperature was measured at the mid-point of the water column at each sampling location or a depth of ½ meter, whichever was less, and time of each temperature reading was recorded. All data were recorded on custom field "Rite in the Rain" data sheets and entered into a Mark Sense formatted Excel spreadsheet.

All captured cutthroat and rainbow trout were measured to the nearest millimeter fork length (FL) and examined for obvious signs of sexual maturity (i.e. fish exuding mature gametes during handling). Cutthroat and rainbow trout ≥250 mm FL were marked with uniquely numbered Floy tags (T-bar anchor).

Scales were collected from the left side of the caudal peduncle from each newly captured cutthroat and rainbow trout for age determination (Brown and Bailey 1949, 1952; Laakso and Cope 1956; Figure 6). Each fish was wiped with the blunt side of a knife to remove excess mucus at the scale

Table 1.-Site description and species present in Sheep Creek (Area 1), Johnson Creek (Area 2), and Area 3.

Site	Common Name	Latitude and Longitude	Species Present[a]
001	Helicopter Slough	N60.49613 W144.72736	CT, DV, SOad
002	Sunglass Pond	N60.53046 W144.72445	SOad
003	Cutthroat Hole	N60.51224 W144.70850	CT,DV,SOad,SSad
004	Bridge Crossing #3	N60.49947 W144.70052	
005	Ejection Pond	N60.50224 W144.71340	CT, DV
006	Holographic Creek	N60.45601 W144.65792	CT
007	Green River	N60.44451 W144.58577	SOad, KSad
008	Fall's Creek	N60.45543 W144.62358	
009	Unnamed Creek #1	N60.42467 W144.53250	
010	Airboat Slough	N60.50379 W144.70221	

[a] CT-cutthroat trout, RB-rainbow trout, DV-Dolly Varden, LT-lake trout, SO-sockeye salmon, SS-silver salmon, KS-king salmon, SC-sculpin, SB-stickleback, ad-adult, jv-juvenile.

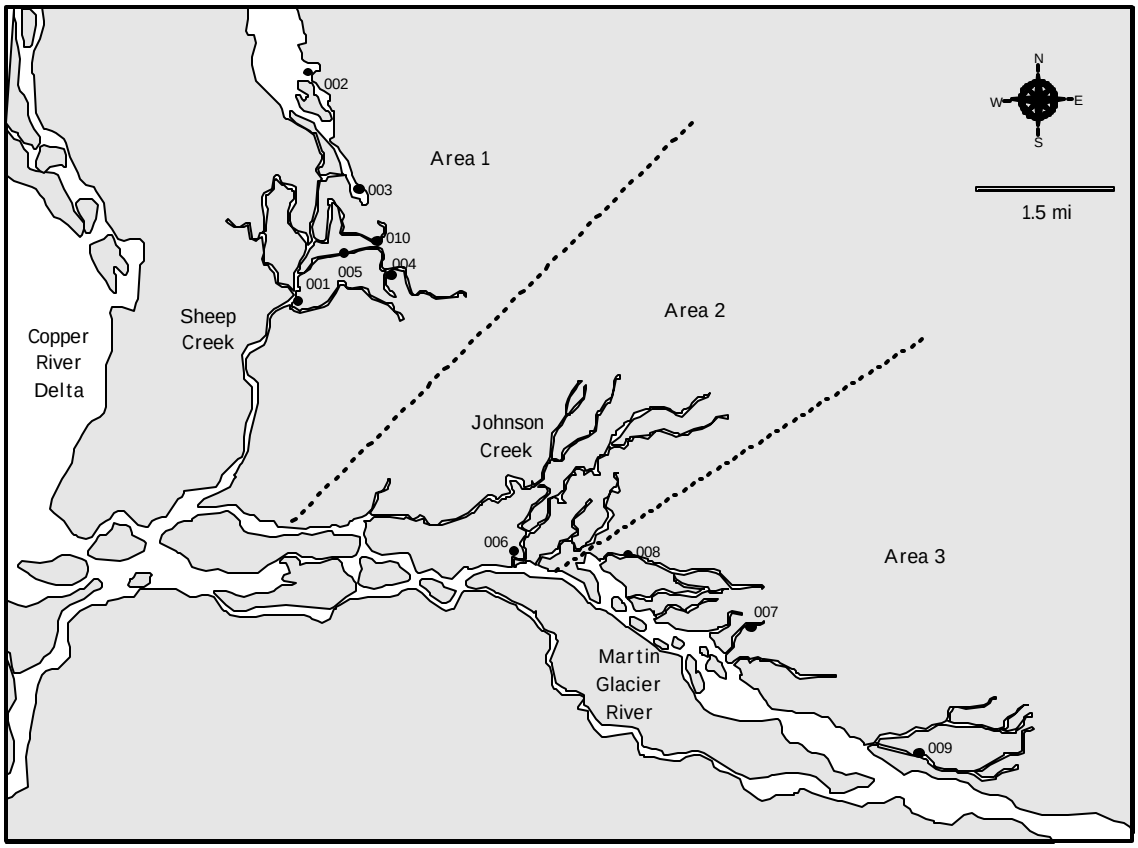

Figure 3.-Sites sampled in the Sheep Creek (Area 1), Johnson Creek (Area 2), and Area 3 sampling areas.

Table 2.-Site description and species present in Lake Tokun (Area 5).

Site	Common Name	Latitude and Longitude	Species Present[a]
101	River	N60.40905 W144.33225	
102	White Beach	N60.41181 W144.31122	
103	Sockeye spawners	N60.40287 W144.28136	SOad
Camp	camp	N60.40894 W144.31965	
trap 104	trap 1	N60.40670 W144.32370	DVjv, LTjv, KSjv, SC, SB
trap 105	trap 2	N60.39849 W144.28155	SSjv, SC, SB
traps 105 and 106	trap 3	N60.39840 W144.28348	KSjv, SSjv, LTjv, SC, SB

[a] CT-cutthroat trout, RB-rainbow trout, DV-Dolly Varden, LT-lake trout, SO-sockeye salmon, SS-silver salmon, KS-king salmon, SC-sculpin, SB-stickleback, ad-adult, jv-juvenile.

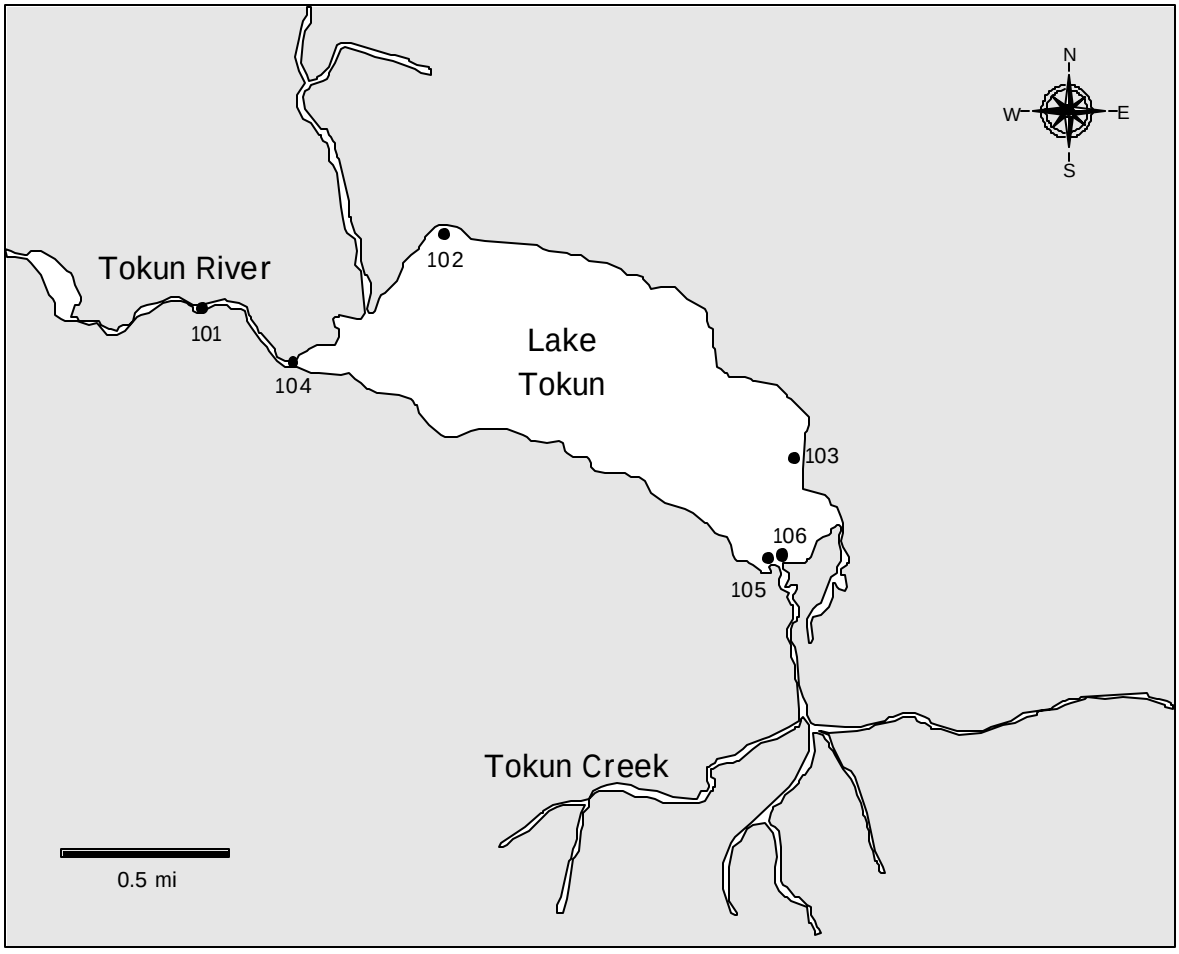

Figure 4.-Sites sampled in the Tokun Lake sampling area (Area 5).

Table 3.-Site description and species present in Martin Lake (Area 7).

Site	Common Name	Latitude and Longitude	Species Present[a]
201	Dolly's Run	N60.38836 W144.59331	DV
202	Dan's Hole	N60.39474 W144.60537	RB
203	Cohole	N60.39693 W144.61168	RB, SSad
204	Bonefish Flats	N60.39868 W144.61950	RB, DV
205	Tree Snag	N60.40287 W144.62740	CT, RB, DV
206	Eagle's Hole	N60.40649 W144.62389	CT, RB, DV
207	Sweepers	N60.40928 W144.62436	RB
208	Farthest Point	N60.41261 W144.63473	RB
212	Bear Creek	N60.35658 W144.55510	SOad, WF, DV
213	Grassy Slough	N60.35320 W144.54818	
214	Shallows	N60.35050 W144.54068	DV
215	Martin Slough	N60.34629 W144.52737	SOad
Cabin	Cabin	N60.38451 W144.59172	
Traps 209,210,211		N60.38220 W144.58879	SSjv, SB

[a] CT-cutthroat trout, RB-rainbow trout, DV-Dolly Varden, LT-lake trout, SO-sockeye salmon, SS-silver salmon, KS-king salmon, SC-sculpin, SB-stickleback, ad-adult, jv-juvenile.

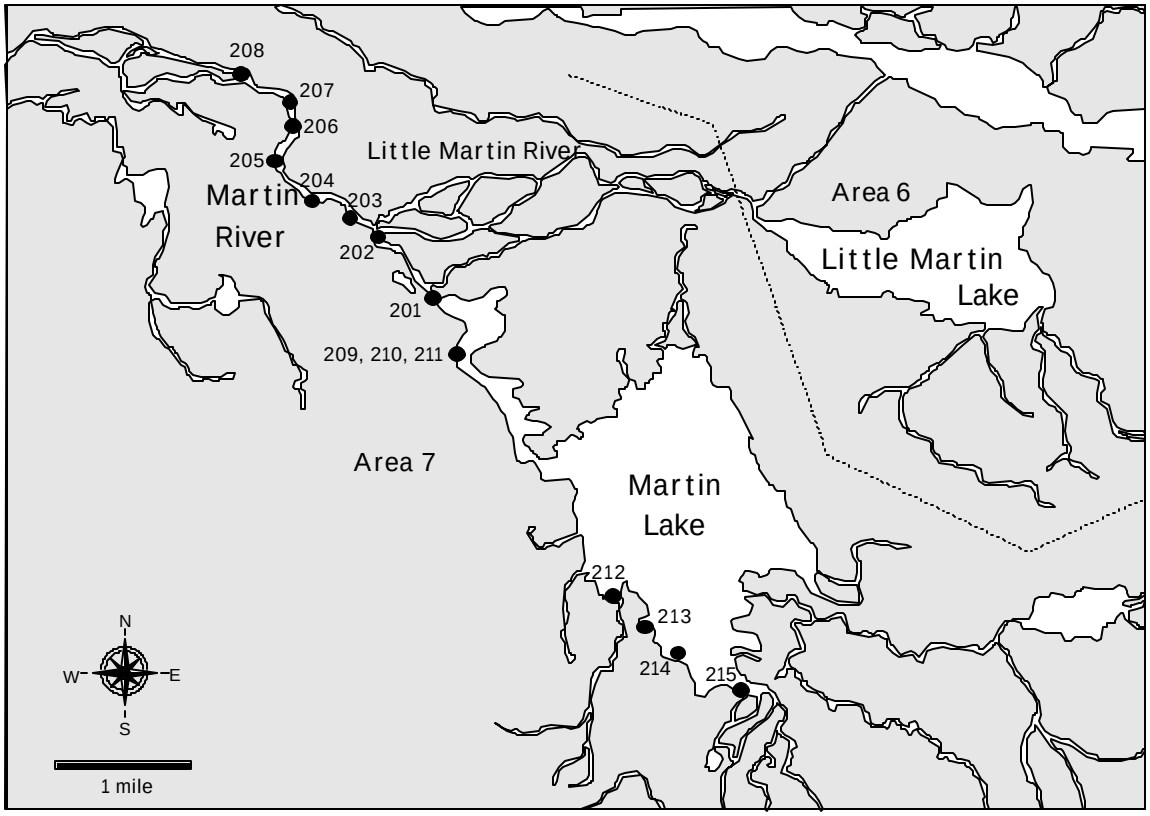

Figure 5.-Sites sampled in the Martin Lake sampling area.

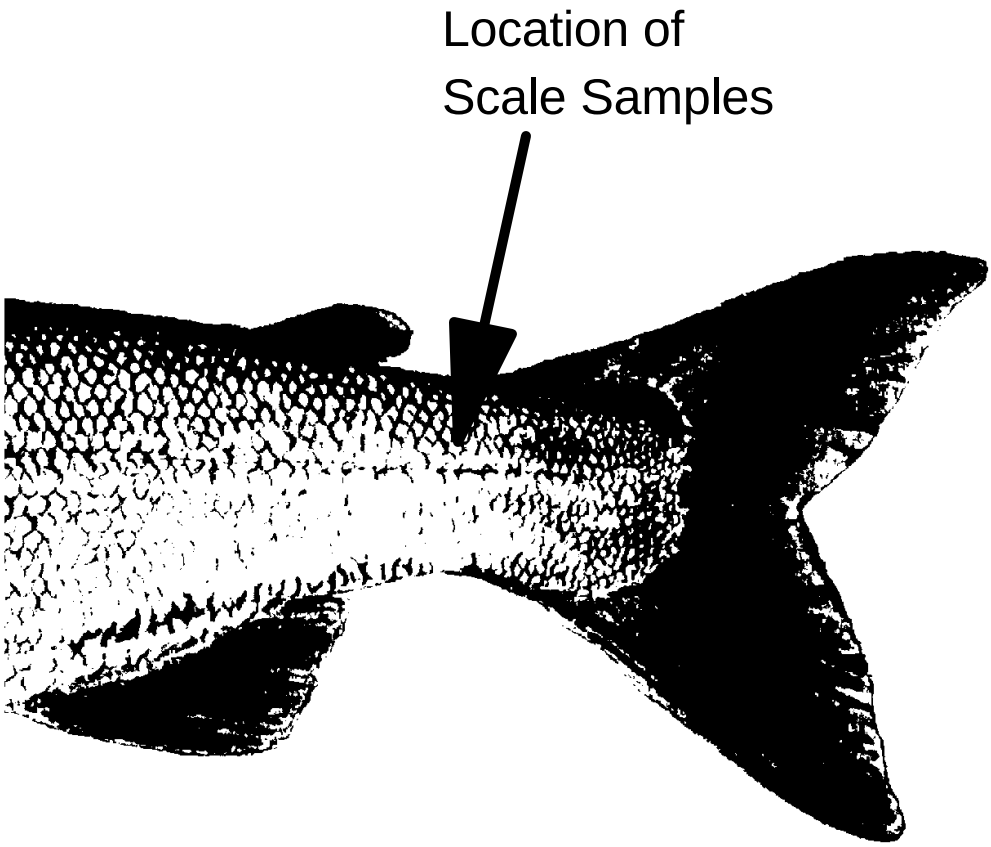

Figure 6.-Location of caudal peduncle scale samples for newly captured trout.

collection site, then a sample of at least 15 scales was taken. Scales were spread out on clear glass slides so that no scales were overlapping. The glass slides were stored in coin envelopes and labeled with the date, species, sample number, length, and tag number. The large number of scales necessary was due to the high proportion of regenerated scales in cutthroat and rainbow trout (Ericksen 1997; Moring et al. 1981). Otoliths were removed from mortalities for age determination and then stored in coin envelopes.

Aging Scales

Cutthroat and rainbow trout scales were collected, prepared, and aged according to methods described by Ericksen (1999). Scales mounted on glass slides were viewed with transmitted light under a scientific grade compound stereomicroscope at magnifications of 40X to 200X. Scales were read along an imaginary reference line drawn along the longest axis of the scale from the scale focus to the anterior edge of the scale (Figure 7). All scales on the slide were examined before one was selected to age. Ideal scales had a clean, small focus without signs of regeneration, and were large compared to other scales in the sample. The criteria used to identify annuli included:

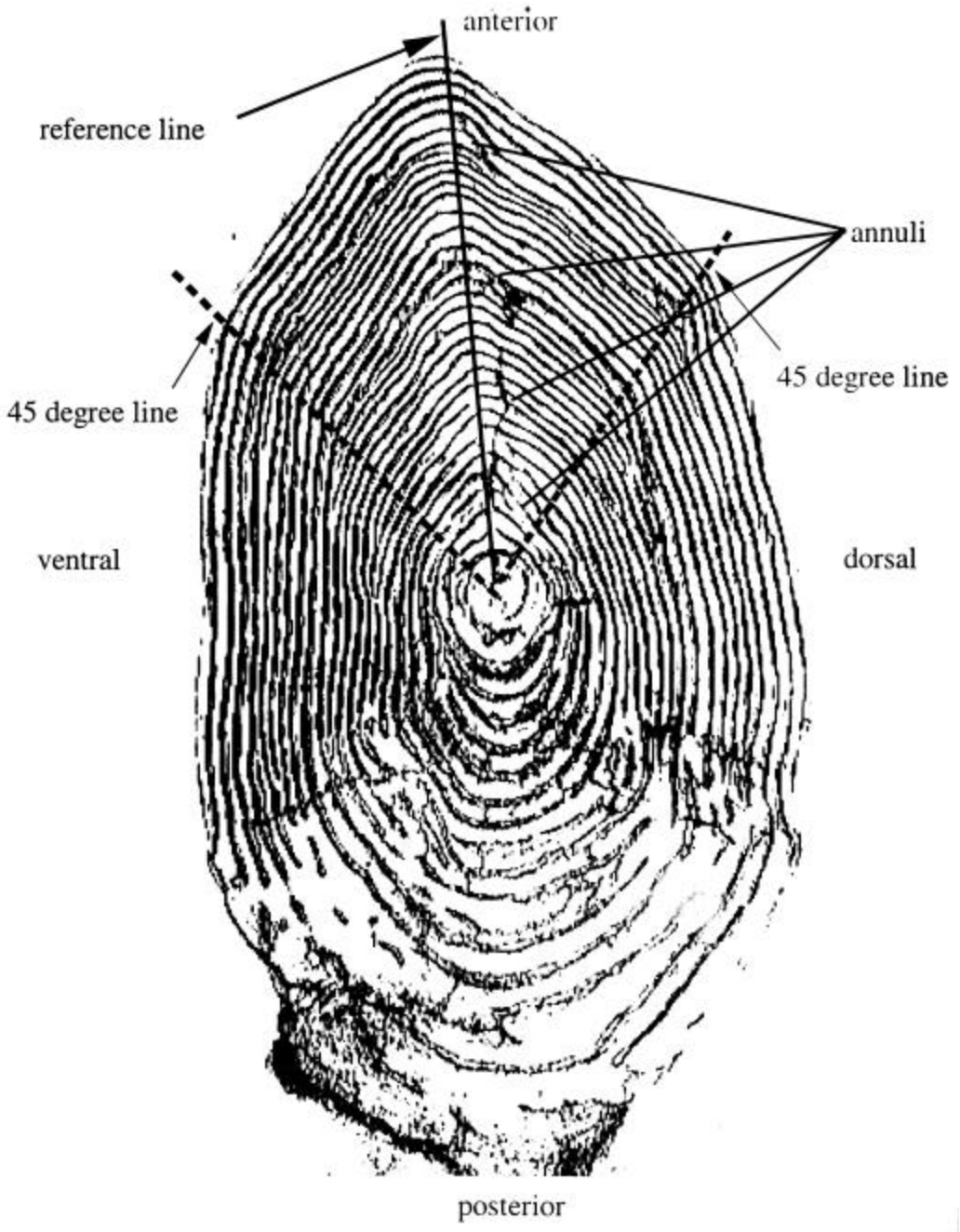

Figure 7.-View of a typical cutthroat trout scale from fish collected in August.

1. Relative spacing of the circuli. Circuli are spaced farther apart during periods of rapid growth in the summer, and relatively closer together as growth slows in the winter.
2. The "crossing over" of the annulus across a previously deposited circuli. On some scales the outer circuli laid down during periods of slow growth tend to flare outward or end abruptly on the side of the scale. When rapid growth begins again, the new circuli is complete.

3. The thick or wavy circuli segments associated with active growth, as opposed to thinner and straighter circuli usually seen during periods of slow growth.
4. Clear or broken spaces on the posterior portion of the scale that may suggest summer growth. In contrast, annuli may be seen as a continuous line along the posterior portion of the scale.

Each scale was read three times by a reader in the Anchorage office, then sent to Juneau and read again by experienced trout scale readers for age verification.

DATA ANALYSIS

A target sample size of 120 cutthroat trout and 120 rainbow trout was set for each of the defined areas based on Thompson (1987); however, we caught very few fish in 2000. Therefore, analysis of biological data was not conducted for this year. Biological data have been archived and scales have been cataloged and stored in the Region II scale library in the Anchorage office.

RESULTS

BIOLOGICAL DATA

We captured a total of 13 cutthroat trout and 24 rainbow trout during five sampling trips (two multi-day trips for a total of 8 sampling days).

At the Sheep Creek, Johnson Creek, and Martin Glacier River drainages (areas 1, 2, and 3), 11 cutthroat trout were caught with hook and line (Appendix A2). Lengths and scales were collected from all of them; nine were tagged and two <250 mm were not tagged. One of the tagged fish subsequently died; otoliths from that fish were collected and archived. In addition, 40 Dolly Varden, 1 sockeye salmon, and 3 coho salmon were captured.

At Lake Tokun, Tokun Outlet Creek, and Tokun Creek (area 5), no cutthroat or rainbow trout were caught with hook and line. The three minnow traps (traps 104, 105, and 106) caught a total of 16 Dolly Varden juveniles, 28 lake trout juveniles, 10 chinook salmon parr, 11 coho salmon parr, 14 stickleback, and 86 sculpin. Spawning sockeye salmon were present at the lake outlet and along the shore.

At Martin Lake and Martin River (area 7), two cutthroat trout were captured with hook and line; both were measured and tagged (Appendix A2). Twenty-four rainbow trout were caught with hook and line, but due to a misunderstanding of sampling objectives, 12 rainbow trout were measured but not tagged, and the other 12 were not sampled at all. All cutthroat and rainbow trout $\geq$250 mm were supposed to be tagged and scales collected. This error will not be repeated in the 2001 season. An additional 30 Dolly Varden and seven coho were caught on hook and line. The minnow traps at Martin Lake caught 30 coho salmon parr, 3 Dolly Varden, and 14 sticklebacks.

Summarized data were submitted to the ADF&G anadromous waters catalog.

HISTORICAL DATA

Data from historical reports of USFS, PWSSC, and ADF&G were combined and merged when detailed site information was available. When possible, we referenced sampling sites with a code from the ADF&G Anadromous Stream Catalog. Data collected from our 2000 field work was added to this database and are presented in Appendix A1. All trout sites sampled in 2000 were given site numbers,

names, and the location was defined by latitude and longitude determined with a handheld GPS. Sites sampled in 2000 have been checked against data in the Anadromous Stream Catalog and new data have been entered.

DISCUSSION

The first objective of this study, concerning age and length estimates, was not met in 2000. The sampling schedule was opportunistic, as the remoteness of the study area required access by airboat or helicopter. Sampling was largely dependant on other agencies for transportation to and from study sites, but scheduling changes prevented ADF&G participation on some of the trips. However, the USFS was instrumental in providing airboat support that gave access to the Sheep Creek drainage and parts of Martin Glacier River, which accounted for three of the season's sampling trips. Chartered fly-ins were more dependable, and trips to Lake Tokun and Martin Lake occurred in August.

Because of these logistical challenges, we were not able to sample the Deadwood Lake and Little Martin Lake areas (areas 4 and 6). Our sampling trips resulted in a capture of only 13 cutthroat trout and 24 rainbow trout, well below the target sample size of 120 fish of each species for each of the defined areas.

In 2001, sampling will continue at the same level as in 2000. Additional technicians will not be hired in 2001 because available money will be used to purchase an airboat. An airboat will allow access to the tributaries of the Martin Glacier River with trips specifically geared towards collecting cutthroat and rainbow trout data. In addition, an airboat will allow more sampling trips (with possible multiple-day trips), and gear (traps and small beach seine) for more thorough sampling. Fly-in trips to Martin Lake are scheduled for June and August 2001. Two technicians will be hired for the project in the spring of 2002. This will finally provide the personnel and resources needed to commit to a full-time sampling project on the Copper River Delta.

The second objective of this study, concerning coalescing existing reports and data, was generally successful. The primary difficulty was comparing observations from various surveys from the three agencies because they use different ways to identify streams and sampling sites. The surveyors for CAC identify sites by the distance (feet) from a known point. USFS assigns streams a number, but does not have a key or reference map. When possible, historical sites were referenced with a code from the ADF&G Anadromous Stream Catalog. All sites sampled in 2000 were given site numbers, names, and a location defined by latitude and longitude determined with a handheld GPS. Generally, there wasn't enough information available from historical reports on sampling times and means to provide useful information, so the database is a record of presence or absence of fish species over time.

The objectives defined for this project will take several seasons to accomplish, but the 2000 season was an informative initial year. Historical data collected by various agencies was compiled into a single database. Sampling trips revealed the large scope of the project and the resources required to achieve the objectives, and sampling methods were tried and provided direction for future efforts.

ACKNOWLEDGEMENTS

The author wishes to thank Merlyn Schelske and the USFS, Cordova Ranger District for allowing ADF&G to sample during their airboat surveys of the Copper River Delta. Barry Stratton and Dan

Bosch collected samples and provided technical assistance. Bob Marshall gave biometrics guidance and has been great about sharing his knowledge of cutthroat trout. Kurt Kondzela aged the scales to verify the initial readings. Publications support was provided by Margaret Leonard. Editorial assistance was provided by Saree Timmons.

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APPENDIX A. SUPPORTING DATA

Appendix A1.-Historical Copper River data coalesced from USFS, PWSSC, and ADF&G surveys.

CAC Location	ADF&G ASC #	USFS Sream ID	Lat/Long	Width (ft)	Bankful Width (ft)	Grade (%)	Observed Species [a]	Comments
7+05	10080-2010	76		90	33	1	CO_{juv},SO_{juv},SB,SC	Clear Creek
184+48		1		8	8.5	4	CT_{juv}, DV_{juv}	
186+50		2		4	7.5	12	CT_{juv}, DV_{juv}	
212+01		7		5.6	12.5	12	DV_{juv},US	
224+05		8		3	8.5	11	DV_{juv}	
225+15	4020	9		3	3	6	CO_{juv},DV_{juv}	
231+81		11		6	11.5	4	DV_{juv}	
272+33		18		3	4.9	4	DV_{juv}	
	212-20-10040-2011	240					DV_{adt}	Sheep Creek
	212-20-10040-2011-3030-0020	243					CO_{juv},SO_{juv},PS_{adt}	pond off Sheep Creek
	212-20-10040-2011-3023-4010		N60.51224 W144.70850				CT,DV,SO_{adt},CO_{adt}	Cutt Hole
279+65	4010-5021	19		6	6	4	CO_{juv},CT_{juv},DV_{juv}	
281+26				3	6	3	CO,CT,DV	
296+44				4	4.2	2	CO,DV	
306+83	212-20-10040-2011-3023-4043	23		44.4	138	1	CO_{juv},CT_{juv},DV_{juv}	Bridge 3
322+54	212-20-10040-2011-3024-4051	24	N60.49947 W144.70052	8	8.6	1	CO_{juv},SB	Bridge Xing #3
328+63	212-20-10040-2011-3024-4055	190		50	150	1	CO_{juv},DV_{juv},SB	
338+09	212-20-10040-2011-3024	26	N60.50224 W144.71340	3	3	very low	CT, CO_{juv},DV_{juv}	Ejection Slough
341+21	212-20-10040-2011-3024	27		6	1	broken	CO_{juv}	
346+67	212-20-10040-2011-3024-4060	28		3	3.5	1	CO_{juv},DV_{juv}	Airboat Slough
362+70				1.75	2	1	CO,DV	
365+43	212-20-10040-2011-3024-4056	30		45	45		CO_{juv},SB	Beaver dam
367+55	909	31		20		low	CO_{juv},DV_{juv},SB	
372+37	5030	32		45	45	low	CO_{juv}	
374+26		33		5.5	5.5	low	CO_{juv}	
374+49	6010	34		9	9		CO_{juv}, DV_{juv},SC,SB	
378+00	5005-0910	35		3		1	CO_{juv},SB	
378+70	212-20	36		3	3	low	CO_{juv}	

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CAC Location	ADF&G ASC #	USFS Sream ID	Lat/Long	Width (ft)	Bankful Width (ft)	Grade (%)	Observed Species [a]	Comments
380+29	212-20	37		11		1	CO_{juv},DV_{juv},SC,SB	
382+52	5007	38		7	7	low	CO,CT_{adt}	
383+50	212-20	39		2	5		CO_{juv}	
385+03	212-20	40		3	3		CO_{juv},SB	
386+33	212-20	41		6	6	low	CO_{juv},SB,SC	
387+15	212-20	42		3	3		CO_{juv}	
390+72	212-20	43		120		low	CO_{juv},SB	flooded area
400+07	4087	46		4.5	18	18	CO_{juv},SC	
400+43		47		7	24	low	CO_{juv}	
411+19		51				low	CO_{juv}	
418+00	212-20-10040-2011-3010	52					CO_{juv}	
442+51	5025	59		9	9	low	CO_{juv}	
443+50	5027	60		1.5			CO_{juv},SB	
447+34	4090	61		33	54	1	CO_{juv},DV_{juv},SB,SC	
448+29		62		6	9	2	DV_{juv},SC,SB	
448+77	212-20	63		24	24	low	CO_{juv},SC	
452+31	5032	64		7	7	low	CO_{juv}	
453+14	212-20	65				low	CO_{juv},DV_{juv},SB,SC	
454+55	212-20	66					CO_{juv}	
462+29		67		3	3	2	CO_{juv},DV_{juv},SC	
468+00	5032	68		3	7	low	CO_{juv},SC	
469+25		69		1.5	1.5	low	DV_{juv}	
472+98	6010	70		5.5			CO_{juv},CT_{juv}	
474+84	212-20	71			36	low	CO_{juv}, DV_{juv},SC	
496+12		73			7	2	DV_{juv}	
506+15	4031	74			18	3		
506+73	212-20	75			45	3	CO_{juv}	
540+79	3051	77		12	12	NA	CO_{juv},DV_{juv}	Bridge 5A
548+00	3067	78		15	15	1	CO_{juv},DV_{juv}	
551+81	2025	79		12	30	1	CO,CT,DV	Bridge 6
553+64	212-20	80		6	12	1	CO_{juv}	
581+11	3040	84		3	3	4	CO_{juv},CT_{juv},DV_{juv}	
601+16	3061	89		1.5	1.5	10	CO_{juv}	
618+00	4010	92A					CO_{juv},SC,SB	dry with pools

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Appendix A1.-Page 3 of 4.

CAC Location	ADF&G ASC #	USFS Sream ID	Lat/Long	Width (ft)	Bankful Width (ft)	Grade (%)	Observed Species [a]	Comments
637+21	4020	96		3	3	22	CO_{juv},SC	
707+41	3080	148		3	6	28	CO,DV	
721+35	3098	144		6	6	23	CO_{juv},DV_{juv}	
752+78		156		3	6	13	DV_{juv}	
756+12		159		24	24	12	CO,DV,SO	
766+32		161		1	1.5	17	DV_{juv}	
766+63		162		7	7	10	DV_{juv}	Pyramid Cr.
772+84		167		4.5	4.5	10	DV_{juv}	
792+85	4035	172		6	NA	1	CO_{juv},DV_{juv},CT_{juv}	
800+65	3094	173		3	3	1	CO_{juv},CT_{juv},DV_{juv},SC	
801+65	212-20	174		6	9	1	CO_{juv},SC	
831+38	3094	175		4.5	4.5	2	CO_{juv},CT_{juv},DV_{juv},SB	
869+60	3033	177		9	9	3	CO_{juv},DV_{juv},SC	Bridge 8
885+72	4050	178		10.5	24	0.5	CO_{juv},DV_{juv}	
889+10				30	33	5	CO,DV	Bridge 9
1067+35				54	54	3	DV	Bridge 11
1157+30				3	3	6	CO	
1253+85				6	6	3	DV	
1667+65				9	30	4	CO,DV	
1675+00		205		4.5	NA	1	SO_{adt},DV_{juv}	Bridge 12
2034+91	5047	214		1	2.4	3	CO_{juv},CT_{juv},DV_{juv}	
2037+97	5049	215		2.7	2.7	10	CO_{juv},CT_{juv}	
2039+28		216		0.75	3.75	1	DV_{juv}	
2048+94	5055	219		9	12	low	CO_{juv},CT_{juv},DV_{juv},SC	
2051+05		220		6	6.7	4	CT_{juv},DV_{juv}	
2062+23		224		2	4.5	9	CT_{juv}	
2065+50		225		3	3.75	8	CT_{juv},DV_{juv}	
2071+82		227		6	7.2	12	CT,DV_{juv},SC	
2088+44				5	6.4	9	DV,CO	
2107+75		237		2	2	6	DV_{juv}	
2111+79		238		3	6	8	DV_{juv}	
2113+71		239		9	14	1	CT_{adt},DV_{juv}	
		247					DV_{adt}	2011(mid Johnson R.)
	212-20-10040-2025		N60.45601 W144.65792				CT	Holographic Creek

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CAC Location	ADF&G ASC #	USFS Sream ID	Lat/Long	Width (ft)	Bankful Width (ft)	Grade (%)	Observed Species [a]	Comments
	212-20-10040-2051		N60.44451 W144.58577				SO_{adt}, KS_{adt}	Green River
	212-20-10040-2031		N60.45543 W144.62358					Falls Creek
	212-20-10040-2170		N60.40905 W144.33225					Tokun River
	212-20-10040-0010		N60.41181 W144.31122				SO_{adt}	Lake Tokun
	212-20-10040-0010		N60.40287 W144.28136					Lake Tokun
	212-20-10040-0010		N60.39840 W144.28348				KS_{juv}, CO_{juv}, LT_{juv}, SC, SB	traps, Lake Tokun
	212-20-10020		N60.38836 W144.59331				DV	Dolly's Run, Martin R.
	212-20-10020		N60.39474 W144.60537				RB	Dan's Hole, Martin R.
	212-20-10020		N60.39693 W144.61168				RB, CO_{adt}	Cohole, Martin R.
	212-20-10020		N60.39868 W144.61950				RB, DV	Bonefish Flats, Martin R.
	212-20-10020		N60.40287 W144.62740				CT, RB, DV	Tree Snag, Martin R.
	212-20-10020		N60.40649 W144.62389				CT, RB, DV	Eagle's Hole, Martin R.
	212-20-10020		N60.40928 W144.62436				RB	Sweepers, Martin R.
	212-20-10020		N60.41261 W144.63473				RB	Farthest Point, Martin R.
	212-20-10020-2115		N60.35658 W144.55510				SO_{adt}, WF, DV	Bear Creek, Martin Lake
	212-20-10020		N60.35320 W144.54818					Grassy Slough, Martin Lake
	212-20-10020		N60.35050 W144.54068				DV	Shallows, Martin Lake
	212-20-10020-2121		N60.34629 W144.52737				SO_{adt}	Martin Slough, Martin Lake
	212-20-10020		N60.38451 W144.59172					Cabin, Martin Lake
	212-20-10020		N60.38220 W144.58879				CO_{juv}, SB	traps, Martin Lake

[a] CT-cutthroat trout, RB-rainbow trout, DV-Dolly Varden, LT-lake trout, SO-sockeye salmon, CO-silver salmon, KS-king salmon, PS-pink salmon, WF-whitefish, SC-sculpin, SB-stickleback, ad-adult, jv-juvenile.

Appendix A2.-Data for cutthroat and rainbow trout captured in the Copper River Delta, 2000.

Date	Species[a]	Fish ID	Length (mm)	Juneau Age	Anchorage Age	Tag Number	Recap	Location
Areas 1, 2, and 3								
7/7/2000	CT	01 01	305	5	5	246401[b]	N	001
7/7/2000	CT	05 01	350	6	6	246402	N	005
7/7/2000	CT	05 02	298	4	6	246403	N	005
7/7/2000	CT	05 03	349	5	5	246404	N	005
7/7/2000	CT	05 04	300	4	5	246405	N	005
7/7/2000	CT	05 05	369	5	5	246406	N	005
7/7/2000	CT	05 06	340	5	5	246407	N	005
7/7/2000	CT	05 07	348	4	5	246408	N	005
7/27/2000	CT	02 01	235	4	3	[c]	N	009
7/27/2000	CT	02 02	240	3	4	[d]	N	009
9/13/2000	CT	06 01	311	4	4	246411	N	003
Area 7								
8/15/2000	CT	06 01	460	6	6	246409	N	201-208
8/16/2000	CT	08 01	456	5	7	246410	N	201-208
8/15/2000	RB					[e]		201-208
8/15/2000	RB					[e]		201-208
8/15/2000	RB					[e]		201-208
8/15/2000	RB					[e]		201-208
8/15/2000	RB					[e]		201-208
8/15/2000	RB					[e]		201-208
8/15/2000	RB					[e]		201-208
8/15/2000	RB					[e]		201-208
8/15/2000	RB					[e]		201-208
8/15/2000	RB					[e]		201-208
8/15/2000	RB					[e]		201-208
8/16/2000	RB	05	260			[f]		201-208
8/16/2000	RB	05	424			[f]		201-208
8/16/2000	RB	05	380			[f]		201-208
8/16/2000	RB	06	460			[f]		201-208
8/16/2000	RB	06	430			[f]		201-208
8/16/2000	RB	06	385			[f]		201-208
8/16/2000	RB	06	400			[f]		201-208
8/16/2000	RB	06	423			[f]		201-208
8/16/2000	RB	06	201			[f]		201-208
8/16/2000	RB	06	443			[f]		201-208
8/16/2000	RB	08	363			[f]		201-208
8/16/2000	RB	08				[e]		201-208
8/16/2000	RB	09	420			[f]		201-208

[a] CT = cutthroat; RB = rainbow trout.

[b] Mortality; otolith taken.

[c] Fin clip.

[d] No fin clip.

[e] No length, scale samples, or tag.

[f] No tag.