

BLIND CREEK CHINOOK SALMON ENUMERATION WEIR, 2014

CRE-37-14

Prepared for: The Yukon River Panel
Restoration and Enhancement Fund

Prepared by: Jane Wilson

J. Wilson & Associates
31 Donjek Road
Whitehorse, Yukon
Y1A 3P8

March 2015

Table of Contents

LIST OF FIGURES	ii
LIST OF TABLES	ii
LIST OF APPENDICES	ii
ABSTRACT.....	iii
INTRODUCTION.....	1
STUDY AREA.....	2
OBJECTIVES	2
METHODS	3
<i>Camp Set-up.....</i>	<i>3</i>
<i>Weir Construction.....</i>	<i>3</i>
<i>Weir Operation</i>	<i>4</i>
<i>Water Conditions</i>	<i>5</i>
<i>Public Awareness.....</i>	<i>6</i>
RESULTS	6
<i>Chinook Counts.....</i>	<i>6</i>
<i>Biological Sampling.....</i>	<i>6</i>
<i>Water Conditions</i>	<i>7</i>
<i>Public Awareness.....</i>	<i>8</i>
DISCUSSION	8
ACKNOWLEDGEMENTS	9
REFERENCES:	10

LIST OF FIGURES

Figure 1. Blind Creek and Weir Location.....	2
Figure 2. View of fence during construction looking from the west bank.	4
Figure 3. Sampling station and counting chamber.....	4
Figure 4. Chinook salmon sampling.	5
Figure 5. Length frequency of female and male Chinook sampled in 2014.....	7
Figure 6. Proportion of total daily weir counts sampled in 2014.....	8

LIST OF TABLES

Table 1. Mean length at age of Chinook sampled from Blind Creek, 2014.	7
---	---

LIST OF APPENDICES

Appendix 1. Blind Creek weir Chinook salmon counts, 2014.	11
Appendix 2. Blind Creek Chinook salmon live sampling results, 2014.	12
Appendix 3. Sex composition of Chinook salmon sampled in Blind Creek, 2003-2014.	16
Appendix 4. Percent composition of age class in sampling years 2006 through 2014.....	17
Appendix 5. Blind Creek Chinook Counts from aerial surveys and weir operations, 1989, 1990, 1995-2014.	17
Appendix 6. Daily and average Chinook salmon counts in Blind Creek, 1997-1999, 2003-2014	18
Appendix 7. Mean, Maximum and Minimum discharge in cubic metres per second for July and August, Blind Creek, 1992-2014.	19
Appendix 8. Blind Creek weather and water conditions, 2014.	20

ABSTRACT

A weir was operated in Blind Creek in 2014 to enumerate the Chinook salmon (*Oncorhynchus tshawytscha*) escapement and obtain biological information from the stock. This was the 12th year a weir has been operated in Blind Creek with funding by the Yukon River Panel, Restoration & Enhancement Fund. Due to the early run timing in 2014, project mobilisation was initiated on July 10, earlier than scheduled. The weir was located in the same area used for the past 11 years, approximately 1 km upstream of the confluence with the Pelly River. Operation of the weir began on July 13 and continued through to August 17. Five Chinook were observed below the weir on July 15 and the first fish passed through the counting chamber on July 17. A total of 602 Chinook salmon was counted in 2014 which was 37% above the previous 10 year average escapement of 439 into Blind Creek. The midpoint of the run occurred on July 30, a week earlier than average, and 90% of the run had passed through the weir by August 5, six days earlier than average. Migrating Chinook were sampled randomly throughout the period of weir operation to obtain information on the age-sex-length structure of the run. A total of 219 Chinook salmon (36% of the run) was live sampled. Of these, 89 (41%) were female and 130 (59%) were male. The mean mid-eye fork (MEF) length of females and males sampled was 803.4 mm and 682.8 mm, respectively. All sampling data and scale cards were submitted to DFO Whitehorse stock assessment; scales were subsequently read by the Pacific Biological Station fish ageing lab. Complete age data was determined from 186 of the Chinook sampled; the remaining 34 samples yielded partial or no ages due to regenerate scales. Of the fish that were successfully aged, 12.4% were age-4, 45.2% were age-5, 37.7 % were age-6, and 4.8% were age-7. The dominant age class of females was age-6 (63.3%), followed by age-5 (26.6%), age7 (8.9%) and age-4 (1.3%). Of the males, age-5 was the dominant age class (58.9%) followed by ages 4 (20.6%), 6 (18.7%) and 7 (1.9%).

INTRODUCTION

Blind Creek is a tributary of the Pelly River in the upper Yukon River drainage supporting a significant Chinook salmon population. The creek flows for about 45 km from headwater lakes located in the Anvil Range and empties into the Pelly River near the town of Faro. Chinook escapements in Blind Creek have been monitored periodically between 1989 and 2000 through aerial surveys or enumeration weir operations and annually since 2003 through weir operations. The 2003 – 2013 ten year average run size is 439 with annual returns ranging from 157 (2012) to 1,155 (2003). Aerial survey results have shown that Chinook salmon spawning occurs throughout the lower 40 km of the creek with highest concentrations found between 12 and 35 km upstream of the confluence with the Pelly River (Harder 1996; Wilson 2001, 2002).

Chinook salmon escapement data from Blind Creek along with data obtained from other Chinook stock assessment projects in the Yukon River drainage provides managers with information that can be used to forecast pre-season run size for the upper Yukon River and implement management strategies for conserving Chinook populations. The Blind Creek weir is currently one of three Chinook assessment projects¹ in the upper Yukon River providing spawning ground escapement data.

Chinook salmon at the weir have been live sampled for age, sex and length (ASL) data during operations since 2003. Sampling is conducted over the entire run and randomly each day in an attempt to obtain a representative sample of the escapement. This information provides biological baseline data on the health of the stock as well as information used by fishery managers to construct sibling based pre-season run forecasts. ASL data collected over a long term (several brood year cycles) is required to properly assess biological trends.

The proximity of the weir operation to the town of Faro and road access has allowed for public viewing of migrating Chinook salmon and an opportunity to increase awareness of management programs and conservation efforts. The weir site is located approximately 10 km southeast of the town of Faro and can be accessed from a maintained mining road (Blind Creek Road). The number of visitors to the weir has increased over the years of operation. During the 2014 weir operation, the site received 100 visitors.

A proposal to continue weir operations in Blind Creek was submitted by J. Wilson and Associates to the Yukon River Panel Restoration and Enhancement (R&E) fund in January 2014. The proposal was accepted and financial support was received from the R&E fund. This report is a summary of the 2014 project. This was the twelfth consecutive year a weir has been operated in Blind Creek with funding by the Yukon River Panel, Restoration & Enhancement Fund.

¹ The other two assessment projects are the Teslin River Sonar and Big Salmon River Sonar enumeration projects (R&E Fund projects: CRE-01N and CRE-41).

STUDY AREA

Blind Creek flows in a southwesterly direction from its headwaters in the Anvil Range into the Pelly River, approximately 10 km southeast of the Town of Faro (Figure 1). The creek and its tributaries drain an area of approximately 618 km². Major lake systems in the drainage basin include the Blind Lake and Swim Lake chains. A mining access road from the Town of Faro crosses the creek at two locations, approximately 2 km (lower bridge) and 3 km (upper bridge) upstream of its confluence with the Pelly River. The weir site is located approximately 1 km upstream of the creek mouth and 30 m downstream of the lower bridge crossing.

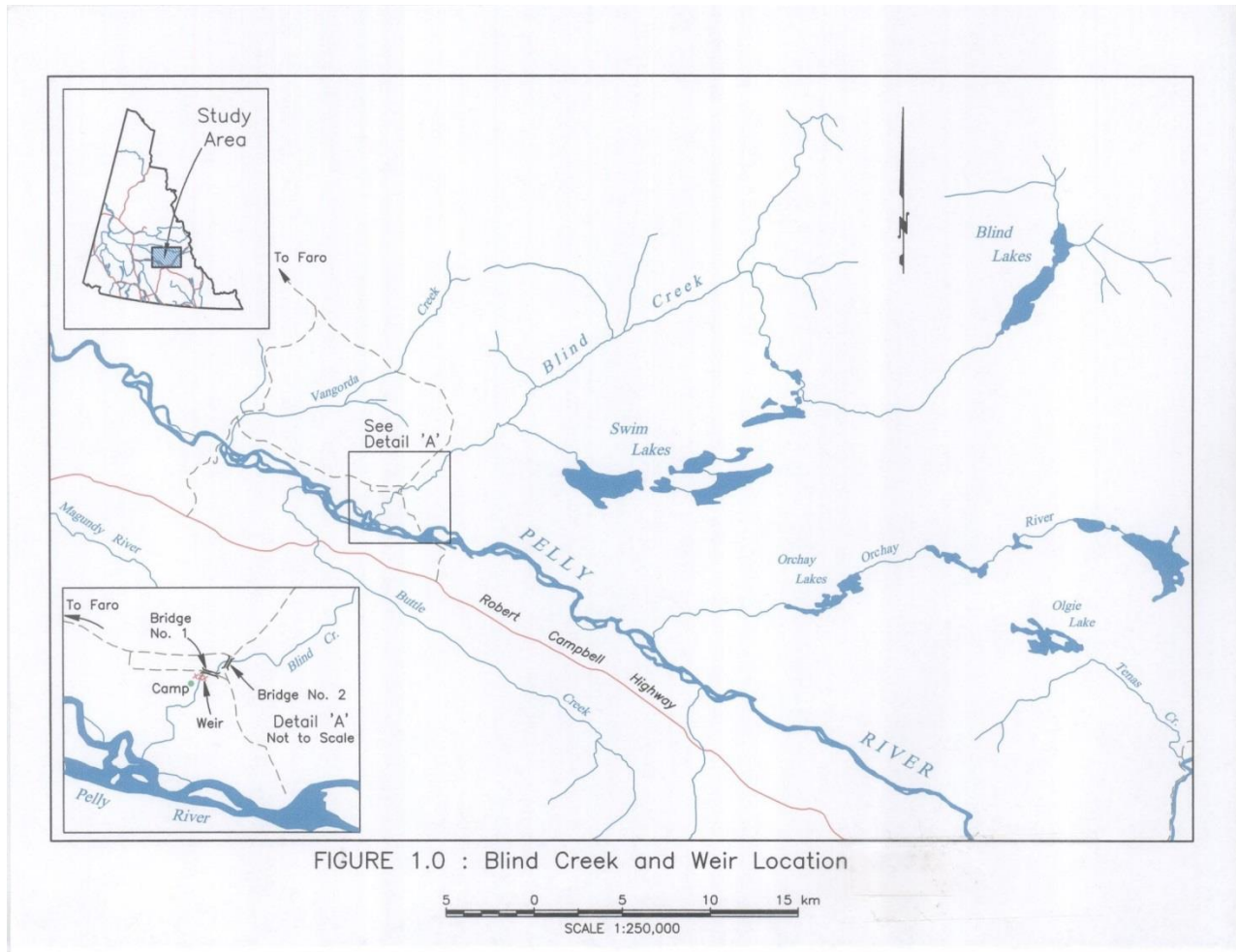


Figure 1. Blind Creek and Weir Location

OBJECTIVES

The specific objectives of this project are as follows:

- 1) Install and operate a weir to obtain a count of the total 2014 Chinook escapement in Blind Creek above the weir;

- 2) Conduct live sampling at the weir to obtain age-sex-length (ASL) data from a representative sample of migrating Chinook with a minimum goal of 25% of the run;
- 3) Provide information about the Chinook weir operation to the Town of Faro Interpretive Centre and on-site interpretation to increase public awareness of the salmon resource and management programs.

METHODS

Camp Set-up

Camp setup and weir installation was initiated four days earlier than scheduled in anticipation of an early run in Blind Creek based on in-season assessments in the lower Yukon River. Materials for the camp were transported from storage in Whitehorse and Faro on July 10.

As in previous years, the camp was set up on the west side of Blind Creek approximately 80 metres from the weir site and comprised of three wall tents: one to house a kitchen/eating area and two for sleeping quarters.

Weir Construction

Weir construction began on July 11 and was completed (fish tight) by July 13. The weir was placed in the same area used for the past 12 years, approximately 1 km upstream of the creek mouth and 30 m downstream of the first bridge crossing.

The weir was constructed as in previous years using conduit panels and wooden tripods stored on site from the previous season's operation. Construction of the weir began with the placement of the counting chamber in the main current and at the upstream apex of the fence location. This chamber consisted of conduit panels connected together to form an enclosure measuring 2m (L) X 0.7 m (W) X 1.0 m (H). Two triangular shaped conduit panels, each 2 metres long, were used to connect the chamber to the fence and create a staging area for fish moving into the chamber. The fence was constructed of conduit panels and tripods placed downstream of the counting chamber in a 'V' configuration to direct fish moving close to the bank towards the staging area (Figure 2).

After the fence was completed, sand bags were placed along the bottom upstream side of the weir to prevent scouring of the creek substrate and undermining of the structure. A white 'flashboard' was secured to the bottom of the counting chamber to improve visibility of salmon passing through. A platform was placed alongside the counting chamber for enumerating and sampling fish and accessed from the bank via a wooden walkway (Figure 3). Black poly was secured over the staging area to prevent fish moving in from seeing weir attendants on the platform.



Figure 2. View of fence during construction looking from the west bank.



Figure 3. Sampling station and counting chamber.

Weir Operation

Personnel were on site 24 hours a day for the duration of the Chinook run. Commencing July 13, the weir was monitored daily from first light until dark and kept closed at night. The weir was checked regularly every 15 to 20 minutes during the early and latter parts of the run and continuously throughout the day on a rotating basis during the peak of the run or when groups of fish are observed behind the weir. Daily and cumulative counts were recorded and relayed three times per week by phone to DFO Whitehorse.

Chinook moving up behind the weir were allowed access to the counting chamber by raising a vertical gate secured to the downstream opening. After a few Chinook moved into the chamber

the gate was closed and the fish immediately sampled. Only a small number of fish (<10) were held at any one time. In the instance where Chinook were observed accumulating behind the weir, a few were allowed to pass through the chamber without being sampled to avoid delaying the run. This was achieved by removing two or three pieces of loose conduit from the front panel. After a few fish were counted through the chamber, the conduit pieces were replaced and the next fish moving in were held for sampling.

Sampling events were attempted each day and, when possible, at various times throughout the day in an attempt to obtain a representative sample of the daily run. Chinook held for sampling were removed from the counting chamber by dip net and placed in a v-shaped trough filled with water (Figure 4). The sex, mid-eye fork length (MEF) and general condition of fish (rated: good, fair or poor) was recorded. Five scales were taken from each fish and placed on standard scale cards for age determination. Scale cards and an electronic copy of ASL data were submitted to DFO, Whitehorse at the completion of field operations. Scales were analyzed for age by the DFO scale analysis lab at the Pacific Biological Station, Nanaimo, B.C.

The weir was checked at least twice a day for scouring and areas of possible escape and several times throughout the day during higher water. Debris collecting on the weir was removed as required.



Figure 4. Chinook salmon sampling.

Water Conditions

Water and air temperatures were taken each morning at the weir using a hand-held thermometer. Water depth readings were taken at the same time from the Yukon Department of Environment staff gauge located about 25 m downstream of the lower bridge along the west bank.

Environment Yukon (Water Resources Branch) monitored stream flows and water temperatures in Blind Creek between May and September, 2014. Hydrological conditions in Blind Creek have been monitored by Environment Yukon since 1992 (Appendix 7).

Public Awareness

Copies of the salmon brochure produced in 2005 by the proponent were provided to the Town of Faro Interpretive Centre at the start of the project. This brochure contains information about the salmon resource and weir operation for visitors to the Faro area. On-site interpretation was provided by the project manager and field technicians. A daily record of the number of visitors viewing the weir operation was maintained.

RESULTS

Chinook Counts

A total of 602 Chinook salmon was counted through the weir between July 13 and August 17; 37% above the 10-year average escapement of 439 into Blind Creek. Daily and cumulative counts are presented in Appendix 1. The midpoint of the run occurred on July 30 a week earlier than average, and 90% of the run had passed through the weir by August 5, 6 days earlier than average.

Biological Sampling

A total of 219 Chinook salmon was live sampled for age-sex-length data. Of these, 89 (41%) were female and 130 (59%) were male. The mean mid-eye fork (MEF) length of females and males sampled was 803.5 mm and 682.8 mm, respectively. The length frequency of female and male Chinook sampled is presented in Figure 5. Complete age data was determined from 186 of the Chinook sampled². Of the fish that were successfully aged, 12.4% were age-4, 45.2% were age-5, 37.7% were age-6, and 4.8% were age-7. The dominant age class of females was age-6 (63.3%), followed by age-5 (26.6%), age7 (8.9%) and age-4 (1.3%). Of the males, age-5 was the dominant age class (58.9%) followed by ages 4 (20.6%), 6 (18.7%) and 7 (1.9%). Mean length at age data for male and female Chinook sampled is presented in Table 1.

Thirty six percent of the total Chinook run through the weir was sampled for ASL data which was above the set minimum sample goal (25%) of the run. However, a minimum of 25% of the total daily count was not achieved on July 24, July 27-30, and Aug 3 and 4 (Figure 6). This was during the peak of the run when large numbers of fish accumulated behind the weir. At this time, sampling events resulted in fish behind the weir moving back downstream and holding for extended periods of time. After moving back up, they were wary and hesitant to enter the chamber. In order to avoid delaying the migration at this time a larger proportion of fish were counted through the weir without being sampled. The exception was during a high water event that created murky water conditions and poor visibility in the chamber (July 31 and August 1), when all fish that entered the chamber were sampled. The collective sample size between July 24 and Aug 4 was 26% of the total number of fish passing through the weir during this period.

The majority of Chinook sampled were in good condition with only a few toward the end of the run showing fungal growth. The sway-back condition was observed in two of the fish sampled.

² Partial ages were determined for 30 fish sampled; no age could be determined for 4 of the sampled fish

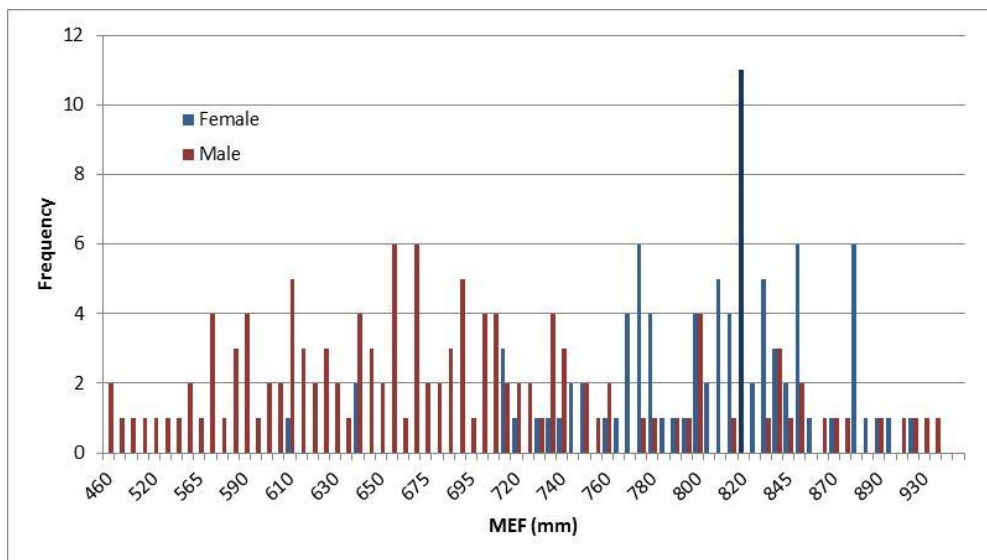


Figure 5. Length frequency of female and male Chinook sampled in 2014.

Table 1. Mean length at age of Chinook sampled from Blind Creek, 2014.

	AGE*	1.2	1.3	1.4	1.5	2.3	2.4	
SEX	Brood Year	2010	2009	2008	2007	2008	2007	TOTAL
Female	Mean of MEF (mm)	610	782	813	895	880	824	805
	Count of MEF (mm)	1	21	49	1	1	6	79
	%	1.3%	26.6%	62.0%	1.3%	1.3%	7.6%	100%
Male	Mean of MEF (mm)	561	694	801	878	612		685
	Count of MEF (mm)	22	63	17	2	3		107
	%	20.6%	58.9%	15.9%	1.9%	2.8%		100%
Total Count of MEF (mm)		23	84	66	3	4	6	186

*European age format

Water Conditions

Water levels were moderate throughout most of the weir operation with the exception of a single high water event which occurred between July 30 and August 4 after heavy rainfall. Water conditions were murky at this time. Daily weather and water conditions recorded by weir attendants in July and August are presented in Appendix 8. Stream discharge data was not available at the time of writing.

A data logger deployed by Environment Yukon (Water Resources Branch) in Blind Creek recorded water temperatures every 15 minutes between May 8 and September 15. Raw data obtained from Environment Yukon showed that a maximum water temperature of 15.1°C was reached on July 14. Mean water temperatures in July and August were 11.9° C and 10.1° C, respectively.

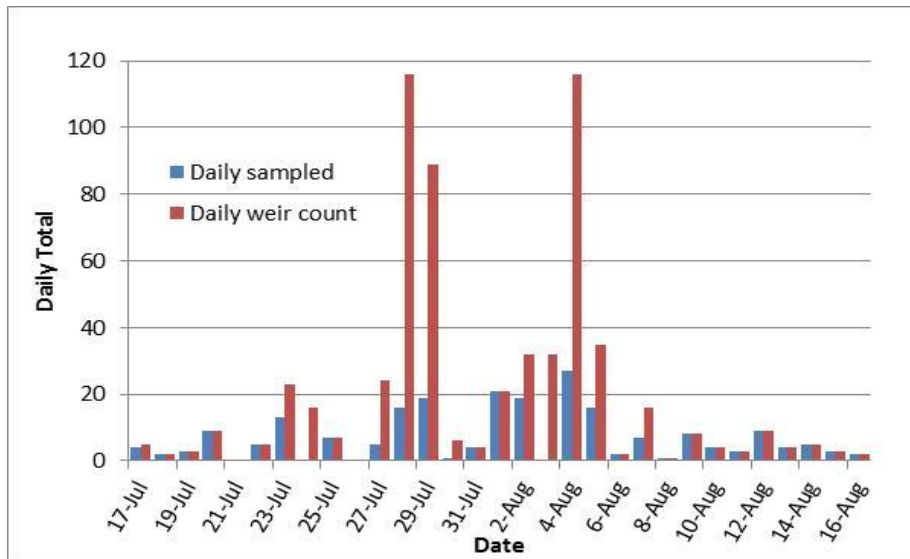


Figure 6. Proportion of total daily weir counts sampled in 2014.

Public Awareness

At least 100 people visited the weir site over the course of operations this year including local people and tourists visiting the Faro area.

DISCUSSION

The 2014 project was successful at obtaining a count of the total Chinook escapement above the weir in Blind Creek. Based on the run pattern observed at the start of weir operations it is likely that the weir was in place before the run entered Blind Creek. Water levels were moderate throughout most of the weir operation with the exception of a single high water event which occurred after a period of heavy rainfall in late July. Despite the creek rising 35 cm in two days, the weir functioned well and remained ‘fish tight’ during this period and throughout the remainder of its operation.

The Chinook salmon escapement in Blind Creek in 2014 was higher than anticipated based on the pre-season prediction by fisheries managers for a poor or significantly below average run of Chinook salmon in the Yukon River system. Higher than anticipated escapements were also observed in other Chinook salmon assessment projects in the upper Yukon River (Mercer & Wilson 2014; Mercer 2014). Management actions to conserve Chinook salmon stocks in 2014 involved the closure of all directed commercial and subsistence fisheries in the Yukon River and the foregoing of harvest by the Yukon First Nations for the majority of the season. These measures enabled more fish to reach spawning grounds in Canada than would have otherwise occurred.

The number of samples obtained during the peak of the run was lower than expected due to concerns with delaying the migration. As in previous years, when large numbers of Chinook accumulated behind the weir they tended to move back downstream and hold for extended periods of time after a sampling event. After repeated sampling events, fish moving back

upstream were hesitant to enter the chamber and would often escape back downstream disturbing other fish attempting to move in. It is recommended in future weir operations that efforts should be made to increase the number of fish sampled during the peak of the run. This may be possible by adding an extension to the current holding pen and creating two compartments separated by a gate. Fish moving up into the second chamber may be less likely to turn around and exit the chamber which could allow more fish to move in and facilitate sampling.

The percentage of females in the sample obtained from the 2014 Chinook run in Blind Creek was 13.4% lower than the 2003-2013 average (46.9%) although similar to runs in 2006 and 2010 (Appendix 3). While males made up the largest proportion of 5 year olds, the age classes 6 and 7 were comprised predominantly of females. These age classes (age-6 and age-7) would have the highest productive potential and may result in good production from this year's escapement.

ACKNOWLEDGEMENTS

The author would like to thank Neil Bylenga, Akilah Bolton, Yasmine Djabri and Doug Hanna for their assistance in weir operations. Ben Irvine provided assistance installing and removing the weir. Jonathan Kolot of Environment Yukon, Water Resources Branch, provided water temperature data for this report.

REFERENCES:

- Harder, P.H., 1996. Chinook Salmon Spawner Aerial Survey, Blind Creek- August 1996. Prepared for Anvil Range Mining Corporation Inc.
- Mercer, B. 2015. 2014 Teslin River Chinook Sonar Project. CRE project 01N-14, Yukon River Panel.
- Mercer, B. and J. Wilson, 2014. 2013 Chinook Salmon Sonar Enumeration on the Big Salmon River. CRE project 41-13, Yukon River Panel.
- Vust, P. 1999. Blind Creek Chinook Salmon Enumeration Weir, 1999. Prepared for the Ross River Dena Council and DFO, Aboriginal Fishery Strategy.
- Wilson, J. 1997. Blind Creek Chinook Salmon Enumeration Weir, 1996. Prepared for the Ross River Dena Council and DFO, Aboriginal Fishery Strategy.
- Wilson, J. 1997. Blind Creek Chinook Salmon Enumeration Weir, 1997. Prepared for the Ross River Dena Council and DFO Aboriginal Fishery Strategy.
- Wilson, J. 1998. Blind Creek Chinook Salmon Enumeration Weir, 1998. Prepared for Ross River Dena Council and DFO Aboriginal Fishery Strategy.
- Wilson, J. 2001. Aerial Enumeration Survey of Chinook Salmon Spawners in Blind Creek, August, 2001. Prepared for Ross River Dena Council and DFO Aboriginal Fishery
- Wilson, J. 2002. Aerial Survey of Chinook Salmon in Selected Tributaries of the Pelly River. Prepared for Ross River Dena Council and DFO Aboriginal Fishery Strategy.
- Wilson, J. 2004-2014. Blind Creek Chinook Salmon Enumeration Weir. Annual reports prepared for the Yukon River Panel, CRE-37.

Personal Communication:

Jonathan Kolot, Environment Yukon, Water Resources Branch, Whitehorse, Yukon.

Appendix 1. Blind Creek weir Chinook salmon counts, 2014.

DATE	Daily Count	Cumulative	# Sampled	#Females sampled	#Males sampled	Comments
13-Jul	0	0	0	0	0	weir fish tight
14-Jul	0	0	0	0	0	
15-Jul	0	0	0	0	0	5 Ck observed below weir
16-Jul	0	0	0	0	0	
17-Jul	5	5	4	2	2	first CK through weir
18-Jul	2	7	2	0	2	
19-Jul	3	10	3	0	3	
20-Jul	9	19	9	3	6	
21-Jul	0	19	0	0	0	
22-Jul	5	24	5	2	3	
23-Jul	23	47	13	3	10	
24-Jul	16	63	0	0	0	
25-Jul	7	70	7	2	5	
26-Jul	0	70	0	0	0	
27-Jul	24	94	5	1	4	
28-Jul	116	210	16	4	12	
29-Jul	89	299	19	11	8	
30-Jul	6	305	1	0	1	High & murky water
31-Jul	4	309	4	0	4	High & murky water
1-Aug	21	330	21	14	7	High & murky water
2-Aug	32	362	19	11	8	water lowering & clearing
3-Aug	32	394	0	0	0	
4-Aug	116	510	27	10	17	
5-Aug	35	545	16	10	6	
6-Aug	2	547	2	0	2	
7-Aug	16	563	7	5	2	
8-Aug	1	564	1	0	1	
9-Aug	8	572	8	1	7	
10-Aug	4	576	4	1	3	
11-Aug	3	579	3	1	2	
12-Aug	9	588	9	2	7	
13-Aug	4	592	4	2	2	
14-Aug	5	597	5	3	2	
15-Aug	3	600	3	1	2	
16-Aug	2	602	2	0	2	
17-Aug	0	602	0	0		weir removed
TOTAL:	602		219	89	130	

Appendix 2. Blind Creek Chinook salmon live sampling results, 2014.

DATE	FISH #	SEX	MEF (mm)	AGE*	Condition (Good/Fair/Poor)	comments
17-Jul	1	M	775	1.3	G	
17-Jul	2	F	820	1.4	G	
17-Jul	3	M	630	1.3	G	
17-Jul	4	F	850	1.3	G	
18-Jul	5	M	620	1.3	G	
18-Jul	6	M	705	M3	G	
19-Jul	7	M	905	1.5	G	
19-Jul	8	M	740	1.4	G	
19-Jul	9	M	615	1.2	G	
20-Jul	10	F	740	1.4	G	
20-Jul	11	M	945	1.4	G	
20-Jul	12	F	905	1.4	G	
20-Jul	13	M	685	1.3	G	
20-Jul	14	F	795	1.4	G	
20-Jul	15	M	680	1.3	G	
20-Jul	16	M	685	1.3	G	
20-Jul	17	M	725	1.3	G	
20-Jul	18	M	700	1.3	G	
22-Jul	19	F	610	1.2	G	
22-Jul	20	M	610	1.2	G	
22-Jul	21	M	760	1.3	G	
22-Jul	22	M	700	M3	G	
22-Jul	23	F	780	1.4	G	
23-Jul	24	M	695	1.3	G	
23-Jul	25	M	800	1.3	G	
23-Jul	26	M	840	1.4	G	
23-Jul	27	F	820	1.4	G	
23-Jul	28	F	640	1.3	G	
23-Jul	29	M	840	1.4	G	
23-Jul	30	M	610	M3	G	
23-Jul	31	F	780	2.4	G	
23-Jul	32	M	930	1.3	G	
23-Jul	33	M	800	1.4	G	
23-Jul	34	M	705	1F	G	
23-Jul	35	M	640	2.3	G	
23-Jul	36	M	845	M4	G	
25-Jul	37	F	640	1.3	G	
25-Jul	38	M	590	1.2	G	
25-Jul	39	F	800	1.3	G	
25-Jul	40	M	670	1.2	G	
25-Jul	41	M	635	M3	G	
25-Jul	42	M	690	M3	G	
25-Jul	43	M	740	1.3	G	
27-Jul	44	M	640	1.3	G	
27-Jul	45	M	735	1.3	G	
27-Jul	46	M	870	1.3	G	
27-Jul	47	F	820	1.3	G	
27-Jul	48	M	615	1.2	G	
28-Jul	49	M	630	1.3	G	

DATE	FISH #	SEX	MEF (mm)	AGE*	Condition (Good/Fair/Poor)	comments
28-Jul	50	M	875	1.4	G	
28-Jul	51	M	650	M3	G	
28-Jul	52	M	725	1.3	G	
28-Jul	53	M	675	1.3	G	
28-Jul	54	M	660	1.3	G	
28-Jul	55	M	850	1F	G	
28-Jul	56	M	645	1.3	G	
28-Jul	57	F	820	1.4	G	
28-Jul	58	F	825	1.4	G	
28-Jul	59	F	830	1.4	G	
28-Jul	60	M	840	1.4	G	
28-Jul	61	M	705	1.3	G	
28-Jul	62	F	815	M3	G	
28-Jul	63	M	690	1.3	G	
28-Jul	64	M	625	M3	G	
29-Jul	65	M	625	M3	G	
29-Jul	66	F	815	1.4	G	
29-Jul	67	F	820	1.3	G	
29-Jul	68	F	805	1.3	G	
29-Jul	69	M	565	1.2	G	
29-Jul	70	M	515	1.2	G	
29-Jul	71	F	840	1.4	G	
29-Jul	72	M	750	1.3	G	
29-Jul	73	M	690	M3	G	
29-Jul	74	F	880	1.4	G	
29-Jul	75	F	745	1.4	G	
29-Jul	76	M	665	1.3	G	
29-Jul	77	F	810	1.3	G	
29-Jul	78	F	790	1.3	G	
29-Jul	79	F	820	1.3	G	
29-Jul	80	F	745	1.4	G	
29-Jul	81	M	590	1.2	G	
29-Jul	82	M	850	1.5	G	
29-Jul	83	F	850	1.4	G	
30-Jul	84	M	640	1.3	G	
31-Jul	85	M	610	1.2	G	
31-Jul	86	M	595	M3	G	
31-Jul	87	M	660	1.3	G	
31-Jul	88	M	545	1.2	G	
01-Aug	89	F	810	1.4	G	
01-Aug	90	M	795	1.3	G	
01-Aug	91	M	720	1.3	G	
01-Aug	92	F	840	M4	G	
01-Aug	93	F	880	1.4	G	
01-Aug	94	F	775	1.3	G	
01-Aug	95	F	880	1.3	G	
01-Aug	96	F	770	1.4	G	
01-Aug	97	M	670	1.4	G	
01-Aug	98	F	880	2.3	G	
01-Aug	99	F	750	1.4	G	
01-Aug	100	M	830	1.4	G	
01-Aug	101	M	610	1.3	G	

DATE	FISH #	SEX	MEF (mm)	AGE*	Condition (Good/Fair/Poor)	comments
01-Aug	102	F	760	1.3	G	
01-Aug	103	F	800	2.4	G	
01-Aug	104	M	730	1.4	G	
01-Aug	105	M	760	1.4	G	
01-Aug	106	F	830	1.4	F	heavily scarred
01-Aug	107	F	870	1.3	G	
01-Aug	108	F	710	M4	G	
01-Aug	109	F	785	M4	G	
02-Aug	110	M	815	1.4	G	
02-Aug	111	M	705	1.3	G	
02-Aug	112	F	820	1.4	G	
02-Aug	113	M	720	1.3	G	
02-Aug	114	-	-	M4	G	
02-Aug	115	M	690	1.3	G	
02-Aug	116	F	820	1.4	G	
02-Aug	117	M	490	1.2	G	
02-Aug	118	F	710	1.3	G	
02-Aug	119	M	605	1.3	G	
02-Aug	120	F	895	1.5	G	
02-Aug	121	F	775	1F	G	
02-Aug	122	F	890	1.4	G	ripe
02-Aug	123	F	800	M4	G	
02-Aug	124	M	680	1.3	G	
02-Aug	125	F	815	1.4	G	
02-Aug	126	F	850	1.4	G	ripe
02-Aug	127	F	845	1.4	G	
02-Aug	128	M	690	1.3	G	
02-Aug	129	F	885	1.4	G	
04-Aug	130	M	710	1.3	G	
04-Aug	131	M	570	1.2	G	
04-Aug	132	F	820	1.4	G	
04-Aug	133	M	735	1.3	G	
04-Aug	134	F	820	1.4	G	
04-Aug	135	M	890	RG	G	
04-Aug	136	M	755	1.3	G	
04-Aug	137	F	775	1.3	G	
04-Aug	138	M	600	1.3	G	
04-Aug	139	M	865	1.3	G	
04-Aug	140	M	620	1.3	G	
04-Aug	141	M	625	1.3	G	
04-Aug	142	M	900	1.4	G	
04-Aug	143	M	605	1.3	G	silver
04-Aug	144	F	810	1.4	G	
04-Aug	145	M	645	1.4	G	
04-Aug	146	F	850	1.4	G	
04-Aug	147	F	880	2.4	G	
04-Aug	148	F	880	2.4	G	
04-Aug	149	F	805	1.4	G	
04-Aug	150	F	850	1.4	G	
04-Aug	151	M	780	1.3	G	
04-Aug	152	M	685	1.3	G	
04-Aug	153	M	610	1.3	G	

DATE	FISH #	SEX	MEF (mm)	AGE*	Condition (Good/Fair/Poor)	comments
04-Aug	154	M	670	M3	G	
04-Aug	155	M	675	1.3	G	
04-Aug	156	F	710	1.4	F	
05-Aug	157	M	560	1.2	G	
05-Aug	158	M	670	1F	G	
05-Aug	159	M	590	M2	G	
05-Aug	160	F	730	M4	G	
05-Aug	161	F	720	1.4	F	thin girth but unspawned
05-Aug	162	F	810	RG	G	
05-Aug	163	F	780	1.4	F	thin girth but unspawned
05-Aug	164	F	845	1.4	G	
05-Aug	165	F	830	RG	G	
05-Aug	166	M	800	1.4	G	
05-Aug	167	M	640	1.3	G	
05-Aug	168	M	575	1.2	G	
05-Aug	169	F	840	1.4	G	
05-Aug	170	F	775	2.4	G	
05-Aug	171	F	775	1.3	F	thin girth but unspawned
05-Aug	172	F	815	1.4	G	
06-Aug	173	M	520	1.2	G	
06-Aug	174	M	790	1.4	G	
07-Aug	175	F	800	1.3	F	pronounced sway back
07-Aug	176	F	750	1.4	F	
07-Aug	177	M	750	1F	F	Spawned
07-Aug	178	F	830	2.4	G	
07-Aug	179	F	860	1.4	G	
07-Aug	180	F	770	1.3	G	
07-Aug	181	M	460	1.2	G	
08-Aug	182	M	500	1.2	G	
09-Aug	183	M	700	1.3	G	red
09-Aug	184	F	770	1.3	F	thin girth but unspawned
09-Aug	185	M	570	1.2	G	ripe
09-Aug	186	M	670	1.3	G	possible gillnet mark
09-Aug	187	M	800	1.4	G	
09-Aug	188	M	570	M2	G	
09-Aug	189	M	580	RG	G	
09-Aug	190	M	660	1.3	G	
10-Aug	191	M	660	1.3	G	
10-Aug	192	M	600	1.3	G	
10-Aug	193	M	660	1.3	G	
10-Aug	194	F	820	1.4	G	
11-Aug	195	M	660	1.3	G	ripe
11-Aug	196	M	615	23	G	ripe
11-Aug	197	F	850	M4	G	
12-Aug	198	M	670	1.3	G	
12-Aug	199	F	810	1.4	G	
12-Aug	200	F	830	1.4	G	
12-Aug	201	M	570	1.2	G	
12-Aug	202	M	590	1.2	G	
12-Aug	203	M	740	1.3	G	ripe
12-Aug	204	M	580	2.3	G	ripe
12-Aug	205	M	710	1.3	G	ripe

DATE	FISH #	SEX	MEF (mm)	AGE*	Condition (Good/Fair/Poor)	comments
12-Aug	206	M	560	1F	G	ripe
13-Aug	207	M	700	M3	G	
13-Aug	208	F	765	1.4	G	
13-Aug	209	M	735	1.3	G	
13-Aug	210	F	735	1.3	G	ripe
14-Aug	211	M	645	1.3	G	ripe
14-Aug	212	F	825	1.4	G	ripe
14-Aug	213	M	580	M2	G	slight sway back
14-Aug	214	F	775	1.4	G	ripe
14-Aug	215	F	770	1.4	G	ripe
15-Aug	216	F	780	1.4	G	
15-Aug	217	M	650	1.3	G	ripe
15-Aug	218	M	735	1.3	G	ripe
16-Aug	219	M	555	1.2	G	
16-Aug	220	M	460	1.2	F	spawned

***European age format** e.g. 1.4 denotes a 6 year old fish with 1+ years freshwater residence and 4 years marine.
No Ages: RG= regenerate scale (center missing from scale). **Partial Ages:** F=freshwater stage M=Marine stage

Appendix 3. Sex composition of Chinook salmon sampled in Blind Creek, 2003-2014.

YEAR	Sample Size	# Females	% of Total	# Males	% of Total
2003	118	54	45.8%	64	54.2%
2004	19	8	42.1%	11	57.9%
2005	161	78	48.4%	83	51.6%
2006	101	41	40.6%	60	59.4%
2007	83	37	44.6%	46	55.4%
2008	191	88	46.1%	103	53.9%
2009	245	106	43.3%	139	56.7%
2010	185	77	41.6%	108	58.4%
2011	203	111	54.7%	92	45.3%
2012	134	65	48.5%	69	51.5%
2013	149	89	59.7%	58	40.3%
2014	219	89	40.6%	130	59.4%
Average	151	70	46.3%	80	53.7%

Appendix 4. Percent composition of age class in sampling years 2006 through 2014.

YEAR	TOTAL ESCAPEMENT	# AGED FISH*	% of ESCAPEMENT AGED	% of AGE				
				AGE-3	AGE-4	AGE-5	AGE-6	AGE-7
2006	677	36	5.3 %	0	2.8 %	69.4 %	27.8 %	0
2007	304	61	20.1 %	0	16.4 %	34.4 %	45.9 %	3.3 %
2008	276	146	52.9 %	0	10.3 %	47.9 %	37.0 %	4.8 %
2009	716	147	20.5 %	4.1%	16.3 %	33.3 %	44.9 %	1.4 %
2010	270	127	47.0 %	0	8.7 %	53.5 %	33.1 %	4.7 %
2011	360	165	45.8 %	0	9.7 %	26.1 %	55.8 %	8.5 %
2012	157	105	66.9 %	0	10.5 %	38.1 %	46.7 %	4.8 %
2013	312	99	31.7 %	0	6.1 %	19.2 %	66.6 %	8.1 %
2014	602	186	30.9 %	0	12.4 %	45.2 %	37.7 %	4.8 %

* Number of Chinook sampled for which complete age was determined.

Appendix 5. Blind Creek Chinook Counts from aerial surveys and weir operations, 1989, 1990, 1995-2014.

YEAR	METHOD	CHINOOK COUNTS	START DATE	ARRIVAL OF FIRST FISH	END DATE	50% of Run	90% of Run
1989	Aerial survey ^a	400	Aug 7		Aug 7		
1990	Aerial survey ^a	443	Aug 14		Aug 14		
1995	Weir	826	NR		NR		
1996	Aerial survey ^a	422	Aug ?		Aug ?		
1996	Weir	NR	July 28		Aug 17		
1997	Weir	957	July 24	July 25	Aug 22	July 30	Aug 8
1998	Weir	373	July 19	July 27	Aug 19	Aug 4	Aug 15
1999	Weir	892	July 28	Aug 1	Aug 22	Aug 6	Aug 10
2000	Weir	NR	NR		NR		
2001	Aerial survey ^b	226	Aug 21		Aug 21		
2002	Aerial survey ^b	107	Aug 15		Aug 15		
2003	Weir	1,155	July 16	July 17	Aug 18	July 29	Aug 5
2004	Weir	792	July 11	July 19	Aug 15	July 30	Aug 5
2005	Weir	525	July 15	July 20	Aug 15	Aug 4	Aug 10
2006	Weir	677	July 16	July 28	Aug 17	Aug 5	Aug 12
2007	Weir	304	July 17	July 24	Aug 17	Aug 6	Aug 12
2008	Weir	276	July 25	July 28	Aug 19	Aug 12	Aug 17
2009	Weir	716	July 20	July 27	Aug 19	Aug 6	Aug 10
2010	Weir	270	July 19	July 28	Aug 19	Aug 11	Aug 16
2011	Weir	360	July 15	July 24	Aug 18	Aug 10	Aug 13
2012	Weir	157	July 25	July 28	Aug 20	Aug 8	Aug 15
2013	Weir	312	July 24	July 29	Aug 19	Aug 9	Aug 14
2014	Weir	602	July 13	July 17	Aug 17	July 30	Aug 5

^a aerial survey conducted by P.A. Harder and Associates Ltd.

^b aerial survey conducted by RRDC and Jane Wilson & Associates

NR - not reported

Note: weir operations in 1997, 1998 and 1999 involved enumeration of Chinook salmon only. Sampling conducted in later years resulted in delays in the normal migration timing.

Appendix 6. Daily and average Chinook salmon counts in Blind Creek, 1997-1999, 2003-2014

DATE	Daily Count 2014	Daily Count 2013	Daily Count 2012	Daily Count 2011	Daily Count 2010	Daily Count 2009	Daily Count 2008	Daily Count 2007	Daily Count 2006	Daily Count 2005	Daily Count 2004	Daily Count 2003	Daily Count 1999	Daily Count 1998	Daily Count 1997	Daily Average
11-Jul											0					0
12-Jul											0					0
13-Jul	0										0					0
14-Jul	0										0					0
15-Jul	0			0						0	0					0
16-Jul	0			0					0	0	0	0				0
17-Jul	5			0				0	0	0	0	1				1
18-Jul	2			0				0	0	0	0	1				0
19-Jul	3			0	0			0	0	0	1	2		0		1
20-Jul	9			0	0	0		0	0	1	32	0		0		4
21-Jul	0			0	0	0		0	0	0	5	2		0		1
22-Jul	5			0	0	0		0	0	1	2	4		0		1
23-Jul	23			0	0	0		0	0	0	2	2		0		3
24-Jul	16	0		3	0	0		1	0	0	140	1		0		15
25-Jul	7	0	0	0	0	0	0	0	0	0	24	10	0	0	122	11
26-Jul	0	0	0	1	0	0	0	0	0	2	10	17	0	0	85	8
27-Jul	24	0	0	1	0	2	0	7	0	10	20	495	0	1	66	42
28-Jul	116	0	2	2	1	8	1	3	2	8	60	2	0	0	73	19
29-Jul	89	1	2	5	1	27	1	3	9	13	33	68	0	0	64	21
30-Jul	6	0	0	4	1	12	2	10	27	105	225	95	0	0	70	37
31-Jul	4	2	3	1	17	106	1	9	26	18	36	7	0	0	44	18
01-Aug	21	0	3	11	0	84	4	8	67	15	60	45	15	0	49	25
02-Aug	32	2	4	7	0	25	1	27	8	15	34	0	65	6	77	20
03-Aug	32	6	7	6	0	24	6	6	109	35	7	7	133	34	38	30
04-Aug	116	19	6	11	1	0	3	13	25	45	15	201	50	169	60	49
05-Aug	35	35	2	7	33	22	5	8	131	46	15	75	116	16	22	38
06-Aug	2	28	8	13	23	106	11	63	19	53	27	50	73	4	33	34
07-Aug	16	48	10	7	19	67	17	59	47	54	19	12	25	5	20	28
08-Aug	1	4	33	35	5	30	26	6	63	31	4	18	129	5	43	29
09-Aug	8	25	17	30	9	110	18	20	44	18	8	1	128	1	19	30
10-Aug	4	36	13	86	4	28	11	9	14	15	2	0	139	31	21	28
11-Aug	3	52	2	45	27	20	15	4	16	14	10	8	1	25	5	16
12-Aug	9	12	6	31	23	9	19	16	28	11	1	4	0	15	16	13
13-Aug	4	5	9	29	19	7	27	14	19	7	0	18	0	9	5	11
14-Aug	5	19	7	6	40	6	20	8	11	3	0	2	0	11	1	9
15-Aug	3	7	8	13	14	13	26	6	6	5	0	2	0	18	13	9
16-Aug	2	6	9	1	6	3	23	4	5			5	0	7	8	6
17-Aug	0	5	4	5	12	4	23		1			0	0	9	3	6
18-Aug		0	2	0	12	3	12					0	14	3		5
19-Aug		0	0		3	0	4						4	4		2
20-Aug			0										0			0
21-Aug													0			0
TOTAL	602	312	157	360	270	716	276	304	677	525	792	1155	892	373	957	

Note: shaded areas denote start and end date of weir operations

Appendix 7. Mean, Maximum and Minimum discharge in cubic metres per second for July and August, Blind Creek, 1992-2014.

	JULY Daily Discharge (m ³ /sec)					AUGUST Daily Discharge (m ³ /sec)				
	Mean	Max.	Max. Day	Min.	Min. Day	Mean	Max.	Max. Day	Min.	Min. Day
1992	9.87	13.06	14/07	6.59	31/07	4.47	6.24	01/08	3.30	27/08
1993	8.93	12.0	11/07	7.41	30/07	7.41	9.18	12/08	6.55	30/08
1994	3.92	5.50	01/07	2.52	27/07	1.48	2.61	01/08	0.94	21/08
1995	4.71	8.09	06/07	2.60	01/07	4.91	5.79	29/08	3.88	15/08
1996	4.80	8.87	12/07	2.67	31/07	3.92	7.62	30/08	2.24	03/08
1997*	4.96	9.66	25/07	2.53	04/07	9.11	10.3	01/08	7.71	03/08
1998	-	-	-	-	-	-	-	-	-	-
1999	4.49	12.5	02/07	2.12	25/07	2.25	3.20	01/08	1.93	27/08
2000	-	-	-	-	-	-	-	-	-	-
2001	8.49	16.2	17/07	5.20	31/07	3.33	5.00	01/08	2.28	18/08
2002	2.85	4.95	06/07	2.25	28/07	2.71	5.81	30/08	1.82	11/08
2003	5.25	14.6	07/07	3.26	29/07	2.49	4.27	01/08	1.37	21/08
2004	3.41	4.56	01/07	3.02	17/07	2.51	3.41	01/08	2.28	26/08
2005	4.28	5.57	19/07	3.23	12/07	2.31	4.48	01/08	1.47	18/08
2006	5.92	10.8	11/07	2.76	31/07	3.46	5.08	15/08	2.50	01/08
2007	5.60	10.8	03/07	3.36	27/07	3.03	4.93	08/08	1.43	31/08
2008	12.55	29.2	16/07	6.26	04/07	9.66	31.1	26/08	4.81	17/08
2009 ^a	3.62	6.49	11/07	1.79	31/07	2.24	4.44	27/08	0.81	07/08
2010	-	-	-	-	-	-	-	-	-	-
2011 ^b	-	-	-	-	-	-	-	-	-	-
2012	14.00	34.4	03/07	7.72	31/07	7.41	12.6	11/08	5.92	08/08
2013 ^b	-	-	-	-	-	-	-	-	-	-
2014 ^c	-	-	-	-	-	-	-	-	-	-

* no data available for period between July 14-July 24 and after August 3.

^a Preliminary data – February 10, 2009. Discharge data was not available for the period July 3-July 10.

^b No data available due to equipment malfunction

^c Data not available at the time of writing this report

Note: 1998, 2000 and 2010 data not available

(Source: Environment Yukon, Water Resources Branch).

Appendix 8. Blind Creek weather and water conditions, 2014.

DATE	TIME	AIR TEMP (°C)	WATER TEMP (°C)	WATER LEVEL (cm)	WATER CLARITY	WEATHER
July 10				64	clear	mix sun and cloud
July 11				64	clear	mix sun and cloud
July 12				63	clear	slight overcast, some showers
July 13				62	clear	slight overcast, sunny in afternoon
July 14	13:00	22	14	60	clear	slight overcast, sunny in afternoon
July 15	8:00	18	13	59	clear	mostly sunny, windy in p.m.
July 16	8:00	17	13	56	clear	cloudy
July 17	8:00	13	10.5	55	clear	mix sun and cloud, breezy, warm
July 18	10:00	18	11	55	clear	mix sun and cloud
July 19	8:00	13	11.5	55	clear	mix sun and cloud, evening showers
July 20	8:00	13	12	56	clear	overcast, cool
July 21	8:00	14	12	55	clear	mostly sunny, warm
July 22	8:00	14	12	54	clear	mostly sunny, warm, evening shower
July 23	8:00	14	13	52	clear/silty in p,m	overcast, cool
July 24	8:00	13	12	55	slightly silty	overcast, showers
July 25	8:00	13	12	53	clear	overcast during day, clearing in evening, cool
July 26	8:00	11	11.5	51	clear	overcast
July 27	8:00	12	11.5	50	clear	rain in early morning, mix sun and cloud in p.m.
July 28	8:00	10	11	49	clear	cloudy with sunny breaks
July 29	8:00	13.5	12	47	clear	rain overnight, cloudy during day, rain in evening
July 30	8:00	10	11.5	51	murky	heavy rain until late afternoon
July 31	8:00	9	9	82	murky	sunny, cool
Aug. 1	8:00	5	9.5	81	murky	light frost overnight, sunny
Aug. 2	8:00	8.5	11	72	clearing, dark stained	sunny, warm
Aug. 3	8:00	10	10	64	clearing, dark stained	mix sun and cloud, warm
Aug. 4	8:00	10	11	61	clear	cloudy in a.m., clearing in afternoon, warm
Aug. 5	8:00	10.5	10	57	clear	sunny, warm
Aug. 6	8:00	12	10	54	clear	light overcast in a.m., cool
Aug. 7	8:00	7	9	53	clear	cloudy with sunny breaks, light rain showers, cool
Aug. 8	8:00	8	8.5	53	clear	light frost overnight, sunny
Aug. 9	8:00	9.5	8.5	51	clear	light frost overnight, light overcast
Aug. 10	8:00	13.5	9.5	50	clear	cloudy with sunny breaks, warm breeze
Aug. 11	8:00	15	10.5	50	clear	overcast, light rain showers in a.m.
Aug. 12	8:30	14	11	50	clear	overcast, light rain showers, clearing in afternoon, mild
Aug. 13	8:00	5.5	9	50	clear	light rain showers throughout day, light frost overnight
Aug. 14	8:00	12	9.5	50	clear	overcast, mild
Aug. 15	8:00	15	10	50	clear	scattered cloud, breezy, mild
Aug. 16	8:00	8.5	10	49	clear	rain overnight, clearing during day, cool
Aug. 17	8:00	12	10	49	clear	overcast, periodic rain showers

