

.....

Champagne & Aishihik First Nations

Takhini River Tributaries' Juvenile Chinook Salmon Investigations 2003



December 15, 2003



Yukon River Panel - Restoration and Enhancement Fund

Project #: RE- 54-03

Abstract

Field investigations for the presence of juvenile chinook salmon (jcs) were conducted on five waterways flowing into Kusuwa Lake on August 4th to August 8th, 2003. Investigations were conducted on the lower reaches of the Upper Takhini River, Hendon River, Kusuwa River, Primrose River and Jo-Jo Creek. Gee-type minnow traps baited with Yukon River origin salmon roe were used to capture fish. A similar investigation was conducted in 2002 on all of these waterways except Jo-Jo Creek. The 2002 investigation included more detailed habitat, reach assessment and water quality work. As in 2002, jcs were captured in low numbers on the Primrose River during this current study. No jcs were captured or observed on the Upper Takhini River in 2003 although they were present there during 2002. Other species captured during the study included slimy sculpins, burbot, lake trout, arctic grayling and long-nose suckers. Funding for the project was provided by the Yukon River Panel's Restoration and Enhancement (R&E) Fund.

Table of Contents

ACKNOWLEDGEMENTS	2
LIST OF FIGURES	3
LIST OF APPENDICES	3
INTRODUCTION	4
BACKGROUND.....	4
OBJECTIVES	4
<i>Long-term Objective</i>	4
<i>Project Objectives</i>	4
PROJECT LOCATION AND DESCRIPTION.....	5
<i>Kusawa Lake and its Tributaries</i>	5
<i>Primrose River</i>	5
<i>Upper Takhini River</i>	5
<i>Hendon River</i>	7
<i>Kusuwa River</i>	7
<i>Jo-Jo Creek</i>	7
METHODS	7
RESULTS	8
PRIMROSE RIVER	8
UPPER TAKHINI RIVER.....	9
HENDON RIVER.....	10
KUSAWA RIVER	10
JO-JO CREEK.....	10
HABITAT ASSESSMENT	11
DISCUSSION	11
REFERENCES	12
APPENDICES	14

Acknowledgements

The following persons contributed to this investigation:

- Lorne LaRoque, Paul Birkel (CAFN), and Ron Chambers (CAFN) conducted the field work during this investigation
- Ron Chambers (CAFN) provided the boats and guided the field crew
- Champagne and Aishihik First Nations' chief, council, and staff identified the project need and provided the necessary resources and support;
- Linaya Workman, and Lawrence Joe (CAFN) provided input, advice, and direction throughout the project development and completion;
- Al von Finster of Fisheries and Oceans Canada provided technical support and direction; and
- The Yukon River Panel provided the financial resources from their Restoration & Enhancement (R&E) Fund which made this project a reality
- David Petkovich managed the field activity and prepared this report.

List of Figures

Figure 1 Kusuwa Lake and Tributaries

List of Appendices

Appendix A Reach break maps of the study area

Appendix B Gee-Type Minnow Trap Catch – Kusuwa Lake
Tributaries – July, 2003

Appendix C Incidental Observations

Introduction

Background

Information on the use of the tributaries of Kusuwa Lake by juvenile chinook salmon is limited. In 1997-98 Blue River Consulting received funding to conduct small stream investigations and gather information on chinook salmon habitat on tributaries of the Takhini River (Zurachenko P., B. Finnsen 1998). In 2002 Champagne and Aishihik First Nation (CAFN) working with EASY Consulting (Environmental & Administrative Services Yukon) conducted habitat assessment and reconnaissance surveys and gee-trapping program on several tributaries of Kusuwa Lake and the Mendenhall River (Pumphrey, I 2003). This study revealed the presence of juvenile chinook salmon in two of the four tributaries of Kusuwa Lake that were investigated. No jcs were found in the Mendenhall system.

This current study continued investigation of jcs in tributaries of the Kusuwa Lake system for presence of jcs and other incidental species, with funding provided by the Yukon river Panel's Restoration and Enhancement Fund.

This project's primary objective is to provide background information to fisheries resource managers for the development of restoration/enhancement study plans for selected tributaries of the Takhini River. Traditional knowledge indicates that Chinook salmon may have been caught in Kusuwa Lake in the past. Prior to the 2002 investigations there had been no confirmed documentation of juvenile chinook salmon utilizing tributaries of Kusuwa Lake, the source of the Takhini River.

CAFN identified tributaries with data gaps regarding salmon habitat and utilization within their traditional territory. They identified and prioritized tributaries to focus the 2002 and 2003 field investigations. The tributaries flowing into Kusuwa Lake (the upper Takhini River, Primrose River, Kusuwa River, Hendon River, Jo-jo Creek and Sandpiper Creek) and the upper Mendenhall River, just below the mouth of Teye Lake, were investigated as a result.

Objectives

Long-term Objective

CAFN's overall objective is to protect and facilitate the rebuilding and/or maintenance of salmon populations within the Takhini River watershed for present and future generations. CAFN plans to obtain this goal through active stewardship with an emphasis on capacity building.

Project Objectives

Identify and delineate chinook salmon habitat and bearing tributaries flowing into Kusuwa Lake.

Project Location and Description

Reach assessments on the tributaries investigated here were conducted during the 2002 study (Pumphrey 2003). Delineated reaches of the various tributaries are Appended (Appendix A1-A3)

Kusawa Lake and its Tributaries

Kusawa Lake and its tributaries (figure 1) are situated at the northern extremity of the Yukon Stikine Highlands Ecoregion (NSL Map sheet 105d). This ecoregion falls within the rain shadow of the Coast Mountains. The climate is one of transition from coastal to interior. Temperatures are moderated throughout the year by the influence of maritime air masses. The mean annual temperature for the area is approximately -1°C with a summer mean of 10°C and a winter mean of -13°C . The mean annual precipitation is 500-600 mm. Permafrost is discontinuous (Ecological Stratification Working Group 1995).

Kusawa Lake, at an elevation of 671 m asl, is one of the major headwater lakes of the Yukon River system. Its major tributaries include Primrose River, Jo-Jo Creek, Devilhole Creek, Upper Takhini River, Hendon River and Kusawa River. Investigation for the presence of jcs was conducted on the lower reaches of each of these tributaries in 2003 except for Devilhole Creek.

Primrose River

The Primrose River drains approximately 1235 km² of the Boundary Ranges to the east and south of Kusawa Lake. Its headwaters include the Rothwell Glacier in northern British Columbia. Major Lakes in the Primrose drainage include Primrose Lake (960 m asl) and Rose Lake (876 m asl). The Primrose River downstream of Rose Lake includes confined, steeply sloped canyons with rapids. It then flows about 3 km over a low delta before entering Kusawa Lake.

Upper Takhini River

The Upper Takhini River drains a mountainous area of approximately 564 km² to the southeast of Kusawa Lake. It flows from its headwaters at the Rothwell Glacier and other icefields in the Boundary Ranges of northern British Columbia through a deeply incised valley which includes Takhini Lake. The lower reaches of the Upper Takhini River are confined with moderately sloped channels.

NTS Map: 115A Dezadeash Range – Kusuwa Lake & tributaries

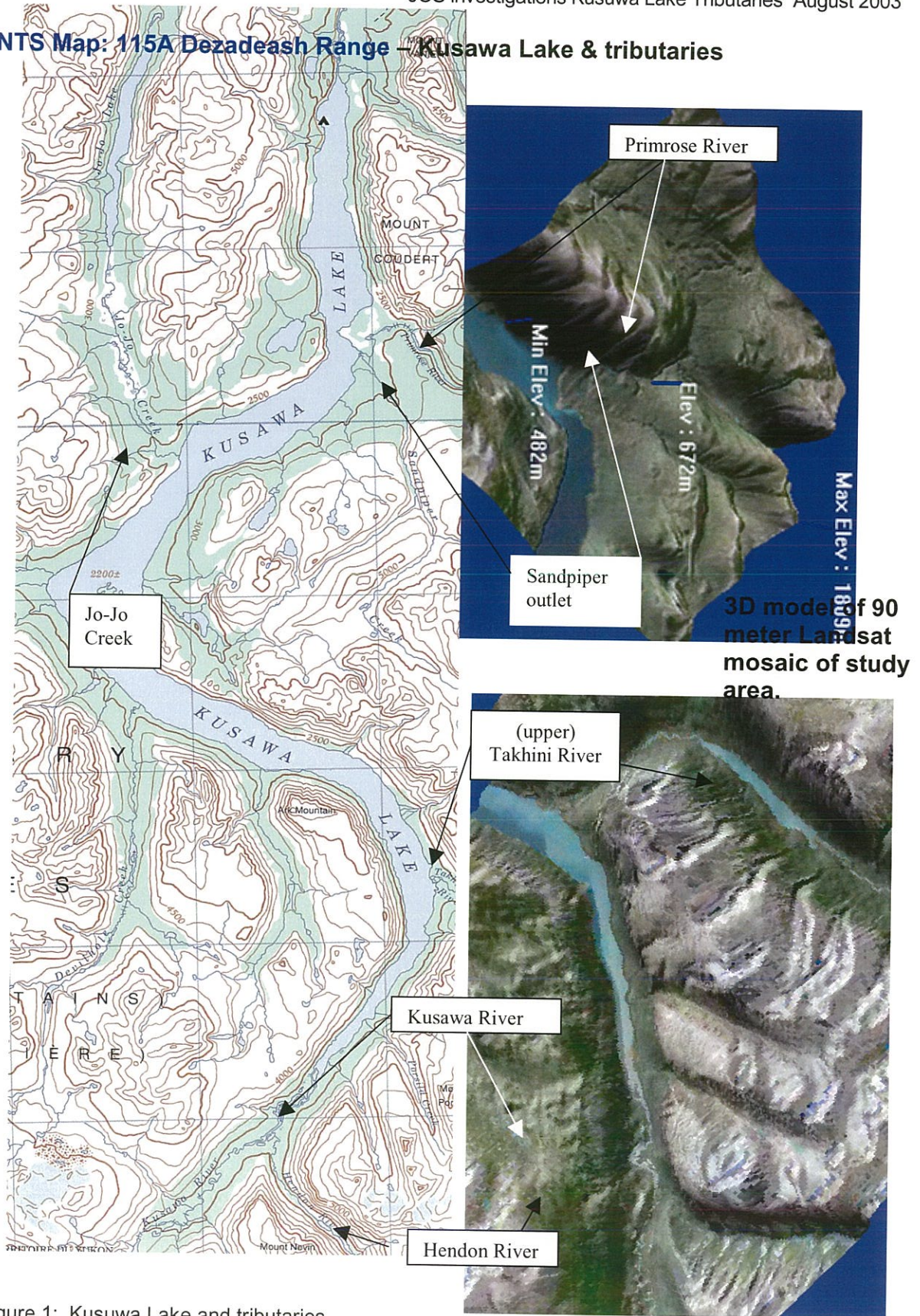


Figure 1: Kusuwa Lake and tributaries

Hendon River

The Hendon River drains approximately 101 km² of mountainous terrain at the southern end of Kusawa Lake. Its headwaters include high elevation lakes and icefields. It flows through about 2 km of wetland into the lower reaches of the Kusawa River.

Kusuwa River

The Kusawa River drains approximately 486 km² of the Boundary Ranges of northern British Columbia. Its headwaters include a number of large alpine lakes and glaciers. The lower reaches of the Kusawa River flow through wetlands into the shallow waters of the southern tip of Kusawa Lake.

Jo-Jo-Creek

Jo-Jo Creek drains Jo-Jo lake located approximately 14.5 kilometers upstream of Kusuwa Lake. According to Brown et al. 1976 the bottom section of the creek is composed of rapids and falls that are impassable to fish.

Methods

Investigation for the presence of jcs was conducted on the lower reaches of the Upper Takhini River, Hendon River, Kususwa River, Primrose River and Jo-Jo Creek from August 4, 2003 to August 8, 2003.

Trapping of juvenile chinook salmon and other fish species was conducted using gee-type minnow traps according to "*The Protocol for the Baiting of Gee - Type Minnow traps for the Capture of Juvenile Chinook Salmon in the Yukon River Drainage Basin*". Traps were set for a minimum of 20 hours (soak time), and were distributed over a wide range of potential juvenile chinook salmon habitat in each tributary.

A walnut-sized portion of previously frozen Yukon River salmon roe was placed in a perforated "Alligator" brand sandwich bag. The bag was then tied and suspended inside the trap and secured with a "twist-tie". The Traps were placed in areas where there was adequate flow and cover and secured to the bank with a cord.

All fish captured were anaesthetized with Alka-Seltzer® and held in a bucket until sufficient time passed for the anesthetic to take effect. Each captured fish was weighed with an Acculab® pocket pro portable electronic scale to 1/10th of a gram. Each fish was measured for fork-length to the nearest millimeter(mm). Fork lengths, the distance from the most anterior part of the head to the median caudal fin rays

(fork of tail), were taken for fork tailed fish such as salmonids and suckers. Total length, the distance from the most anterior part of the head to the tip of the longest caudal fin ray, were taken for fish without forked tails such as burbot and sculpins. For each trap, the date, location, habitat, numbers caught, and the number of hours set was recorded. A condition factor (k), defined as $k = \text{Weight (grams)} * [100 / \text{Length (cm)}]^3$, were calculated for each juvenile chinook salmon.

A small piece of pectoral fin was clipped from each jcs captured and stored in alcohol for future DNA sampling.

Beach seining was attempted on the Upper Takhini river but the net was too short in length to be effective and therefore was not used on the other tributaries.

The reach break analyses of the major tributary streams flowing into Kusawa Lake were completed through the interpretation of 1:40,000 scale air photos. Reaches were delineated according to their apparent homogeneity. Each reach identified had a contiguous sequence of like physical characteristics, such as slope, confinement and riparian vegetation. Some reach breaks, or boundaries between reaches, were identified at the confluence with tributary streams; other breaks were recognized at distinct changes in drainage patterns, such as at locations where a relatively straight, confined stream changed into a meandering pattern or into a braided, multi-channelled pattern. Maps outlining the reach breaks within tributaries in the study area are appended (Appendix A1-A3).

Results

From 52 traps set in the five tributaries a total of 42 fish were captured consisting the following six species:

Juvenile chinook Salmon (<i>Onchorynchus tshawytscha</i>)	JCS
Lake trout (<i>Salvelinus namaycush</i>)	LT
Arctic Grayling (<i>Thymallus Arcticus</i>)	AG
Long-nose Sucker (<i>Catostomus catostomus</i>)	LNS
Slimy Sculpin (<i>Cottus cognatus</i>)	SS
Burbot (<i>Lota lota</i>)	BB

Of the 42 fish captured only 4 were jcs captured in the Primrose River. The following is a summary of fish captured and effort for each of the tributaries sampled.

Primrose River

A total of 12 traps were set in the Primrose River in the first three reaches (p1- p3). Four jcs were captured in the first two reaches. A total of 13 other fish were captured consisting of burbot, long-nose suckers and slimy sculpins. Numerous arctic grayling were observed rising in reach 3 (P3).

Number of traps: 12

Fish species captured and number:

SS – 6

JCS – 4

LNS – 6

BB - 1

Water Temp: 15 °C

Upper Takhini River

A total of 16 traps were set within the first four reaches (four traps per reach) of the Upper Takhini River resulting in the capture of only 3 fish consisting of 2 slimy sculpins and one juvenile lake trout. A beach seine was conducted in reach T-3 and resulted in the capture of 3 sculpins and one arctic grayling.

Beach Seine

AG - 1

SS - 1

Gee-trapping

Number of traps set: 16

Fish species captured and number:

SS – 2

LT – 1

Water Temp: 10.0 °C

Hendon River

A total of 8 traps were set within the first two reaches of the Hendon river resulting in the capture of 13 slimy sculpins and 1 long-nose sucker. Juvenile arctic grayling were observed in the river and captured by angling.

Number of traps set: 8

Fish species captured and number:

SS – 13

LNS – 1

Water Temp = 14 C

Kusawa River

A total of 11 traps were set on the Kususwa River within the first three reaches. No jcs were captured and fish were only captured in the first two reaches. The only species captured were slimy sculpins.

Number of traps set: 11

Fish species captured and number:

SS – 6

Water temp = 13 C

Jo-Jo Creek

A total of 5 traps were placed in the lower portion of Jo-Jo creek at the mouth. Only two fish, lake trout juveniles were captured at this location.

Number of traps: 5

Fish species captured and number:

LT – 2

Water temp = 11 C

Habitat assessment

More detailed habitat and reach assessment was conducted during the 2002 field investigations (see Pumphreys 2003).

Discussion

Juvenile chinook salmon (jcs) investigations on waterways flowing into Kusuwa Lake revealed the presence of jcs in Upper Takhini and Primrose Rivers (Pumphrey 2003). This marked the first time for recorded observations of jcs on any of the waterways flowing into Kusuwa Lake. With respect to this current study jcs were only captured in the Primrose River. In both 2002 and 2003 investigations the number of jcs captured was low (6 and 4, respectively). Prior to these studies investigations for jcs in this area is limited to field investigations in 1974 on the Primrose and Upper Takhini River and Jo-Jo Creek (Brown et. Al. 1976). No jcs were captured during this investigation, however capture technique involved mostly gill-netting with some limited seining.

The presence of jcs in the tributaries of Kusuwa Lake indicates that adults likely spawn in the vicinity although there has been no documented observations of chinook spawning in this area except in the Takhini River and its tributaries. Pumphreys (2003) noted potential salmon spawning dunes in the Upper Takhini and Primrose Rivers and past aerial and level reconnaissance work in the area indicates that there is suitable spawning habitat in many of the tributaries.

References

- Anon.(1997). Ambient Fresh Water and Effluent Sampling Manual, Resource Inventory Committee Manual. Province of British Columbia.
- Anon.(1997). Fish Collection Methods and Standards Version 4, Resource Inventory Committee Manual. Province of British Columbia.
- Anon.(1997). Freshwater Biological Sampling Manual, Resource Inventory Committee Manual. Province of British Columbia.
- Anon.(1997). Reconnaissance Fish and Fish Habitat Inventory: Standards and Procedures, Resource Inventory Committee Manual. Province of British Columbia.
- Brown R.F., M. S. Elson, L.W. Steigenberger 1976. Catalogue of Aquatic Resources of the Upper Yukon River Drainage (Whitehorse Area). Environment Canada, Fisheries and Marine Service. PAC/T-76-4. 149 pp.
- Cody, W.J. 1996. Flora of the Yukon Territory. NRC Research Press, Ottawa, Ontario, Canada.
- Cox, J. 1999. Salmon in the Yukon River Basin, Canada. - a compilation of historical records and written narratives. Yukon Panel Restoration & Enhancement Fund - CRE-17-98.
- Cruikshank, Julie. (1990). Life Lived Like a Story – life stories of three Yukon elders. University of Nebraska Press.
- Department of Fisheries & Oceans, Habitat Management Sector Yukon & NBC, 1995. Guidelines for small stream investigations restoration/development of chinook salmon spawning populations. March 22, 1995. Unpublished draft
- Department of Fisheries and Oceans, Whitehorse Yukon, Stream Files.
- DFO - Internet site. Fisheries Information Summary System (FISS)
- Ecological Stratification Working Group. 1995. A National Ecological Framework for Canada. Agriculture and Agri-food Canada. Ecozone Analysis Branch, Ottawa, Canada.
- Petkovich, D. and Workman L., August, 1994. *Champagne and Aishihik First Nations Community Salmon Management Plan.*

- Scott, W. B., and E. J. Crossman. 1973. *Freshwater Fishes of Canada*. Fisheries Research Board of Canada, Ottawa, Bulletin 184.
- Stream Inventory Manual. 1994. - Prepared by B.C. Ministry of Environment, Lands and Parks, and Department of Fisheries and Oceans, 300 p.
- Taccogna, G and K. Munro (eds). 1995. *The Streamkeepers Handbook: A practical guide to stream and wetland care*. Salmonid Enhancement Program, Dept. Fisheries and Oceans, Vancouver, B.C. (Updated version for the Yukon , 1977.)
- von Finster, Al . 1994. *Unpublished*. Notes on Fish and Fish Habitat of the Waters of the Yukon Territory - Prepared for Fisheries and Oceans Canada, Whitehorse.
- Zurachenko P. and Finnon B., Blue River Consulting, March 1998; Small Stream Investigations Regarding Restoration and Enhancement of Chinook Salmon Habitat on Select Tributaries of the Takhini River. *The Yukon River Panel: Restoration and Enhancement Fund*.

Appendices

Appendix A - Primrose and Sandpiper Creek Reaches

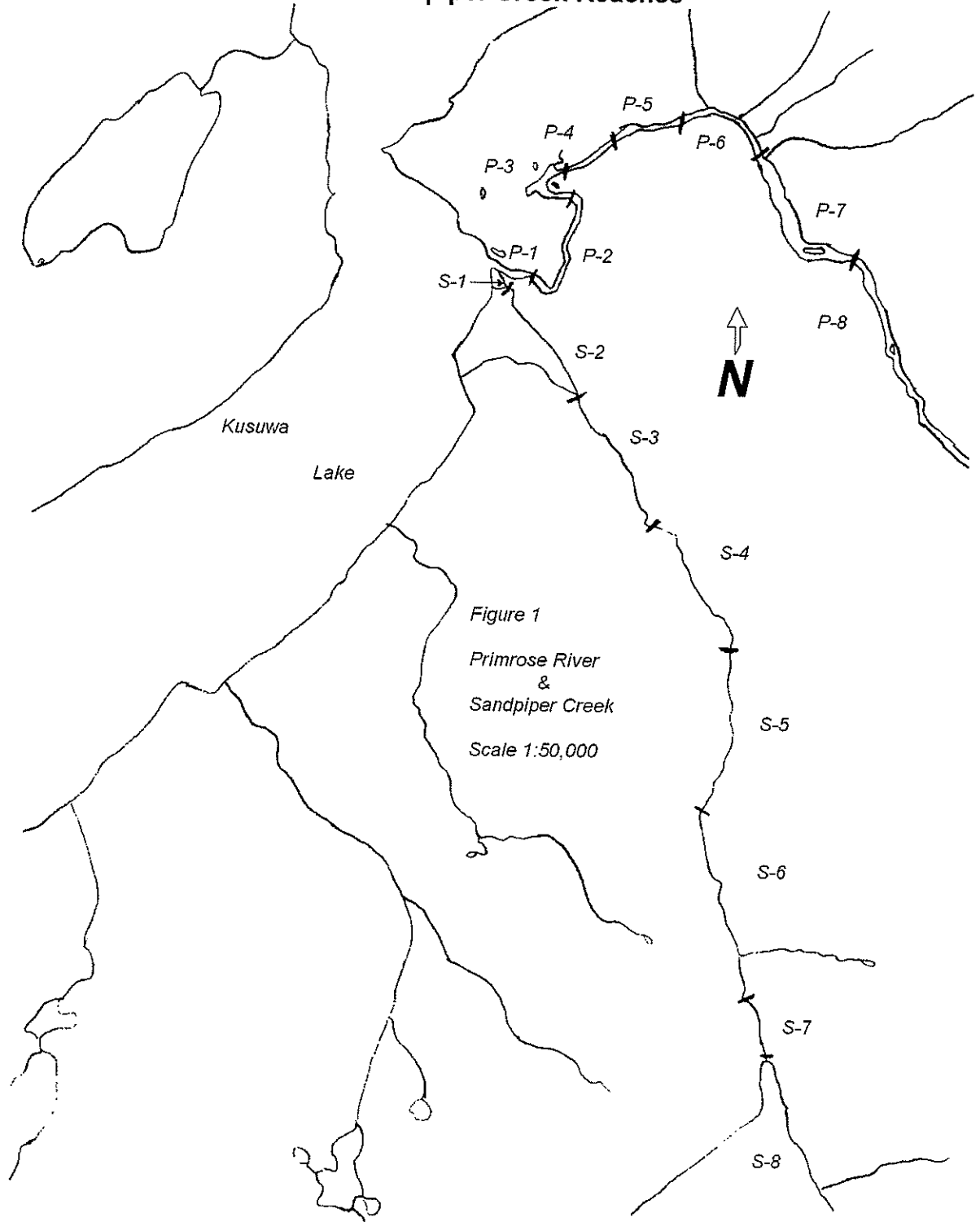


Figure 1
Primrose River
&
Sandpiper Creek
Scale 1:50,000

Appendix A 2 – Upper Takhini River Reaches

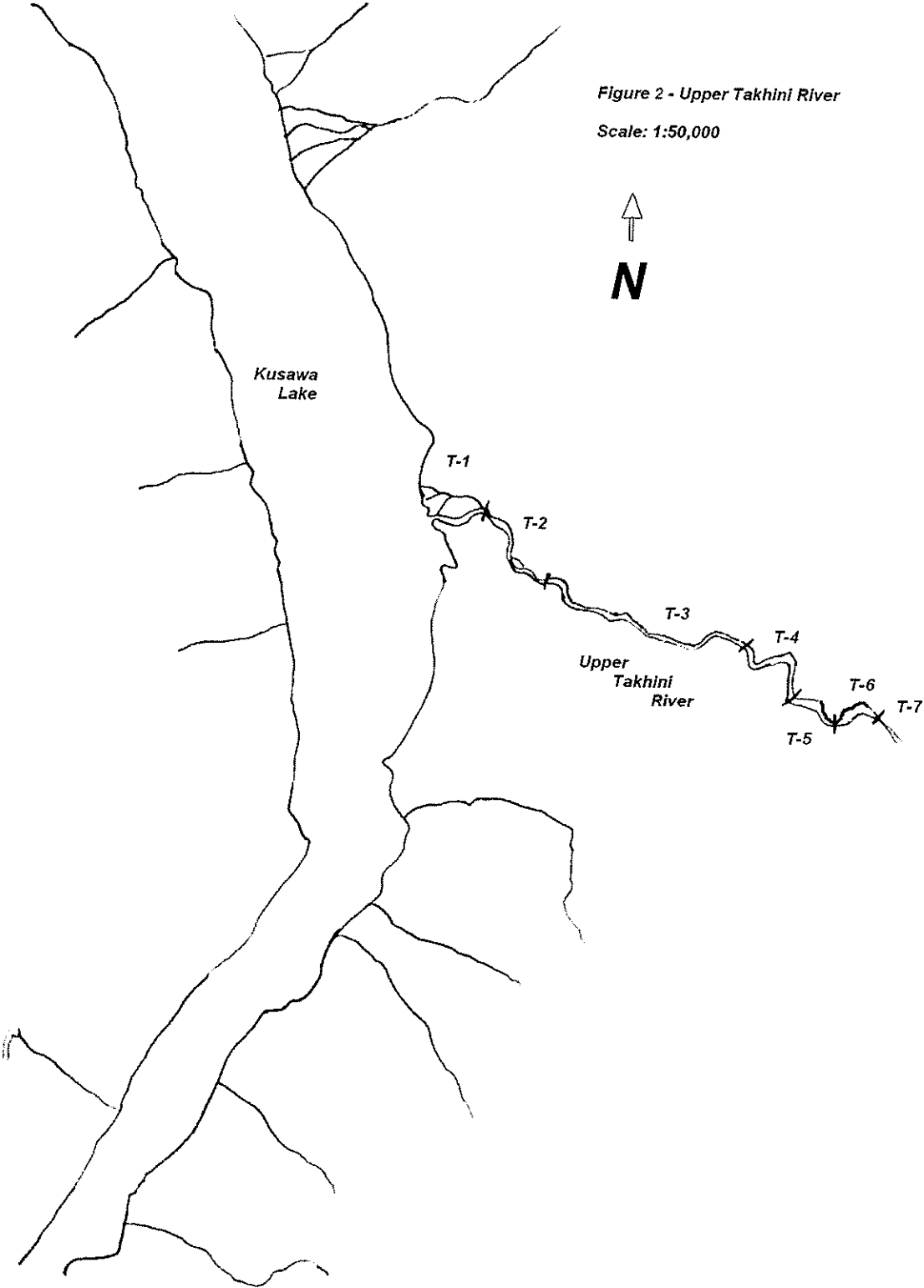
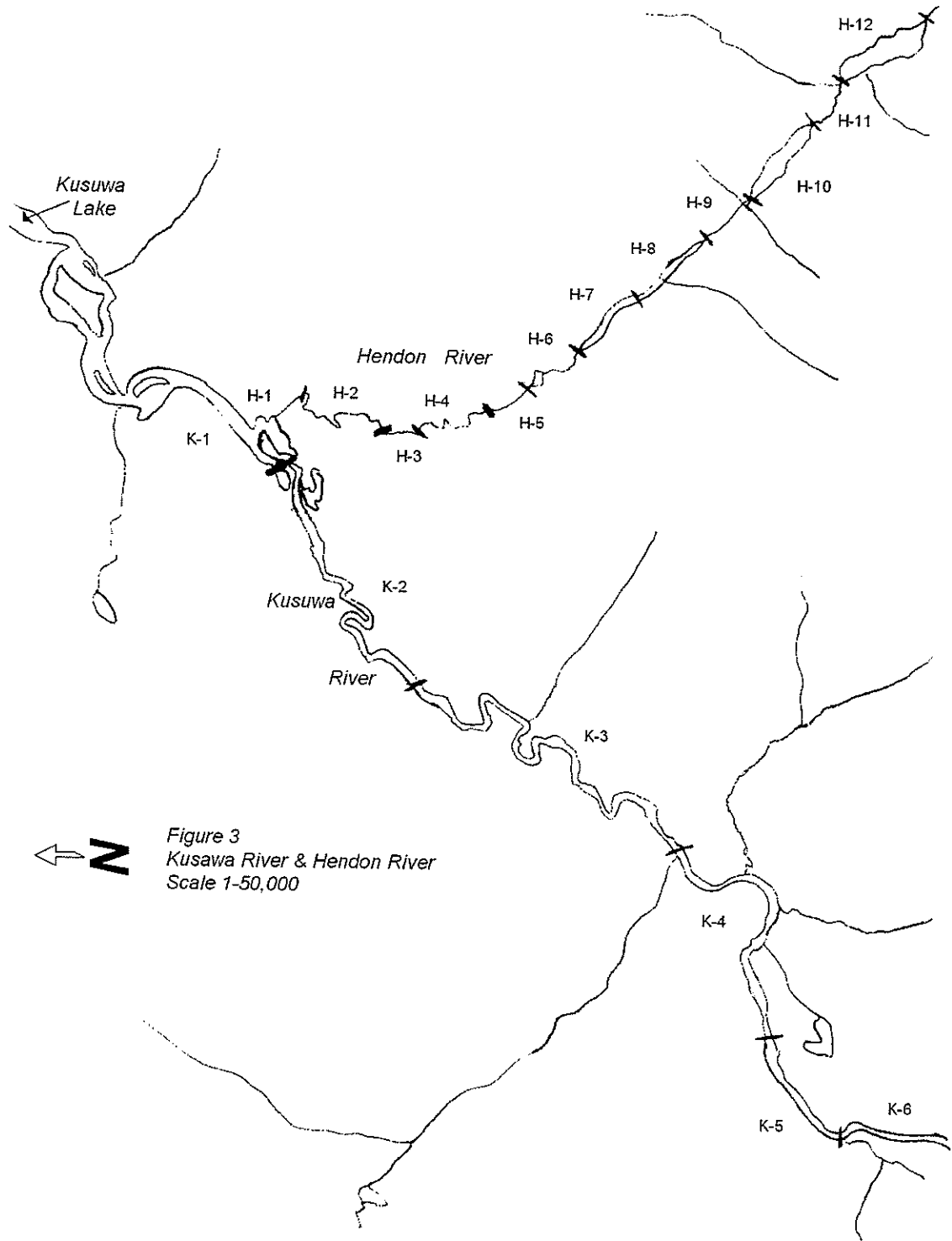


Figure 2 - Upper Takhini River
Scale: 1:50,000

Appendix A 3 – Kusuwa and Hendon River Reaches



Appendix B – Gee-Type Minnow Trap Catch Data – Takhini River Tributaries –
August 4-8, 2003

**Yukon River Panel - Restoration and Enhancement
Fund**

**Upper Takhini River Juvenile Chinook Salmon Investigations 2003
Sampling 2003**

Location	Reach	Species	Length (mm)	Weight (g)	K Condition	DNA sampled taken y/n	COMMENT
Upper Takhini River	T-3	SS				n	
Upper Takhini River	T-4	SS				n	
Upper Takhini River	T-1	LT	105	12.1	1.05	n	
Hendon river	H-1	SS				n	4 captured
Hendon river	H-2	LNS	160			n	
Hendon river	H-2	SS				n	7 captured
Kusawa River	K-1	SS				n	2 captured
Kusawa River	K-2	SS				n	4 captured
J0-Jo Creek		LT	59	2.5	1.22	n	
J0-Jo Creek		LT	96	10	1.13	n	
Primrose River	P-1	LNS	165	40	0.89	n	
Primrose River	P-1	LNS	100	13	1.30	n	
Primrose River	P-1	LNS	109	16	1.24	n	
Primrose River	P-1	LNS	139	29	1.08		
Primrose River	P-1	LNS	114	15	1.01		
Primrose River	P-1	JCS	78	4	0.84	y	
Primrose River	P-1	JCS	73	3	0.77	y	
Primrose River	P-1	JCS	72	6.5	1.74	y	
Primrose River	P-1	SS				n	2 captured
Primrose River	P-2	SS				n	
Primrose River	P-2	SS				n	
Primrose River	P-2	JCS	80	5	0.98	y	
Primrose River	P-3	BB	150	17	0.50	n	
Primrose River	P-3	LNS	40	0.7	1.09	n	

Reach locations are illustrated

SS=Slimy Sculpin; LNS=Long Nose Sucker; BB=Burbot; JCS=Juvenile
Chinook Salmon, LT-Lake Trout.

Appendix C

Incidental Observations during field investigations August 4-8, 2003

Kusuwa River:

Blue Heron at mouth

Bald Eagle

Arctic Terns (2)

Arctic Loons (4)

Forest Fire smouldering approximately 4 km upstream of mouth

Primrose River:

Belted Kingfisher

Common Loons (9)

Common Mergansers

Arctic Terns

Water monitoring gauge at 63 cm (P-2)

Jo-Jo Creek:

Surf Scoter