



TAHLTAN  
FISHERIES

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## Tuya sockeye smolt survey - 2013



**-Final Report -**

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For: Northern Fund of the Pacific Salmon Commission

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## INTRODUCTION

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### **Background:**

In 1992, Transboundary salmon enhancement activities linked to the Pacific Salmon Treaty lead to sockeye salmon first being transplanted into Tuya Lake. Since 1989, associated egg takes have been conducted at Tahltan Lake with the eggs being incubated at Snettisham hatchery in Alaska. Enhanced fry have then been planted into Tuya Lake and/or back into Tahltan Lake. During the hatchery incubation period the fry are thermally marked allowing for subsequent identification through otolith extraction and reading. Tuya Lake is generally considered to have a high rearing capacity (based upon smolt size and previous limnology samples.)

### **Objectives and scope:**

As yet, full smolt enumeration has not been conducted for out-migrating Tuya smolts. The main objective of this project was to capture approximately 200 smolts for subsequent biological sampling. It should be noted that given the small sample size, detailed interpretation of results is limited. The project is only a reconnaissance level initiative where samples are obtained over a short period. However, the reduced cost and project duration does allow for the collection of useful indicator information and serves as some means of monitoring which could be continued or expanded in the future.

### **Site description:**

Tuya Lake is located in the northwest portion of British Columbia at the headwaters of the Tuya River, approximately 72 km northwest of Dease Lake. (See Figure 1.) The lake is approximately 13 km long and 3 km wide at a relatively high elevation of 1,117 m above sea level. Tuya Lake drains into the Tuya River which contains areas of high velocity flows and vertical drops which restrict upstream fish migration, particularly in the lower reaches. This area is quite isolated having no existing roads, with the main land use probably being hunting and guide/outfitting. The sampling site for this project is located approximately 1.5 km south of the lake outlet. (See Figure 2.) Here the river course is relatively confined and fairly wide, creating a glide section which leads to more open water below.

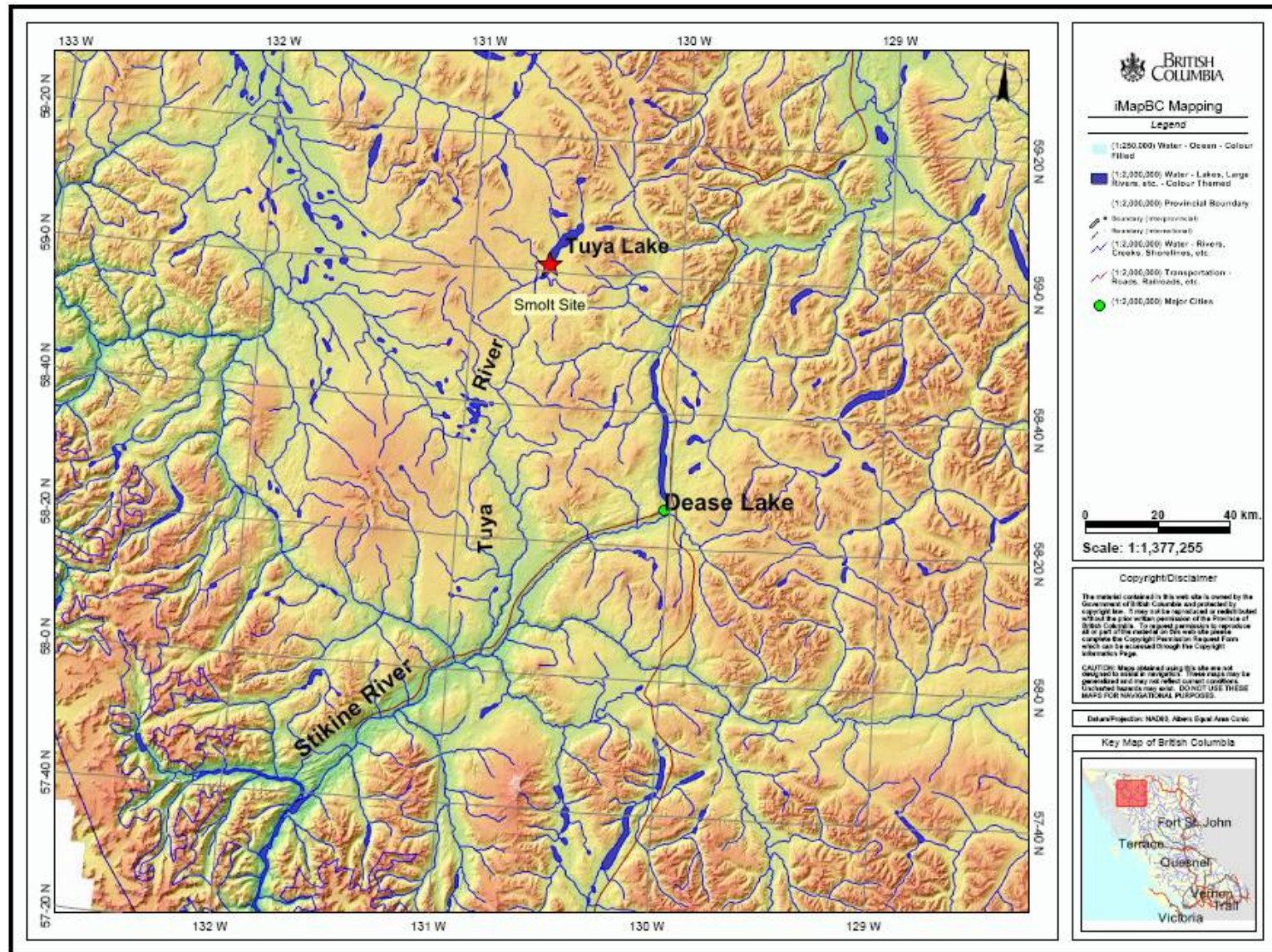


Figure 1: General location of project site

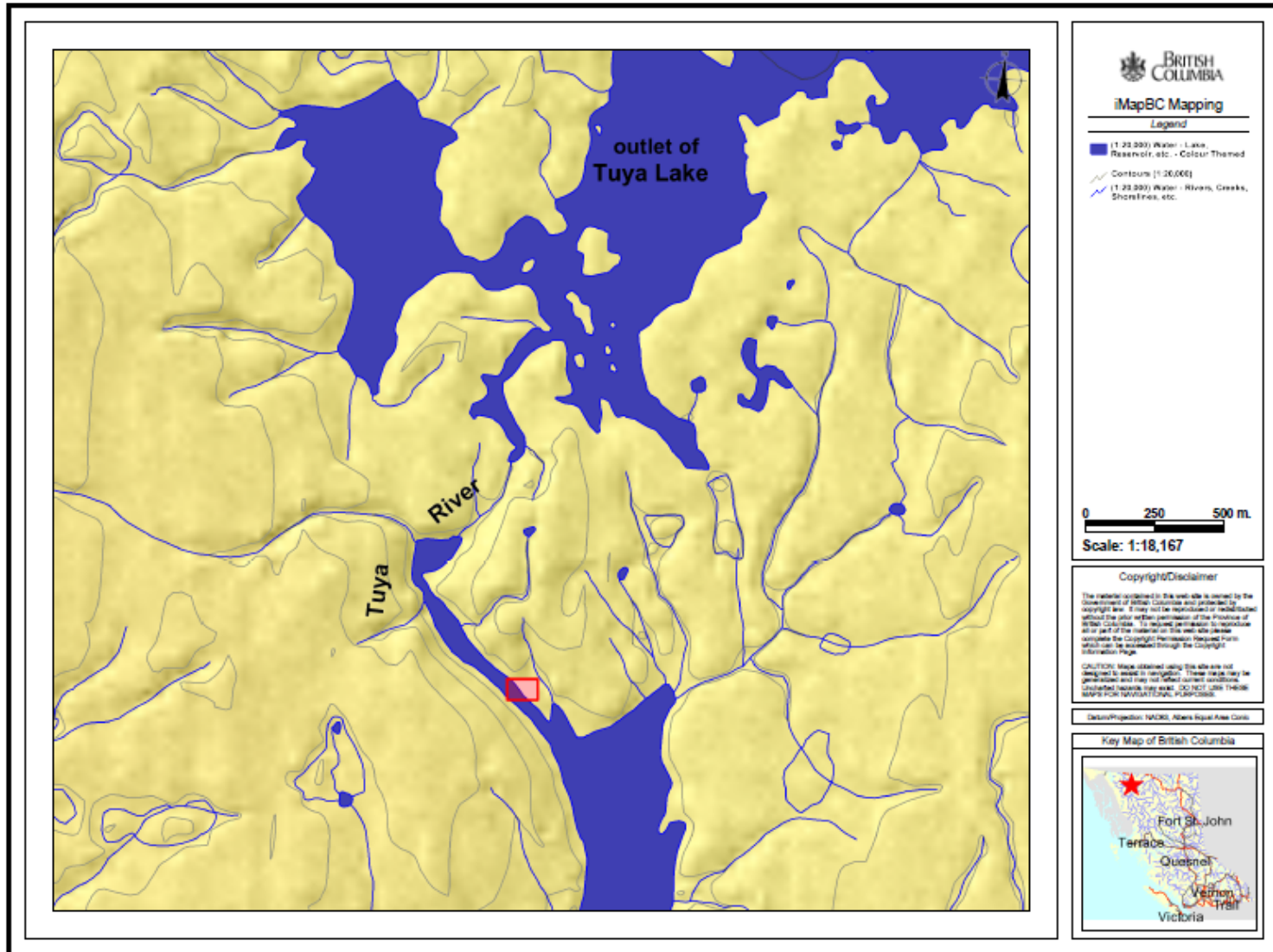


Figure 2: Specific location of smolt sampling site

## METHODS

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A Tahltan Fisheries Biologist and Technician flew to the sight by rotor wing on June 1<sup>st</sup>, 2013 and remained there until June 3<sup>rd</sup>, 2013. The sampling site was located on the upper Tuya River approximately 1.5 km south of the lake outlet. (UTM coordinates <sup>09</sup> 0406091E / 6542899N).

Fish were captured using a smolt / fyke net approximately 4 m across at its upstream opening. The associated trap consisted of a plywood box with plumbing joint intake and wire mesh outlet. The net was anchored in-river using re-bar and safety/support lines were attached from shore to both the net and trap. The net was set on June 1<sup>st</sup> at 18:30 hrs. It was checked at 1:00 hrs on June 2<sup>nd</sup> and then pulled out at 10:00 hrs.

Sockeye smolts captured were sampled for: fork length (nearest mm); weight (nearest 0.1 g using a digital scale); age (scales); and otoliths. Smolt heads were preserved in ethanol and sent to the DFO-Whitehorse Lab for otolith extraction and analysis.

**Photo 1: Tuya Lake - June 3, 2013**



**Photo 2: Tuya sampling site - 2013**

## **RESULTS**

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### **General:**

Unfortunately, only 1 smolt sample was obtained. The river was very high (approximately 2 feet higher than usual) most likely due to seasonably warm temperatures and recent rainfall. The fyke net could not be set properly in the usual location given that you could only walk out into the river about 10 feet from shore. An alternative site was chosen upstream where the net could be set a bit further out. However, it is assumed that this was still not sufficient to effectively capture smolts which tend to follow the central / main current of the river.

### **Length and weight:**

The one sockeye smolt captured measured 164mm in fork length and 35.0g in weight. Thermal mark results (from otolith analysis) for the captured smolt were not yet available during the writing of this report.

## DISCUSSION

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### Data limitations:

As noted previously, the relatively small sample size (particularly in recent years) restricts the level at which data can be analysed. With merely a small fraction of the overall smolt population being sampled, only general interpretation of results can be made.

### Average smolt sizes:

The yearly average weight of enhanced age 1+ Tuya smolts from 1993-2012 is displayed in Table 1 and Figure 3 below. Within the 14 years in which sampling was conducted, the overall average is 10.0g.

**Table 1: Average yearly length / weight characteristics by age class (1993-2012)**

Sample Year	Origin	Brood-year	Age	Number of fish	Percent	Ave. Weight (g)	Ave. Length (mm)
1993	Enhanced	1991	1	370	100.0 <sup>a</sup>	8.76	99.7
1994	Enhanced	1992	1	432	96.0	8.99	99.0
	Enhanced	1991	2	20	4.0	22.34	135.3
1995	Enhanced	1993	1	208	97.1	9.64	95.6
	Enhanced	1992	2	4	2.9	27.35	137.0
1996	Enhanced	1994	1	236	95.9	9.70	99.5
	Enhanced	1993	2	10	4.1	24.50	133.1
1997 <sup>c</sup>	Enhanced	1995	1	178	55.7	8.40	93.8
	Enhanced	1994	2	139	43.9	26.40	136.1
1998	Enhanced	1996	1	228	94.2	10.10	103.4
	Enhanced	1995	2	14	5.8	25.20	140.7
1999	Enhanced	1997	1	89	74.8	11.20	104.1
	Enhanced	1996	2	19	16.0	35.1	158.2
	Enhanced	1995	3	3	2.5	67.9	205.3
	Wild <sup>b</sup>	1997	1	8	6.7	9.6	96.4
2000	Enhanced	1998	1	396	99	8.4	93.8
	Wild	1998	1	4	1	12.6	106.5
2001	Enhanced	1999	1	69	31.8	12.50	106.6
	Enhanced	1998	2	146	67.3	26.24	137.7
	Wild <sup>a</sup>	1999	1	3	1.4	13.6	106.0
	Wild	1998	2	1	0.5	21.4	128.0
2002	No Sampling	-	-	-	-	-	-
2003	No Sampling	-	-	-	-	-	-
2004	No Sampling	-	-	-	-	-	-
2005	Enhanced	2003	1	189	95.5	12.44	105.0
	Enhanced	2002	2	4	2.0	23.45	125.8
	Wild	2003	1	2	1.0	12.30	103.0
	Wild	2002	2	3	1.5	22.70	128.0
2006	No Sampling	-	-	-	-	-	-
2007	Enhanced	2005	1	211	95.5	10.95	102.4
	Enhanced	2004	2	6	2.7	22.18	129.7



	Wild	2005	1	2	0.9	11.75	102.5
	Wild	2004	2	2	0.9	21.60	129.0
2008	Enhanced	2006	1	196	91.2	11.38	101.1
	Enhanced	2005	2	19	8.8	22.12	128.6
2009 <sup>d</sup>	Enhanced	2007	1	256	99.2	8.1	95
	Wild	2007	1	1	0.8	N/A	N/A
2010	No Sampling	-	-	-	-	-	-
2011	No Sampling	-	-	-	-	-	-
2012	Enh./Wild TBD	2010	1	26	96.3	9.8	102
	Enh./Wild TBD	2009	2	1	3.7	N/A	N/A

<sup>a</sup>The first outplant was in 1992 (BY 1991).

<sup>b</sup> 1999 (BY1997) was the first year natural origin smolts have been observed outmigrating from Tuya Lake.

<sup>c</sup> One age 3 smolt was captured at Tuya Lake in 1997.

<sup>d</sup> In 2009 only 123 of the otolith samples were analyzed for marks (approximately half of the total samples).

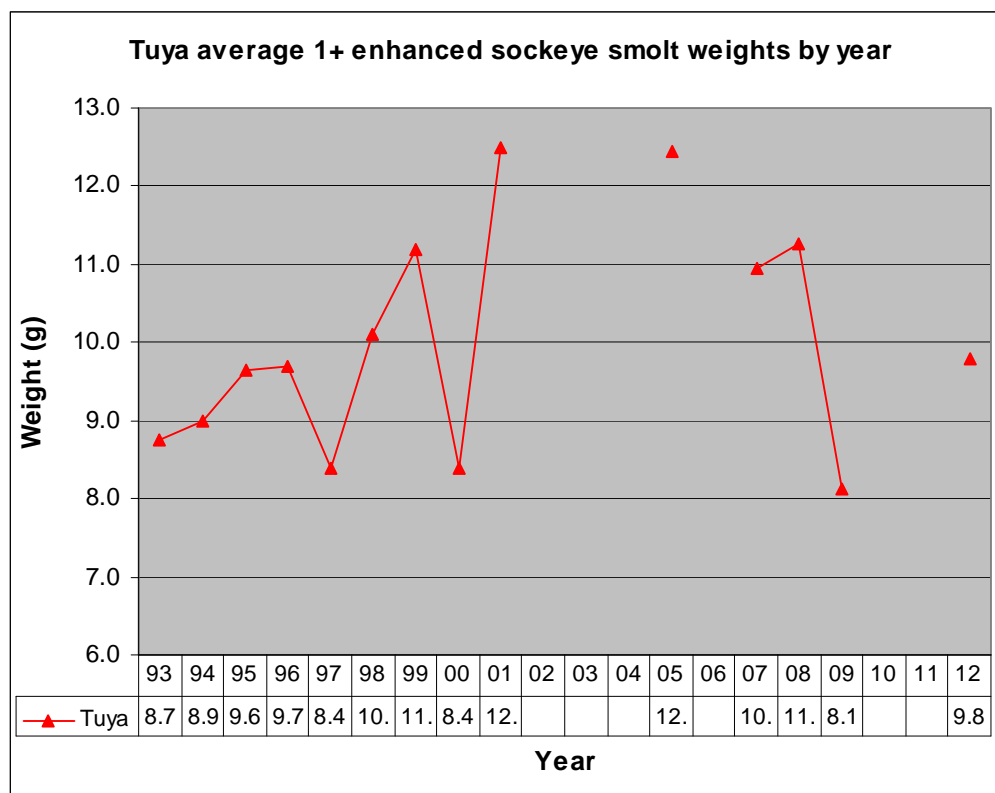


Figure 3: Comparison of average (enhanced age 1+) Tuya smolt weights

### General recommendations:

In 2013 the project was conducted during an average timing, however the river level was very high during this period. Based on previous experience, the fyke net was set at the greatest depth/flow that was deemed safely possible. Unfortunately, this was not sufficient to get the wing of the net out into the centre section of the river. It is suspected that this may have been a key factor in not achieving the sampling target in 2013.

This is the second consecutive year that the sampling target has not been achieved, which was likely influenced by high water conditions and an inability to set the fyke net appropriately. In light of such, it is suggested that in upcoming years, potential improvements to the fyke net deployment should be considered. The following recommendations are provided (for consideration by the TBR Enhancement Sub-Committee):

- The sampling site could be moved up to the actual outlet of the lake. (The existing site is 2km downstream from the lake);
- A small inflatable boat should be brought in, to allow safe crossing of the river;
- Having access to the other bank would allow installation of an anchor point on that side;
- The additional anchor point should allow extension of the fyke net wing further across the river;
- A second wing for the fyke net could be purchased and attached to allow more coverage across the river;
- Project timing should remain similar to previous years (as discussed by the Sub-Committee last year).

Although this smolt sampling project remains limited in scope, it usually provides some general indication of average smolt sizes and thermal mark presence/absence. It is recommended that this project along with annual zooplankton assessments be continued as a basic means of monitoring smolt characteristics and lake productivity.

## **Project performance review:**

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Below is a list of the measures for project success from the original proposal. After each is a brief review of post-project performance.

1. Achievement of sampling targets: Unlike in most years, the sampling target was not achieved in 2013. However, with changes and contingencies in terms of deployment of the fyke net, there is optimism that the target can be attained next year.
2. Effective reporting of results: The methods and outcomes from the project have been reported in this document. As well, the results were related to the TBR Enhancement Sub-Committee meeting in November of 2013. It is expected that the Sub-Committee will discuss recommendations to improve project success during the 2014 pre-season meeting sessions.
3. Not exceeding the original budget: The overall project costs came in under budget. (Please refer to the associated financial report for more details.)

## **ACKNOWLEDGEMENTS**

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