

**A Summary of Juvenile Salmonid Trapping in the Lillooet  
Lake Catchment, Including Lillooet and Birkenhead Rivers,  
2011.**

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## ***Executive Summary***

This project is an extension of research conducted in the Spring of 2010, which documented the presence and spawning habits of chinook salmon (*Oncorhynchus tshawytscha*) in the Lillooet Lake watershed and its neighbouring rivers. In the Spring of 2011 minnow trapping was conducted in various streams throughout the Lillooet Lake watershed. Minnow traps were placed in the Lillooet River and several of its major tributaries (Miller Creek, Twin One Creek, Tenas Bridge Creek) as well as in the Birkenhead River and Joffre Creek. Although no juvenile chinook were captured in the Spring of 2011, data can be used to enhance success rates in future captures and is compared to data from the Spring of 2010.

## ***Acknowledgements***

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## **Introduction**

While the migration and spawning habits of Birkenhead River chinook salmon (*Oncorhynchus tshawytscha*) are fairly well documented (eg. Greenbank 2007, 2008, 2009, Schubert et al. 2007, Townsend et al. 2010), the distribution of juveniles is less well understood (Schubert et al. 2007). Additionally, high turbidity, poor access and limited stock assessment, as well as limited funding has hindered efforts to document the distribution of chinook salmon in neighbouring rivers which share the Lillooet River watershed with the Birkenhead River.

In an effort to better understand the distribution of chinook salmon in the Lillooet River watershed, a minnow trapping program was undertaken in the Spring of 2010 and 2011 with the intention of documenting the presence or absence of juvenile chinook salmon in rivers draining into the upper Lillooet River and Lillooet Lake. This report will describe the results of the Spring 2011 study which was funded by the Fraser Salmon and Watersheds Program.

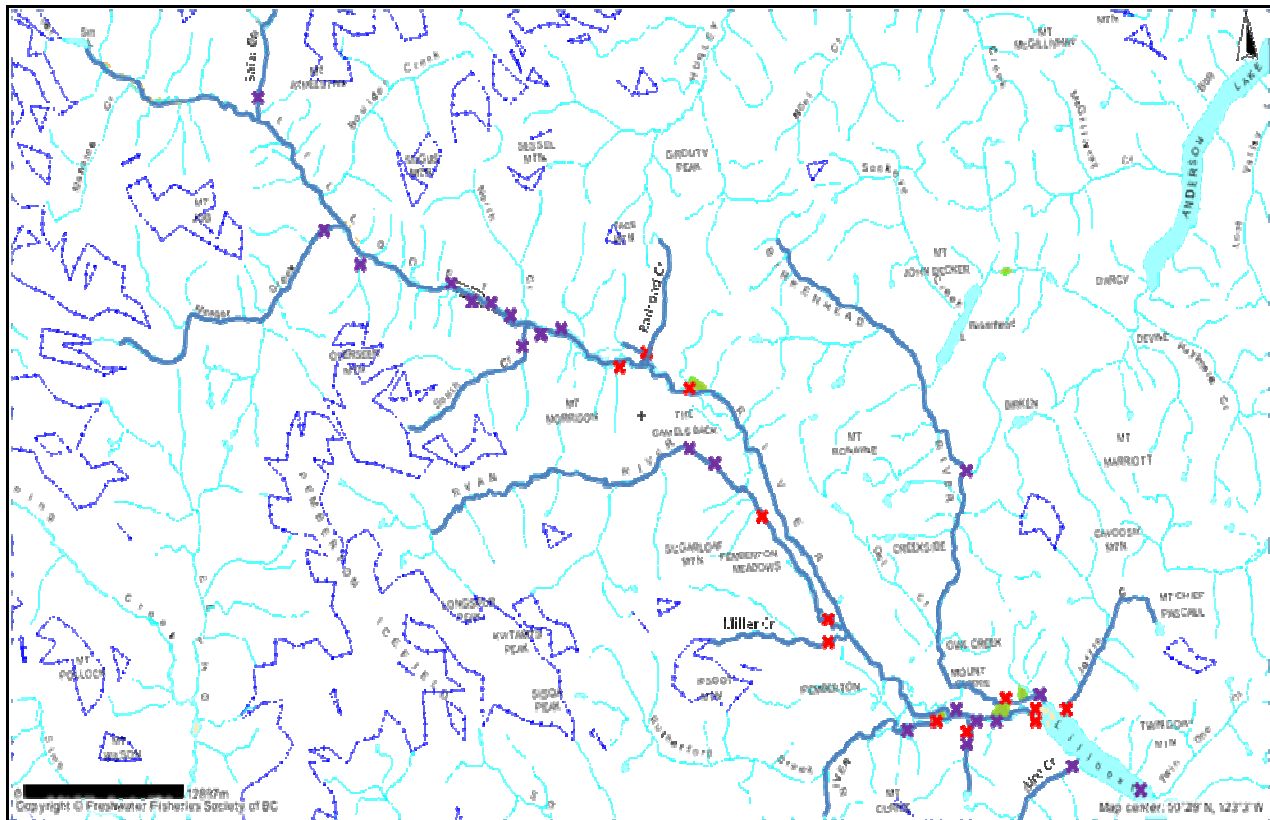
## **Methods**

### **Study Area**

The study area included Joffre Creek and Birkenhead River systems, which drain directly into the Lillooet Lake (Figure 1). We also sampled the upper Lillooet River mainstem as well as some Lillooet River and Lillooet Lake tributaries including, Miller Creek, Tenas Bridge Creek and Twin One Creek.

**Table 1. Trapping locations, number of sets and total traps set.**

<b>System</b>	<b>Location</b>	<b>Traps Sets</b>	<b>Traps per Set</b>	<b>Total Traps</b>
Joffre Creek	Lower Reaches	2	10	20
Twin One Creek	Lower Reaches	3	3	9
Tenas Bridge	Mainstem	1	5	5
Miller	Lower Reach / Near Lillooet R confluence	1	9	9
Lillooet River	15 to 35 Km on Lillooet River FSR	21	5 - 15	229
<b>Totals</b>		<b>28</b>		<b>272</b>



**Figure 1** Lillooet River catchment.

### **Minnow Trapping**

Wire funnel traps were baited with salmon roe and left overnight at sampling locations. Between three and 15 traps were set at each trapping location (Appendix A), and traps were set for at least 24 hours but no longer than 36. Trapping commenced 24 February 2011 and continued until 31 May 2011 (Appendix A). A subset of captured individuals was measured for fork length.

### **Results**

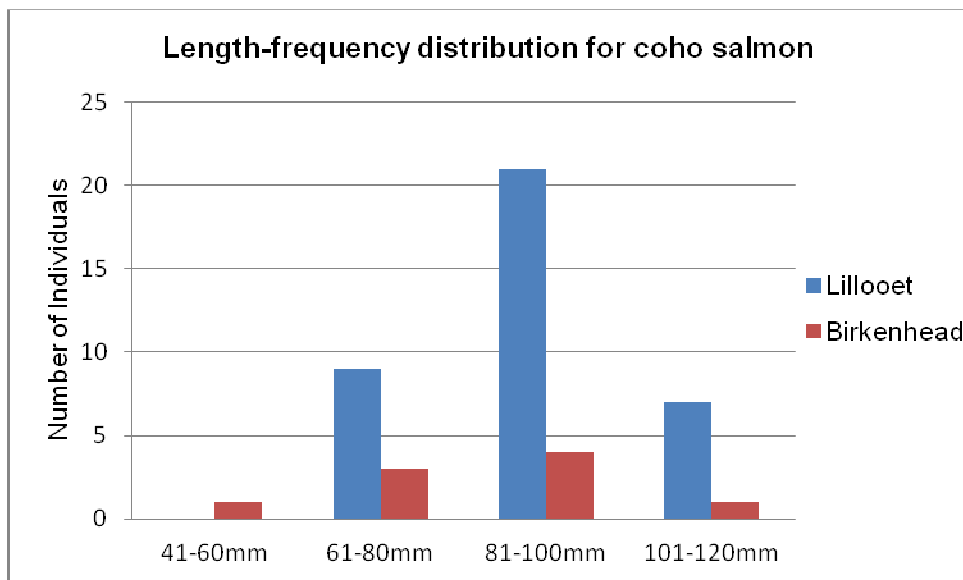
Although our target species (chinook salmon) were not found in any of the six stream systems sampled, coho salmon (*Oncorhynchus kisutch*), cutthroat trout (*O. clarkii*), bull trout (*Salvelinus confluentus*), and mountain whitefish (*Prosopium williamsoni*) were captured (Appendix A).

Table 1 summarizes the number of traps set in each system and the number of each species captured. Coho salmon were found in three of the six systems, with the greatest number of coho salmon (69, 51%) caught in the Lillooet River. Catch per unit effort (CPUE) was calculated for all systems where coho were encountered. For this calculation, one unit effort is defined as one minnow trap set for an overnight soak (24 to 36 hours). CPUE was calculated at 3.11 for Miller Creek, 1.9 for the Birkenhead River, and 0.3 for the Lillooet River.

**Table 2 Summary of species captured by location and date.**

Location	Date	No. of Traps	No. of Fish Captured				
			Coho	CTT	BT	WF	Sculpin
Joffre Creek	24-Feb	20	0	4	0	0	0
Twin One Cr.	24-Feb	9	0	1	0	0	1
Tenas Bridge	4-Mar	5	0	1	0	0	0
Miller	8-Mar	9	28	1	2	0	0
Lillooet	8 Mar to 31 May	230	69	5	10	1	139
Birkenhead	13-May	20	38	1	0	0	2

Fork lengths measured for all species in all systems is summarized in the text below and more specifically for coho salmon in the figure below. At Joffre Creek four cutthroat trout were caught with measured fork lengths ranging from 100mm to 130mm. At Twin One Creek one cutthroat trout and one sculpin were caught each with a fork length of 130mm. At Tenas Bridge one cutthroat trout was caught measuring 100mm in fork length. At Miller Creek, although 28 coho salmon, one cutthroat trout, and two bull trout were caught no measurements were taken. In the Lillooet River 69 coho salmon were caught with fork lengths ranging from 39mm to 145mm. In addition, five cutthroat trout were caught ranging from 104mm to 129mm in fork length, ten bull trout were caught ranging from 92mm to 145mm, one white fish was caught measuring 58mm in fork length, and 139 sculpin were caught of which those that were measured ranged in fork length from 68mm to 111mm. There were 38 coho salmon captured in the Birkenhead River ranging from 46mm to 115mm in fork length and one cutthroat trout was caught measuring 89mm in fork length. No measurements were taken for the sculpins caught at Birkenhead.



**Figure 2 Length-frequency distribution for coho salmon captured from the Lillooet and Birkenhead Rivers. No measurements documented for coho captured from Miller Creek.**

## ***Discussion***

We know that juvenile chinook salmon are present in the upper Lillooet River and some of its tributaries. Due to the difficulties with visual observations of adult Chinook in this area an extensive minnow trapping program was undertaken in the Spring of 2010. Minnow trapping was repeated in the Spring of 2011 with less positive results.

It is likely that chinook salmon were not encountered in the 2011 study due to access limitation which delayed the start of trapping. In 2010, juvenile chinook were captured in February and March however, no chinook were captured after 22 March 2010. In 2011, minnow trapping efforts only commenced on 24 February and the Lillooet River was not visited until April; the Birkenhead River, not until May.

In the 2010 study, chinook salmon were captured in the Lillooet River between 23 February and 22 March, with the greatest capture results achieved on 1 March, 2010. Whereas the 2011 study did not commence trapping rigorously in the Lillooet River until 13 April, with the exception of one location visited on 8 March. The same is true for the Birkenhead River where minnow trapping captured Chinook in mid February 2010, but none were captured during trapping in May 2011.

As with the previous study this suggests that traps set in March, April and May might have been too late to capture juvenile chinook, as fish large enough to be trapped may have already migrated downstream. Increased effort to gain earlier access into the upper Lillooet River trapping areas is required.

Exploratory efforts have proven largely unsuccessful in enumerating adult chinook escapement to the Lillooet and Green Rivers due to the large size and high turbidity of these systems (J. Greenbank, *personal observation*). Given the unique evolutionary and conservation properties of the well-studied Birkenhead chinook population (Shubert et al. 2007), it is likely that increased attention and effort to the study of these neighbouring populations will provide useful information for scientists and resource managers.



## ***Literature Cited***

- Berezay, G, CN MacKinnon, and AY Fedorenko. 1988. Birkenhead River Chinook hatchery operational history 1977-1986. Internal report, Department of Fisheries and Oceans, Vancouver.
- Greenbank, J. 2010. Salmon Escapement Monitoring in the Birkenhead River and Upper Lillooet River Watersheds, 2009-10. Prepared for Lil'wat Nation.
- Greenbank, J. 2009. Salmon Escapement Monitoring in the Birkenhead River and Upper Lillooet River Watersheds, 2008-9. Prepared for Lil'wat Nation.
- Greenbank, J. 2008. Salmon Escapement Monitoring in the Birkenhead River and Upper Lillooet River Watersheds, 2007-8. Prepared for Lil'wat Nation.
- Schubert, ND, and 9 others. 2007. Status of Birkenhead River Chinook Salmon (*Oncorhynchus tshawytscha*). CSAS Research Document 2007/019.
- Townsend, M, R Joseph, and J Greenbank. 2010. A residence time study for spawning chinook salmon in the Birkenhead River. Prepared for Lil'wat Nation.

**Appendix A: Location and Species Information for traps set in the Lillooet Lake catchment, 2011.**

River	Site	Date	Temp	# Traps	Chinook	Coho	CTT	BT	WF	Sculpin	NPM	Description
Joffre	J1	24/02/2011	1.5	10	0	0	3	0	0	0	0	Joffrey Creek Upper Half
Joffre	J2	24/02/2011	-1.5	10	0	0	1	0	0	0	0	Joffrey Creek Lower Half
Twin One	T1	24/02/2011	-1	3	0	0	0	0	0	0	0	
Twin One	T2	24/02/2011	-10	3	0	0	1	0	0	1	0	
Twin One	T3	24/02/2011	-10	3	0	0	0	0	0	0	0	
Tenas Bridge	TB1	04/03/2011	3	5	0	0	1	0	0	0	0	27Km Tenas Bridge
Miller	Mill1	08/03/2011	2	9	0	28	1	2	0	0	0	Upstream and downstream from bridge
Lillooet	L1	08/03/2011	3	10	0	0	0	0	0	3	0	Lillooet River past fire base
Lillooet	L15-1	13/04/2011	NR	10	0	0	0	2	0	0	0	Main channel of Lillooet River past fire base
Lillooet	L15-2	13/04/2011	NR	10	0	5	0	0	0	3	0	Main channel of Lillooet River past fire base
Lillooet	L17-1	15/04/2011	NR	10	0	18	4	0	0	0	0	17Km FSR Lillooet River
Lillooet	L17-2	15/04/2011	NR	10	0	17	0	0	0	0	0	17Km FSR Lillooet River
Lillooet	L23-1	19/04/2011	NR	15	0	3	0	2	1	0	0	23Km board FSR
Lillooet	L23-2	19/04/2011	NR	15	0	9	0	0	0	2	0	23Km in FSR
Lillooet	L21-1	27/04/2011	NR	10	0	3	0	0	0	0	0	21Km FSR
Lillooet	L21-2	27/04/2011	NR	10	0	2	0	1	0	0	0	21Km FSR
Lillooet	L35-1	03/05/2011	NR	15	0	0	0	0	0	0	0	35Km FSR Lillooet River
Lillooet	L35-2	03/05/2011	3.5	15	0	2	0	0	0	0	0	35Km FSR Lillooet River
Lillooet	L22-1	04/05/2011	NR	10	0	0	1	0	0	0	0	22Km FSR Lillooet River
Lillooet	L22-2	04/05/2011	NR	10	0	0	0	0	0	1	0	22Km FSR Lillooet River
Lillooet	LS2.5-1	05/05/2011	NR	10	0	1	0	3	0	5	0	2.5Km South Side Lillooet River
Lillooet	LS2.5-2	05/05/2011	NR	10	0	4	0	1	0	2	0	2.5Km South Side Lillooet River
Lillooet	L6-1	12/05/2011	NR	10	0	0	0	0	0	39	0	6Km FSR Lillooet River
Lillooet	L6-2	12/05/2011	NR	10	0	0	0	0	0	19	0	6Km FSR Lillooet River
Lillooet	L2.5-1	19/05/2011	NR	10	0	0	0	1	0	25	0	2.5Km FSR Lillooet River
Lillooet	L2.5-2	19/05/2011	NR	10	0	5	0	0	0	11	0	2.5Km FSR Lillooet River
Lillooet	LX1	31/05/2011	NR	10	0	0	0	0	0	10	0	Lillooet River X-Ronnings
Lillooet	LX2	31/05/2011	NR	10	0	0	0	0	0	19	0	Lillooet River X-Ronnings

<b>Species codes</b>	<b>Common Name</b>	<b>Scientific Name</b>
Chinook	chinook salmon	<i>Oncorhynchus tshawytscha</i>
Coho	coho salmon	<i>O. kisutch</i>
RBT	rainbow trout	<i>O. mykiss</i>
CTT	cutthroat trout	<i>O. clarkii</i>
BT	bull trout	<i>Salvelinus confluentus</i>
MW	mountain whitefish	<i>Prosopium williamsoni</i>
NPM	northern pikeminnow	<i>Ptychocheilus oregonensis</i>
Sculpin	sculpin	<i>Cottus sp.</i>

**Appendix B: Fork length measurements for fish trapped in the Lillooet lake catchment, 2011**

River	Site	Date	Species	Fork Length	Bin
Joffre	J1	24/02/2011	Cutthroat	100	81-100mm
Joffre	J1	24/02/2011	Cutthroat	100	81-100mm
Joffre	J1	24/02/2011	Cutthroat	100	81-100mm
Joffre	J2	24/02/2011	Cutthroat	130	121-140mm
Twin One	T2	24/02/2011	Cutthroat	130	121-140mm
Twin One	T2	24/02/2011	Sculpin	130	121-140mm
Tenas Bridge	TB1	04/03/2011	Cutthroat	100	81-100mm
Lillooet	L15-1	13/04/2011	Bull Trout	124	121-140mm
Lillooet	L15-1	13/04/2011	Bull Trout	128	121-140mm
Lillooet	L15-2	13/04/2011	Coho	91	81-100mm
Lillooet	L15-2	13/04/2011	Sculpin	68	61-80mm
Lillooet	L15-2	13/04/2011	Coho	98	81-100mm
Lillooet	L15-2	13/04/2011	Sculpin	72	61-80mm
Lillooet	L15-2	13/04/2011	Coho	86	81-100mm
Lillooet	L17-1	15/04/2011	Coho	97	81-100mm
Lillooet	L17-1	15/04/2011	Coho	89	81-100mm
Lillooet	L17-1	15/04/2011	Coho	92	81-100mm
Lillooet	L17-1	15/04/2011	Coho	53	41-60mm
Lillooet	L17-1	15/04/2011	Coho	73	61-80mm
Lillooet	L17-1	15/04/2011	Coho	68	61-80mm
Lillooet	L17-1	15/04/2011	Coho	73	61-80mm
Lillooet	L17-1	15/04/2011	Coho	83	81-100mm
Lillooet	L17-1	15/04/2011	Coho	82	81-100mm
Lillooet	L17-1	15/04/2011	Cutthroat	126	121-140mm
Lillooet	L17-1	15/04/2011	Cutthroat	129	121-140mm
Lillooet	L17-1	15/04/2011	Cutthroat	104	101-120mm
Lillooet	L17-1	15/04/2011	Coho	100	81-100mm
Lillooet	L23-1	19/04/2011	Bull Trout	127	121-140mm
Lillooet	L23-1	19/04/2011	Bull Trout	145	
Lillooet	L23-1	19/04/2011	Coho	82	81-100mm
Lillooet	L23-1	19/04/2011	Coho	89	81-100mm
Lillooet	L23-1	19/04/2011	Coho	120	101-120mm

River	Site	Date	Species	Fork Length	Bin
Lillooet	L23-1	19/04/2011	White Fish	58	41-60mm
Lillooet	L23-2	19/04/2011	Coho	75	61-80mm
Lillooet	L23-2	19/04/2011	Coho	68	61-80mm
Lillooet	L23-2	19/04/2011	Coho	45	41-60mm
Lillooet	L23-2	19/04/2011	Coho	105	101-120mm
Lillooet	L23-2	19/04/2011	Coho	145	
Lillooet	L23-2	19/04/2011	Coho	94	81-100mm
Lillooet	L23-2	19/04/2011	Coho	120	101-120mm
Lillooet	L23-2	19/04/2011	Coho	52	41-60mm
Lillooet	L23-2	19/04/2011	Coho	98	81-100mm
Lillooet	L23-2	19/04/2011	Sculpin	90	81-100mm
Lillooet	L23-2	19/04/2011	Sculpin	111	101-120mm
Lillooet	L21-1	27/04/2011	Coho	120	101-120mm
Lillooet	L21-1	27/04/2011	Coho	94	81-100mm
Lillooet	L21-1	27/04/2011	Coho	112	101-120mm
Lillooet	L21-2	27/04/2011	Bull Trout	138	121-140mm
Lillooet	L21-2	27/04/2011	Coho	64	61-80mm
Lillooet	L21-2	27/04/2011	Coho	39	
Lillooet	L35-2	03/05/2011	Coho	120	101-120mm
Lillooet	L35-2	03/05/2011	Coho	89	81-100mm
Lillooet	L22-1	04/05/2011	Cutthroat	129	121-140mm
Lillooet	L22-2	04/05/2011	Sculpin	90	81-100mm
Lillooet	LS2.5-1	05/05/2011	Coho	90	81-100mm
Lillooet	LS2.5-1	05/05/2011	Bull Trout	128	121-140mm
Lillooet	LS2.5-1	05/05/2011	Bull Trout	138	121-140mm
Lillooet	LS2.5-2	05/05/2011	Coho	94	81-100mm
Lillooet	LS2.5-2	05/05/2011	Coho	74	61-80mm
Lillooet	LS2.5-2	05/05/2011	Coho	84	81-100mm
Lillooet	LS2.5-2	05/05/2011	Coho	98	81-100mm
Lillooet	LS2.5-2	05/05/2011	Sculpin	110	101-120mm
Lillooet	LS2.5-2	05/05/2011	Bull Trout	136	121-140mm
Lillooet	L2.5-1	19/05/2011	Bull Trout	92	81-100mm
Lillooet	L2.5-2	19/05/2011	Coho	70	61-80mm

River	Site	Date	Species	Fork Length	Bin
Lillooet	L2.5-2	19/05/2011	Coho	110	101-120mm
Lillooet	L2.5-2	19/05/2011	Coho	90	81-100mm
Lillooet	L2.5-2	19/05/2011	Coho	74	61-80mm
Lillooet	L2.5-2	19/05/2011	Coho	82	81-100mm
Birkenhead	BRK1	13/05/2011	Coho	46	41-60mm
Birkenhead	BRK1	13/05/2011	Coho	88	81-100mm
Birkenhead	BRK1	13/05/2011	Coho	96	81-100mm
Birkenhead	BRK1	13/05/2011	Coho	64	61-80mm
Birkenhead	BRK1	13/05/2011	Cutthroat	89	81-100mm
Birkenhead	BRK2	13/05/2011	Coho	81	81-100mm
Birkenhead	BRK2	13/05/2011	Coho	115	101-120mm
Birkenhead	BRK2	13/05/2011	Coho	89	81-100mm
Birkenhead	BRK2	13/05/2011	Coho	74	61-80mm
Birkenhead	BRK2	13/05/2011	Coho	78	61-80mm