Fishery Data Series No. 06-06

Assessment of Fish Species in Resurrection Creek, Alaska, 2000

Final Report for Study 00-038(a)
USFWS Office of Subsistence Management
Fishery Information Services Division

by

Jeffery A. Breakfield

March 2006

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

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

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 SERIES NO. 06-06

ASSESSMENT OF FISH SPECIES IN RESURRECTION CREEK, ALASKA, 2000

FINAL REPORT FOR STUDY 00-038(A)
USFWS OFFICE OF SUBSISTENCE MANAGEMENT
FISHERY INFORMATION SERVICES DIVISION

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ABSTRACT

Ground crews surveyed Resurrection Creek from 15 July-5 October 2000 to define portions of the drainage accessible to salmonids. Blockages to fish movement in tributaries and the headwaters were documented using global positioning system (GPS) coordinates and photographs. Crews fished baited minnow traps within each sampling area and above blockages to confirm presence or absence of juvenile salmonids. In addition, crews documented presence of spawning adult salmon. Salmonids were present in 17 of 28 tributaries sampled. Blockages in certain tributaries were documented as having the greatest restriction on salmonids attempting to utilize the drainage.

Using GPS coordinates, the field crew also recorded the location of all anglers observed during surveys and identified the targeted fish species when possible. When the crew had determined that the mid-July entry of anadromous salmonids had begun, two flights of the drainage were made to determine the location of the fishery.

Key words: chinook salmon, *Oncorhynchus tshawytscha*, coho salmon, *Oncorhynchus kisutch*, sockeye salmon, *Oncorhynchus nerka*, pink salmon, *Oncorhynchus gorbuscha*, chum salmon, *Oncorhynchus keta*, Dolly Varden, *Salvelinus malma*, rainbow trout, *Oncorhynchus mykiss*, Resurrection Creek, tributaries, anadromous, salmonids, smolt, juvenile, Turnagain Arm, Cook Inlet.

INTRODUCTION

Resurrection Creek is a nonglacial watershed on the northern Kenai Peninsula and flows approximately 42 km from its headwaters in the Kenai Mountains to the Turnagain Arm of Cook Inlet, Alaska (Figure 1). The creek basin encompasses approximately 400 km^2. The mainstem originates at an elevation of approximately 4,200 m, and drops 100 m per km for the first 25 km. Most of the tributaries in this reach, which originate from mountain snowmelt or groundwater sources, exhibit a similar or steeper drop in elevation. Many contain falls or other obstructions that block upstream migration of anadromous salmonids. The lower 15 km of Resurrection Creek falls at approximately half the rate of the upper creek, as do several of the tributaries located in the lower reach.

Annual average discharge for Resurrection Creek measured near Hope, Alaska varied from 69 cubic feet per second (cfs) in March to 713 cfs in June, 1967-1986 (Table 1; USGS 2000). Many tributaries exhibit signs of scouring from spring runoff.

Historically the drainage was subject to extensive mining, with significant alterations to the creek bed in the lower river. Currently, recreational portable dredge and pan mining are allowed in the main creek, and larger commercial mining still occurs in Palmer Creek (Figure 1).

A fishery in Resurrection Creek occurs primarily for Pacific salmon at the saltwater terminus, although some anglers pursue Dolly Varden *Salvelinus malma* in the road accessible lower reach. The fishery targets primarily pink salmon *Oncorhynchus gorbuscha*; however, coho *O. kisutch*, sockeye *O. nerka* and chum salmon *O. keta* are also harvested. An average of 2,492 anglers fished for 3,550 angler-days during the 1996-1999 seasons (Howe et al. 2001a-d; Table 2). Pink salmon was the most frequently caught species, followed by chum and coho salmon. Effort in even years, when pink salmon returns were high, was double that of nonpink years. With the exception of coho salmon, anglers generally did not harvest their catch.

The objectives of this project were to:

1. Document the extent of salmonid distribution in the mainstem Resurrection Creek and its tributaries; and
2. Provide methods and costs for measuring demographics of fishery participants.

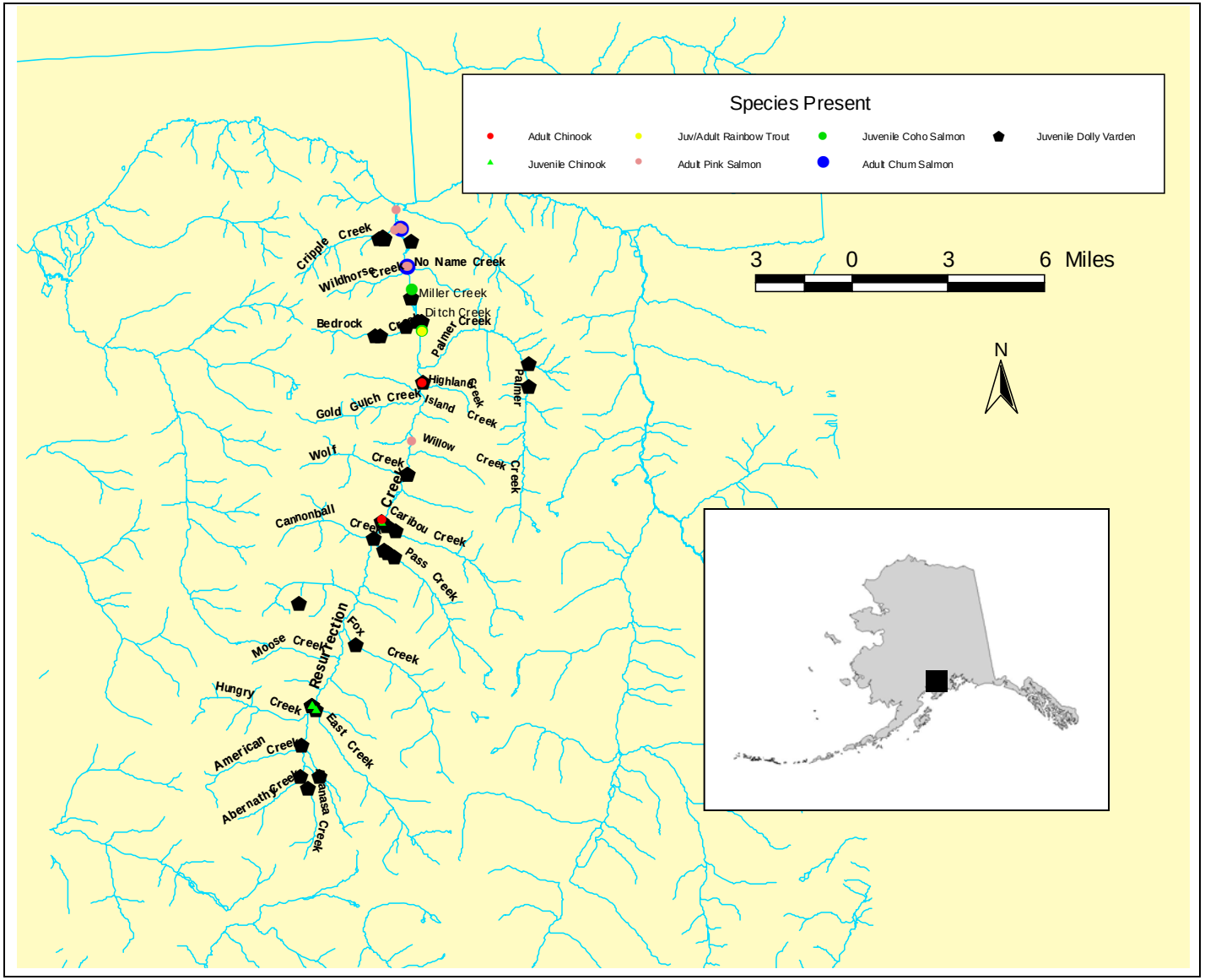

Figure 1.-Salmonid passage in Resurrection Creek and its tributaries, 2000.

Table 1.-Average monthly discharge (cfs) from Resurrection Creek, 1967-1986.

Year	Month											
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1967										365.0	235.0	170.0
1968	120.0	110.0	126.0	74.6	422.0	683.0	382.0	221.0	164.0	131.0	98.2	77.1
1969	65.0	65.0	61.3	91.9	299.0	602.0	334.0	221.0	139.0	656.0	216.0	192.0
1970	138.0	70.7	65.0	75.1	367.0	780.0	703.0	478.0	265.0	184.0	226.0	135.0
1971	109.0	84.5	73.9	78.5	175.0	715.0	954.0	765.0	429.0	294.0	158.0	108.0
1972	79.5	67.0	64.0	57.5	264.0	589.0	590.0	309.0	302.0	384.0	179.0	115.0
1973	85.5	70.4	64.3	70.2	220.0	439.0	403.0	289.0	229.0	165.0	113.0	94.1
1974	71.3	64.0	60.0	67.1	265.0	517.0	353.0	186.0	150.0	213.0	153.0	84.5
1975	70.3	63.6	52.3	49.6	357.0	671.0	634.0	330.0	274.0	178.0	68.3	52.8
1976	49.3	50.7	51.0	75.9	217.0	622.0	470.0	235.0	501.0	344.0	285.0	207.0
1977	129.0	115.0	64.8	83.2	353.0	1,326.0	1,051.0	501.0	359.0	320.0	145.0	116.0
1978	79.7	80.0	65.7	70.2	234.0	590.0	557.0	300.0	327.0	292.0	171.0	125.0
1979	82.3	67.3	61.3	95.7	482.0	760.0	694.0	362.0	235.0	474.0	323.0	119.0
1980	105.0	119.0	67.5	113.0	451.0	1,255.0	1,397.0	736.0	403.0	488.0	263.0	119.0
1981	198.0	120.0	93.5	102.0	755.0	861.0	770.0	741.0	341.0	256.0	245.0	141.0
1982	112.0	138.0	102.0	72.4	219.0	591.0	514.0	297.0	363.0	221.0	127.0	103.0
1983	85.2	73.6	64.3	93.3	424.0	685.0	450.0	349.0	233.0	224.0	141.0	97.8
1984	87.4	68.6	91.1	88.5	289.0	552.0	406.0	263.0	235.0	289.0	134.0	87.4
1985	64.2	43.6	40.6	43.0	227.0	601.0	651.0	416.0	381.0	260.0	107.0	93.5
1986	77.3	60.5	48.3									
Mean	95.2	80.6	69.3	77.9	334.4	713.3	628.5	388.8	296.1	302.0	178.3	117.7

Source: USGS 2000

Table 2.-Sport catch and harvest of Resurrection Creek salmonids estimated from the Statewide Harvest Survey, 1996-1999.

Year	Anglers	Trips	Days Fished	SWHS[a] Respondents		Coho Salmon	Red Salmon	Pink Salmon	Chum Salmon	Dolly Varden/ Arctic Char
1996	2,849	2,485	3,884	116	Catch	729	291	13,910	659	898
					Harvest	224	94	3,296	144	291
1997	1,680	1,370	2,048	72	Catch	113	74	4,032	378	370
					Harvest	84	14	866	124	0
1998	4,130	4,121	6,101	135	Catch	407	274	31,739	1,237	126
					Harvest	274	0	7,418	246	93
1999	1,307	1,164	2,167	47	Catch	414	0	4,947	1,033	157
					Harvest	233	0	691	230	91
Avg.	2,492	2,285	3,550	93	Catch	416	160	13,657	827	388
					Harvest	204	27	3,068	186	119
					% Retained	49%	17%	22%	22%	31%

[a] Statewide Harvest Survey (Howe et al. 2001a-d).

METHODS

PRESENCE OF SALMONIDS

From 15 July-5 October 2000, ground crews canvassed the entire Resurrection Creek drainage, sampling each tributary at least once. At most tributaries, the crew trapped upstream as far as could be hiked from the confluence in one-half day or until reaching a barrier deemed impassable to upstream migrating fish. Barriers to upstream migration in each tributary were described and mapped. Road accessible tributaries were sampled at intervals, canvassing the entire stream length adjacent to the road. The crew identified the beginning and end of the survey, and any barriers encountered, by latitude/longitude coordinates obtained with a hand held global positioning system (GPS).

At most locations, crews captured juvenile and small adult fish using minnow traps baited with salmon roe. Two traps were set in eddies or near bank locations considered suitable for rearing. Traps were fished for a minimum of 20 minutes and the catch recorded. Technicians used GPS coordinates to identify all trap locations. GPS coordinates of observations of adult anadromous salmonids were also recorded by species.

FISHERY SURVEY

Limited sampling of the sport fishery was conducted opportunistically when the crew was at the mouth of Resurrection Creek at various times of the day. Anglers were counted and interviewed when possible. They were asked what species they were targeting, residency, and how many fish they had caught and harvested. Other than number and species of fish harvested, we did not collect any other harvest data.

When the crew had determined that the entry of anadromous salmonids had begun in Resurrection Creek, two separate flights were made of the drainage in early July and early August to determine the location of the fishery and to observe barriers to fish migration on tributaries. These overflights were on days of the week when the fishery was most active. Photographs of tributaries and Resurrection Creek were taken during the flights and on the ground. Photographs were archived at the Alaska Department of Fish and Game (ADF&G) Sport Fish Division office in Soldotna, Alaska and were not analyzed.

COST ESTIMATE OF DEMOGRAPHIC SURVEY

Postseason, project biologists prepared two options for assessing demographics of anglers fishing in this area: resampling of previous respondents to the Statewide Harvest Survey (SWHS, Howe et al. 2001a-d), and an onsite fishery exit survey.

The first option requires recontacting anglers known to have fished the area who responded to the original SWHS. Each respondent would be asked to complete an additional questionnaire. Follow-up letters would be sent to nonrespondents to the questionnaire to increase participation.

The second option, an onsite fishery exit survey, would entail asking a suite of questions regarding fishery participation and fish use. In this approach, several technicians would be scheduled to interview anglers as they left the fishery.

RESULTS

PRESENCE OF SALMONIDS

Of 28 tributaries examined, 17 had salmonids in the lower reaches (Table 3) but most were Dolly Varden. Distribution of chinook and coho salmon juveniles was more restricted (Figure 1). Pink salmon juveniles were not present during the study period.

Adult salmonids were observed throughout the mainstem Resurrection Creek up to the Caribou Creek and Pass Creek confluences. Holding and spawning of pink and Chinook salmon were observed in several locations in the mainstem (Figure 1; Appendix A1).

Barriers to upstream migration were present in the lower reaches of 12 tributaries (Figure 2; Table 4).

FISHERY SURVEY

We counted 73 anglers fishing at the mouth of Resurrection Creek on 4 days during the survey in 2000. These anglers were in the lower stretch of the creek below the highway bridge. We counted six anglers fishing upstream, above the bridge in the stretch of creek that borders the road. No anglers were observed along the Resurrection Creek trail above Palmer Creek. Most anglers surveyed were residents (Table 5). The overflights were made on a day when the fishery was most active. During the flights, we were unable to count anglers, and barriers were impossible to observe on the tributaries.

COST ESTIMATE OF DEMOGRAPHIC SURVEY

Costs to estimate demographics of anglers at Resurrection Creek would be much less using the SWHS option than for an onsite creel survey (Appendix A2). The SWHS contacted an average of 93 anglers from 1996-1999, ranging from 47-135 anglers (Howe et al. 2001a-d).

Nearly the entire fishery occurs in a <1 km section of the river at its terminus, and access is essentially limited to one parking area. Interviews could be concentrated in that area, with two shifts per day designed to interview all anglers exiting the beach. One additional technician would be used to contact anglers in other reaches of the drainage on 5 randomly selected days per week.

DISCUSSION

Salmonid distribution in the Resurrection Creek drainage was largely restricted by hydrological barriers. In many cases, populations of Dolly Varden found above the barriers were small mature adults known locally as golden fins. In addition, a number of the tributaries with no apparent barriers, but with severe elevation changes, had no or very few salmonids in the upper reaches.

Monitoring of the sport fishery at the mouth of Resurrection Creek indicated that anglers were self-imposing hook-and-release practices. If an angler creel survey is conducted in the future, soliciting angler preferences would help characterize the type of fishery desired by anglers and aid managers in further developing effective management strategies.

Both options for conducting an angler survey at Resurrection Creek would provide the information of interest. Although resampling of previous SWHS respondents would be less expensive than an onsite survey, the SWHS option could result in a limited sample size.

Table 3.-Surveyed tributaries of Resurrection Creek, Alaska, 2000.

Tributary	Species[a]	Date
West Side		
Cripple Creek	Dolly Varden, PS, CS	16-Aug-00
Unnamed Creek	Dolly Varden	16-Aug-00
Wildhorse Creek	No Fish	30-Aug-00
Bedrock Cabin Creek	Dolly Varden	25-Jul-00
Rimrock Creek	Dolly Varden	26-Jul-00
Gold Gulch Creek	No Fish	26-Jul-00
Unnamed Creek	No Fish	4-Oct-00
Wolf Creek	Dolly Varden	2-Aug-00
Cannonball Creek	Dolly Varden	27-Sep-00
White Creek	No Fish	27-Sep-00
Moose Creek	No Fish	22-Aug-00
Hungry Creek	Dolly Varden	22-Aug-00
American Creek	Dolly Varden	23-Aug-00
Abernathy Creek	Dolly Varden	23-Aug-00
Afanasa Creek	Dolly Varden	23-Aug-00
East Side		
Unnamed Creek	Dolly Varden	1-Sep-00
Palmer Creek	Dolly Varden	1-Aug-00
Highland Creek	No Fish	5-Oct-00
Island Creek	No Fish	5-Oct-00
Willow Creek	No Fish	4-Oct-00
Unnamed Creek	No Fish	4-Oct-00
Caribou Creek	Dolly Varden	2-Aug-00
Pass Creek	Dolly Varden	3-Aug-00
Unnamed Creek	No Fish	27-Sep-00
Fox Creek	Dolly Varden	22-Aug-00
Unnamed Creek	No Fish	22-Aug-00
East Creek	DV, jKS, Slimy Sculpin	23-Aug-00
Coer D'Alene Creek	Dolly Varden	1-Aug-00

[a] DV = Dolly Varden, PS = Adult Pink Salmon, jKS = Juvenile King Salmon, CS = Adult Chum Salmon.

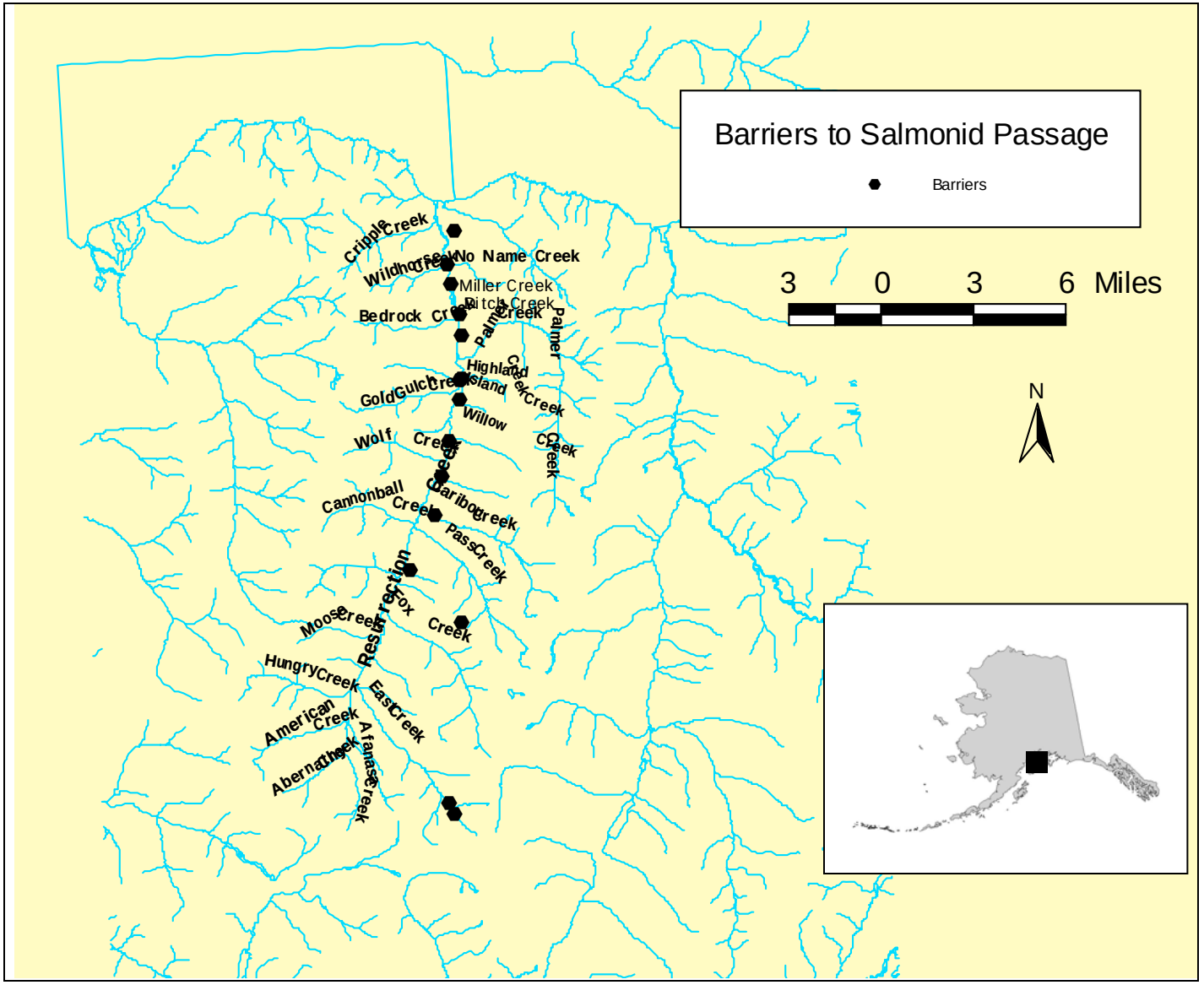

Figure 2.-Resurrection Creek drainage; barriers shown to salmonid passage in Resurrection Creek and its tributaries, 2000.

Table 4.-Resurrection Creek barriers, 2000.

Tributary	Latitude	Longitude	Barriers
Western Tributaries			
Cripple Crk.	60 54' 39.2"	149 39' 28.2"	Barrier, 2 ft falls at this location
Wildhorse Crk.	60 53' 45.0"	149 38' 12.9"	80 ft ravine at this location
Gold Gulch Crk.	60 50' 30.1"	149 37' 57.9"	2 Beaver dam barriers
Moose Crk.	60 43' 44.0"	149 43' 50.0"	Partial barrier w/ high velocity
Eastern Tributaries			
Unnamed Crk.	60 52' 20.6"	149 37' 40.7"	Ditch creek, pool along side of road
Highland Crk.	60 50' 33.5"	149 37' 51.4"	45^{o} angle steep barrier at this location
Island Crk.	60 49' 58.5"	149 38' 02.8"	45^{o} angle steep barrier at this location
Willow Crk.	60 48' 49.2"	149 38' 45.1"	35^{o} gradiant at this location
Unnamed Crk.	60 47' 52.6"	149 39' 18.7"	Barrier upstream 50 yds.
Caribou Crk.	60 46' 46.4"	149 39' 51.6"	Tree barriers at this location
Unnamed Crk.	60 45' 15.9"	149 41' 33.0"	Small creek along trail with no name
East Crk.	60 38' 23.8"	149 39' 51.7"	Headwaters of East Creek in Beaver Ponds
East Crk.[a]	60 33' 31.0"	149 40' 02.3"	Headwaters of East Creek in west end of Beaver Ponds
East Crk.	60 38' 42.7"	149 40' 11.7"	Down East Creek Valley from Beaver Ponds
Settling Pond	60 53' 11.0"	149 38' 06.8"	Landlocked mining pond on West side of Res. Creek
Settling Pond	60 51' 45.8"	149 37' 43.5"	Landlocked mining pond at camp

[a] Possible error in latitude/longitude.

Table 5.-Sport catch of Resurrection Creek salmonids by surveyed anglers, 2000.

Date	Number of Anglers	Catch	Location	Residency
21-Jul	22	pink salmon	Mouth	20 resident, 2 non-resident
21-Jul	6	N/A	Upstream	N/A[a]
25-Jul	8	N/A	Mouth	N/A
26-Jul	27	pink salmon	Mouth	N/A
28-Jul	16	pink salmon	Mouth	N/A

[a] NA = not available.

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APPENDIX A. SUPPORTING DATA

Appendix A1.-Fish observations in Resurrection Creek, Alaska and its tributaries, 2000.

Date	Tributary	Latitude	Longitude	Method[a]	Species[b]	Count
7/21/2000	Resurrection Creek	60 55 21.2	149 38 42.3	a	adult pink	6
7/25/2000	Bedrock cabin Creek	60 52 21.8	149 37 50.3	t	juv DV	2
7/25/2000	Bedrock cabin Creek	60 52 13.2	149 38 32.5	t	juv DV	3
7/26/2000	Resurrection Creek	60 50 40.1	149 37 51.3	v	adult chinook	10
7/26/2000	Rimrock Creek	60 50 43.3	149 37 46.6	t	juv DV	5
7/26/2000	Gold Gulch Creek	60 50 30.1	149 37 57.9	t	no fish	
7/27/2000	Bedrock cabin Creek	60 52 02.6	149 39 58.0	t	juv DV	4
7/27/2000	Bedrock cabin Creek	60 52 03.7	149 40 18.5	v	juv DV	1
7/27/2000	Resurrection Creek	60 53 50.7	149 38 16.2	v	adult pink	40
7/27/2000	Resurrection Creek	60 53 50.7	149 38 16.2	v	adult chum	1
8/1/2000	Resurrection Creek	60 53 49.2	149 38 20.9	v	adult pink	1,000
8/1/2000	Coer D'Alene Creek	61 51 00.5	149 31 52.5	t	juv DV	4
8/1/2000	Palmer Creek	60 50 25.4	149 31 57.8	t	juv DV	1
8/2/2000	Wolf Creek	60 48 17.3	149 39 01.3	t	juv DV	2
8/2/2000	Resurrection Creek	60 47 03.4	149 40 33.7	v	adult chinook	1
8/2/2000	Caribou Creek	60 46 55.2	149 40 17.9	t	juv DV	4
8/2/2000	Caribou Creek	60 46 46.4	149 39 51.6	t	juv DV	1
8/2/2000	Wolf Creek	60 48 17.3	149 39 01.3	t	juv DV	2
8/3/2000	Pass Creek	60 46 17.7	149 40 31.9	t	juv DV	4
8/3/2000	Pass Creek	60 46 12.4	149 40 21.4	t	juv DV	7
8/3/2000	Pass Creek	60 46 06.5	149 39 59.9	t	juv DV	1
8/3/2000	Resurrection Creek	60 47 04.2	149 40 33.8	t	juv DV	5
8/8/2000	Resurrection Creek	60 52 04.9	149 37 43.3	t	juv coho	4
8/8/2000	Resurrection Creek	60 52 04.4	149 37 43.3	v	juv coho	500
8/15/2000	Resurrection Creek	60 49 08.1	149 38 39.2	v	adult pink	15
8/16/2000	Cripple Creek fork	60 54 37.8	149 39 27.3	t	juv DV	2
8/16/2000	Cripple Creek	60 54 39.5	149 39 41.1	t	no fish	0
8/16/2000	Cripple Creek	60 54 38.5	149 39 24.9	v	juv DV	5
8/16/2000	Unnamed Creek	60 54 32.9	149 39 31.1	t	no fish	0
8/16/2000	Cripple Creek	60 54 49.6	149 38 50.2	v	adult pink	4
8/16/2000	Resurrection Creek	60 54 53.3	149 38 33.0	v	adult pink	100
8/16/2000	Resurrection Creek	60 54 51.5	149 38 29.7	v	adult chum	1
8/16/2000	Resurrection Creek	60 54 51.5	149 38 29.7	v	adult pink	12
8/16/2000	Unnamed Creek	60 54 49.6	149 38 25.5	v	adult pink	na
8/16/2000	Cripple Creek	60 54 39.0	149 39 41.6	v	juv DV	1
8/16/2000	Cripple Creek	60 54 39.2	149 39 28.2	t	juv DV	1
8/16/2000	Cripple Creek	60 54 39.5	149 39 29.2	v	juv DV	1
8/22/2000	Fox Creek	60 43 48.6	149 42 27.8	t	juv DV	9
8/22/2000	Moose Creek	60 43 44.0	149 43 50.0	t	no fish	
8/22/2000	Hungry Creek	60 42 00.5	149 45 25.6	t	juv DV	1
8/23/2000	Resurrection Creek	60 42 14.5	149 45 06.3	t	juv DV	17
8/23/2000	Resurrection Creek	60 42 14.5	149 45 06.3	t	juv chinook	1
8/23/2000	Resurrection Creek	60 42 14.5	149 45 06.3	t	sculpin	1
8/23/2000	East Creek	60 42 08.8	149 44 55.8	t	juv DV	11
8/23/2000	East Creek	60 42 08.8	149 44 55.8	t	juv chinook	1
8/23/2000	Resurrection Creek	60 40 20.2	149 44 54.7	t	juv DV	5
8/23/2000	American Creek	60 41 12.8	149 45 49.5	t	juv DV	1
8/23/2000	Abernathy Creek	60 40 21.5	149 45 59.5	t	juv DV	2

-continued-

Appendix A1.-Page 2 of 2.

Date	Tributary	Latitude	Longitude	Method[a]	Species[b]	Count
8/23/2000	Afanasa Creek	60 40 02.8	149 45 36.3	t	juv DV	6
8/24/2000	East Creek	60 42 14.5	149 45 05.4	t	juv DV	5
8/24/2000	East Creek	60 42 14.5	149 45 06.3	t	juv DV	2
8/24/2000	East Creek	60 42 14.5	149 45 06.3	t	juv chinook	2
8/24/2000	East Creek	60 42 14.5	149 45 06.3	t	sculpin	5
8/29/2000	Unnamed Creek	60 54 30.9	149 37 53.7	t	juv DV	3
8/30/2000	Unnamed Creek	60 52 20.6	149 37 40.7	t	juv DV	3
8/31/2000	Settling Pond	60 53 11.0	149 38 06.8	t	RBT	6
8/31/2000	Settling Pond	60 53 11.0	149 38 06.8	t	dv	4
8/31/2000	Settling Pond	60 53 11.0	149 38 06.8	t	juv rbt	4
8/31/2000	Settling Pond	60 53 11.0	149 38 06.8	t	juv DV	4
8/31/2000	Resurrection Creek	60 53 11.0	149 38 06.8	t	juv coho	20
9/1/2000	Unnamed Creek	60 52 20.7	149 37 40.7	t	juv DV	48
9/26/2000	Cannonball Creek	60 46 36.2	149 41 03.1	t	juv DV	5
9/28/2000	Caribou Creek	60 47 03.4	149 40 33.7	t	juv chinook	2
9/28/2000	Caribou Creek	60 47 03.4	149 40 33.7	t	juv DV	7
9/28/2000	Caribou Creek	60 47 03.4	149 40 33.7	t	sculpin	1

[a] a = angler, v = visual, t = trap.

[b] DV = Dolly Varden; RBT = rainbow trout.

Appendix A2.-Estimated cost of two options for measuring the demographics of anglers fishing in Resurrection Creek, Alaska.

Expenditure	Detail[a]	Amount
Resampling of Statewide Harvest Survey		
Field Personnel	1 mm FWT II time to prepare mail outs and follow up letters; enter data	$4,000
Equipment	office supplies, postage	$1,000
Housing and Food	n/a	
Transportation	n/a	
Data Analysis and Report Preparation	1 mm Biometrician I	$6,000
Total		$11,000
Fishery Exit Survey		
Field Personnel	9 mm FWT II time to sample the fishery from July 1 through September 30	$36,000
Equipment	field supplies	$500
Housing and Food	3 m rental @ $1,000/month; food	$5,700
Transportation	2 trucks @ $1,200 ea	$2,400
Data Analysis and Report Preparation	2 mm Biometrician I	$12,000
Total		$56,600

Note: FWT = Fish and Wildlife Technician

[a] mm = man month