Miner River Chinook Salmon Index Aerial Survey 2010

Yukon Restoration and Enhancement Project CRE-113-10

FINAL REPORT

Prepared For:

Yukon River Panel

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Executive Summary

Ecological Logistics & Research Ltd. (ELR) was retained by the Vuntut Gwitchin First Nation Government (VGFN) to conduct an aerial survey of the Miner River, Yukon, from the confluence of the Whitestone River upstream to the confluence with Fishing Creek. Fisheries and Oceans Canada (DFO) had requested adult and juvenile Chinook salmon genetic samples also be collected in conjunction with the survey effort. Turbidity was extremely high due to extensive flooding which resulted in only two adult Chinook salmon being observed. Limited Gee trapping was also conducted, from which three juvenile Chinook salmon were captured and sacrificed. Overall, the survey was compromised by high river turbidity and the number of returning Chinook could not be estimated.

Table of Contents

Executive Summary i

Table of Contents ii

1. Introduction and Project Background 1

2. Objectives 1

3. Study Area 1

4. Methods 2
- **4.1 Survey Timing and Contingency** 2
- **4.2 Aerial Survey** 2
- **4.3 Genetic Sampling** 3

5. Results 3
- **5.1 Aerial Survey** 3
- **5.2 Genetic Sampling** 3

6. Discussion 4

References 5

Figures 6

Photos 8

List of Figures

Figure 1: Project Area Overview and Flight Lines 7

List of Tables

Table 1: Juvenile Chinook Salmon Capture Data from Gee Traps, Miner River, August 9, 2010. 4

Table 2: Qualitative and Quantitative Data on Miner River Chinook Spawning. Past data from Anderton 2001, 2002,2003, 2005a, 2005b and EDI 2009. 4

List of Photos

Photo 1: View of the confluence of the Whitestone River (left) and the Miner River (right), looking South. Note the heavy sediment load in both rivers. Photo taken August 9, 2010.

Photo 2: View of the Miner River near the downstream end of the survey area. Note the turbidity in relation to a clear backwater, and the overall high water level. Photo taken August 9, 2010.

Photo 3: Representative view of the flooding and poor visibility conditions encountered in the Miner River. Photo taken August 9, 2010.

Photo 4: View of the confluence of Fishing Creek (right) with the Miner River (left) at the upstream extent of the study area. Note the high turbidity in the Miner River. Photo taken August 9, 2010.

Photo 5: View of debris observed on a mid-stream island in the Miner River near Fishing Creek. The debris indicates much higher recent flood waters that were receding at the time of observation. Photo taken August 9, 2010.

Photo 6: View of sediment and debris observed on a mid-stream island in the Miner River near Fishing Creek. Photo taken August 9, 2010.

Photo 7: A representation of the poor visibility at the Miner River near its confluence with the Whitestone River. Visibility was approximately 18 cm at the time of the photo (13:30). Photo taken August 9, 2010.

Photo 8: View of the high water levels on the Miner River, near the downstream extent of the study area. Photo taken August 9, 2010.

Photo 9: View of the three juvenile Chinook salmon captured in Gee Traps near the upstream extent of the study area. Photo taken August 9, 2010.

Photo 10: Photo showing representative flooding in the area of the Miner River. This photo shows extensive flooding and high sediment load on a tributary of Chance Creek, west of Eagle Plains Yukon. Photo taken August 9, 2010.

1. Introduction and Project Background

Several studies have been conducted by to date the Vuntut Gwitchin Government (VGG) on Chinook salmon (*Oncorhynchus tshawytscha*) within the Porcupine River watershed. Salmon form an important resource for the community and First Nation, and the VGG remains engaged at helping to monitor local salmon returns to provide data that can be used to help manage Chinook and other salmon species locally and regionally. The VGG, along with research partners, have conducted several previous aerial surveys on the Porcupine River drainage , however these surveys have not produced reliable results and no index is available for spawning Chinook salmon in the upper Porcupine River. Previous studies have located tagged Chinook on the Miner River (Anderton 2001 to 2005b, 2009), and the potential for using aerial surveys of the Miner River to create an index of spawning Chinook salmon on the upper Porcupine River is being explored. This 2010 aerial survey program was meant to provide continuance of data collection from a successful Miner River aerial survey in 2009. In addition to an aerial survey, Fisheries and Oceans Canada planned to have genetic samples of adults and/or juveniles collected in a parallel effort on site.

2. Objectives

The specific objectives of the 2010 Miner River research program were:

- To conduct an aerial survey of the Miner River from its confluence with the Whitestone River to Fishing Creek, in order to enumerate adult Chinook Salmon and Chinook Redds.
- To document survey conditions.
- To collect genetic samples and biometric data from adult and/or juvenile Chinook Salmon on the Miner River.

3. Study Area

The Miner River is a tributary of the Porcupine River, a large drainage of the Yukon River. Old Crow is the closest major settlement to the Miner River study area, located downstream of the confluence of the Miner River and Porcupine River (approximately 150 km northwest of the study area). The Miner River and its tributaries flow northward from the northern extent of the Ogilvie Mountains to above the Arctic Circle, from where it joins with the Whitestone River and Porcupine River. The extent of the 2010 study area is shown in Figure 1, attached.

4. Methods

4.1 Survey Timing and Contingency

The 2010 Miner River aerial Chinook survey was originally planned to be conducted on August 7, 2010 by VGG personnel based in Old Crow. This date was set in consideration of the overall late Chinook run in 2010, and the potential for a slowed migration rate due to high water levels of 2010. A follow-up genetic sampling flight had been tentatively scheduled for the following day (August 8, 2010), depending on the results of the aerial survey flight. Leading up to the survey date, a sudden death in the community of Old Crow led to a change in plans as both the Old Crow airport and the original survey crew became unavailable. At that time, a decision was made to still attempt to collect 2010 data, and VGG retained Ecological Logistics and Research Ltd. (ELR) to conduct the survey and genetic collections under the direction of VGG and DFO. The survey had to be re-scheduled to August 9, 2010, due to the logistical changes.

4.2 Aerial Survey

The ELR crew mobilized to the survey area on August 8th, 2010 in preparation for the survey, travelling from Whitehorse to Eagle Plains Yukon and overnighting in Eagle Plains. The survey was conducted in a Robinson R44 Helicopter provided by Horizon Helicopters. On August 9, 2010, the survey crew (Chris Jastrebski and Paul Sparling left Eagle Plains at 08:30 for the Miner River. Upon leaving Eagle Plains on that day, the weather was quite suitable for the survey (sunny with minimal cloud (<20%), ~12^{o}C, and with a S/SW wind of ~20 km/h). Based on these conditions, a decision was made to start at the confluence of the Miner River with Fishing Creek so the survey could be conducted from the upstream toward the downstream end (providing the best light angle for visibility). En route to upstream extent of the survey area, low cloud was encountered in an upland area between the Whitestone River and the Miner River, so the crew had to turn back and follow the Whitestone River downstream (northward) to its confluence with the Miner River (the downstream extent of the study area). Throughout upland areas in the region, while following the Whitestone River, and upon reaching the Miner River, extensive flooding, high turbidity, and poor survey conditions were noted by the crew (Photos 1 through 4). The confluence of the Whitestone and Miner Rivers was reached at 09:47, and visibility was deemed too poor to effectively conduct the survey. The crew proceeded upstream through the study area (following the Miner River) to attempt to locate an upstream area suitable for the survey (potentially outside of the area of flooding), and the Miner river was flown at a faster speed while noting conditions and taking photos. Turbidity levels and flooding were observed to subside slightly as the crew travelled upstream, however visibility remained unsuitable for the survey, even at the upstream extent of the study area. The crew landed on a mid-channel island near Fishing Creek to further observe conditions, and water levels were determined to be receding slowly, but still at a high level. At this time, cloud had again dispersed to 20%, winds were calm and the temperature was 14^{o}C.

ELR contacted both Dick Mahoney (VGG Fish and Wildlife Coordinator) and Trix Tanner (Department of Fisheries and Oceans) to discuss the conditions observed on site, and it was decided at that time that the survey would not be possible, and that it was not worth waiting to see if waters would subside. It was also decided that no additional effort should be made to collect genetic samples as adult fish were the primary target of these collections. Emphasis was placed on documenting flood conditions in the Miner River and surrounding area.

The crew followed the Miner River back downstream en route to Eagle Plains, taking photos and documenting conditions, and also landed briefly at the downstream extend of the study area to measure water visibility. The crew returned to Eagle Plains and departed for Whitehorse at 15:20, completing work in Whitehorse at 20:15.

4.3 Genetic Sampling

Adult genetic sampling was not possible as part of the survey due to the flood conditions and low visibility in the Miner River.

As noted earlier, on August 9th, the survey crew landed on a mid-channel island near the upstream extent of the survey area (near Fishing Creek) to assess conditions and contact project administrators regarding survey plans. During this time, ELR set four fine mesh Gee traps (baited with roe) and set for roughly 30 minutes. Three traps were set in shallow overflow channels near woody debris, and one trap was set on the edge of the main channel near clumps of freshly submerged alder that had been deposited by the flood waters (still with leaves). The four traps were again re-set in the main channel for an additional 15 minutes. All captured fish were measured, weighed, sacrificed, and preserved in ethanol as per DFO request.

5. Results

5.1 Aerial Survey

Due to the extensive flooding in the project area, it was not possible to conduct the 2010 Miner River aerial Chinook Salmon survey. High water levels and high sediment load prevented aerial observations of salmon to be made with confidence.

During the overview flight up the Miner River, one observation of two adult Chinook salmon was made, upstream of the Fishing Branch River (two adults surfacing on a shallow gravel bar). The location of this observation is noted on Figure 1. No other observations were made, and the single observation was considered incidental due to the speed of travel.

Overall, visibility in the river was very poor, and was measured at the upstream and downstream extents of the study area. Near Fishing Creek, visibility was measured to be roughly 60 cm below the surface at 11:40 am (7^{oC}), and water levels were noted to be receding slowly. Where the crew landed, there were signs that the water had been as much as 1.15 m higher than at the time (Photos 5 and 6). Near the confluence of the Whitestone River (at the downstream extent of the study area), visibility was measured to be only 18 cm at 13:30 (estimated to be between 30 and 35 NTU; Photos 7 and 8).

5.2 Genetic Sampling

As discussed in the methodology, no adult genetic sampling was possible due to the flooded conditions and lack of adult salmon observations. The crew did not spend a second day on site collecting genetic samples.

While stopped near Fishing Creek, the crew did capture three juvenile Chinook Salmon with fine mesh Gee traps (3 fish in four traps over 45 minutes, providing an overall CPUE of 1 fish per trap hour). Length and weight data for these fish is provided in Table 1, below, and Photo 9 shows the fish sampled. All of the captures were made on the periphery of the main channel at a deep cut bank, among fresh alder debris that had been submerged by flood waters. Initially, three of the four traps had been set in an overflow channel that produced no fish (30 minutes), following which time all four traps were set in the main channel.

Table 1: Juvenile Chinook Salmon Capture Data from Gee Traps, Miner River, August 9, 2010.

Fish No.	Fork Length (mm)	Weight (g)	Samples
1	75	2.8	Sacrificed
2	74	2.8	Sacrificed
3	75	2.7	Sacrificed

6. Discussion

During the 2010 aerial survey attempt, the high water levels and high turbidity prevented the crew from completing an aerial count of Chinook salmon, and consequently no Yukon Chinook salmon spawning escapement estimate was possible. Despite this, important observations on river conditions were recorded and several juveniles were collected. The extreme turbidity conditions observed on this flight indicates that future aerial surveys are unlikely to be worthwhile at these high water levels. While the Miner River is over 100 km upstream of the water survey station at the Canada – US border, future high water levels at the Porcupine water survey station are likely to be correlated with turbid waters on the Miner River, if the water level is associated with widespread rain events such as those that occurred in 2010. Future aerial survey projects should consult the water survey station real-time database and consider the growing set of data that compared survey success with downstream water levels (shown in Table 2, below).

Forecasts of returning adult Chinook salmon from the 2010 brood year should also consider the possible negative effect of extreme flood conditions on the success of incubation, in conjunction with the low basin-wide 2010 run size.

Table 2: Qualitative and Quantitative Data on Miner River Chinook Spawning. Past data from Anderton 2001, 2002,2003, 2005a, 2005b and EDI 2009.

Survey Date	Method of Survey	Number of Salmon	Number of Redds	Water Levels Near Border (m^3/s)*
August 8, 2001	Aircraft	unclear	102	298
August 10, 2002	Aircraft	1	42	463
August 1 & 2, 2003	Aircraft	Data not collected	8	663**
August 1, 2004	Aircraft	Numerous	Numerous	141
August 4, 2005	Boat	Numerous	Numerous	228
August 3, 2009	Helicopter	319	110	163
August 9, 2010	Helicopter	2***	Data not collected	1500

**Source: Environment Canada, 2010. http://www.wsc.ec.gc.ca/hydat/H2O/index_e.cfm?cname=main_e.cfm*

***Average of both days*

****Incidental observations due to high turbidity*

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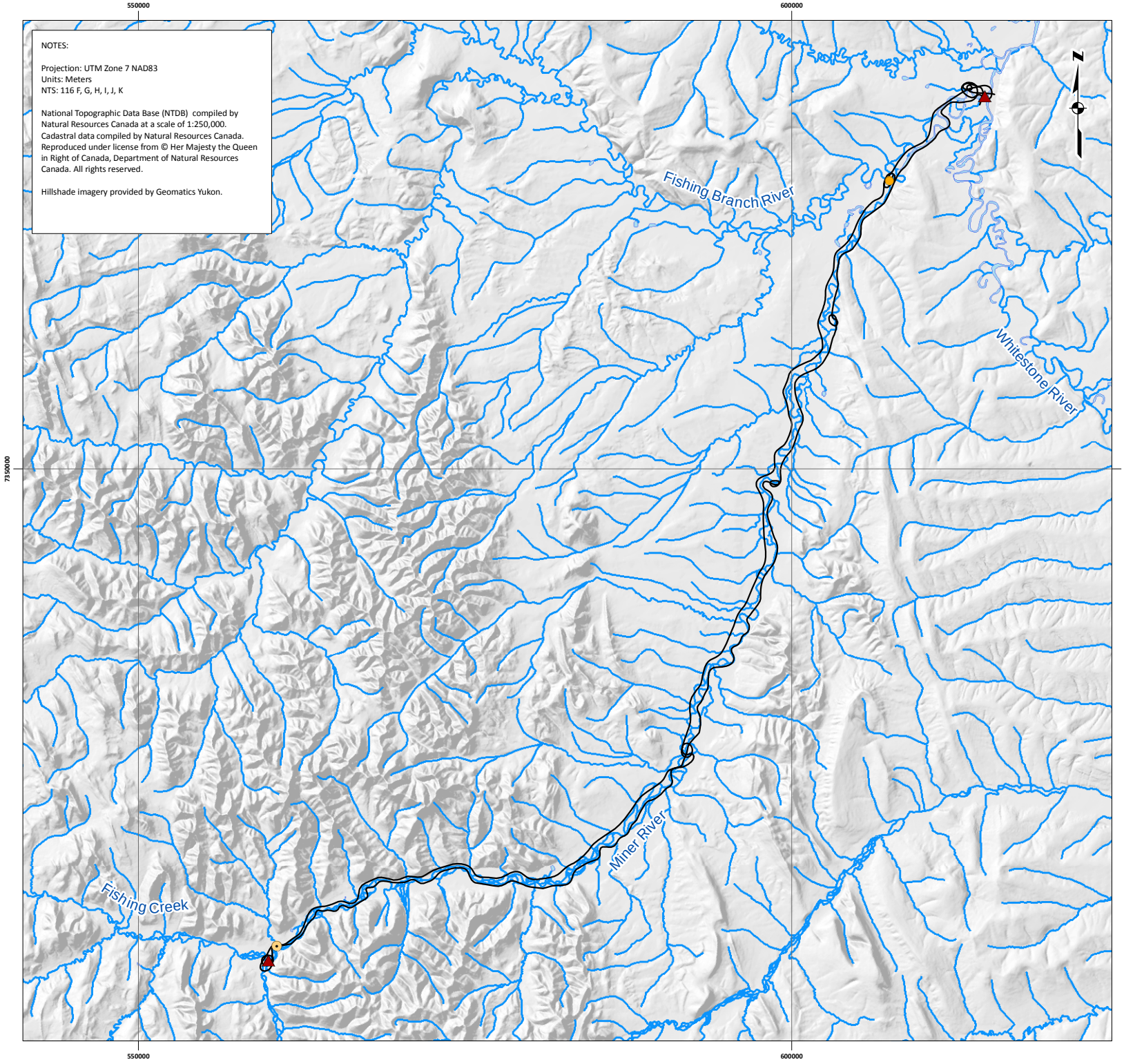
Figures



Miner River Chinook Salmon Aerial Survey 2010

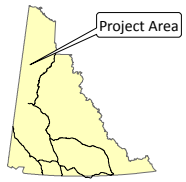
Ecological Logistics & Research Ltd.

Legend

Survey Features

Type

- Adult Salmon Observation Location
- Juvenile Salmon Capture Location
- Survey Start/End Locations
- August 9, 2010 Flight Lines



Scale: 1:400,000

0 2,000 4,000 8,000 12,000 16,000

Meters

Date: Nov.14, 2010	Drawn by: CJJ
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FIGURE 1

Project Area Overview and Flight Lines

Photos

Photo 1: View of the confluence of the Whitestone River (left) and the Miner River (right), looking South. Note the heavy sediment load in both rivers. Photo taken August 9, 2010.

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