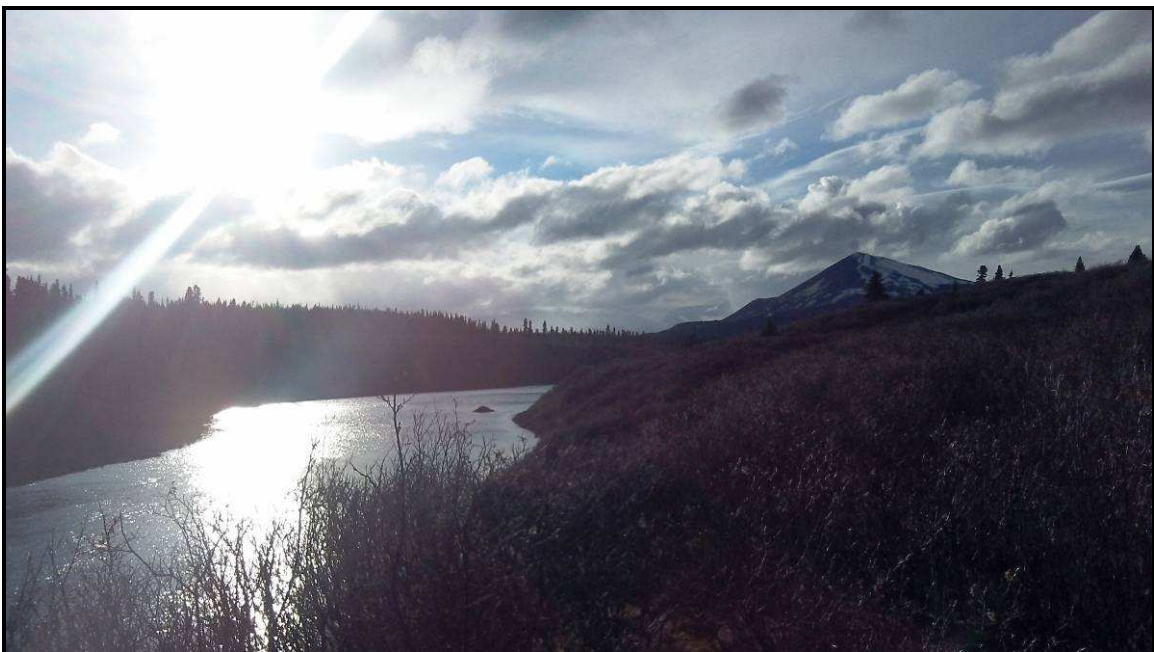




**TAHLTAN
FISHERIES**

Tuya sockeye smolt survey



- Final Report -

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For: Northern Fund of the Pacific Salmon Commission

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INTRODUCTION

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.

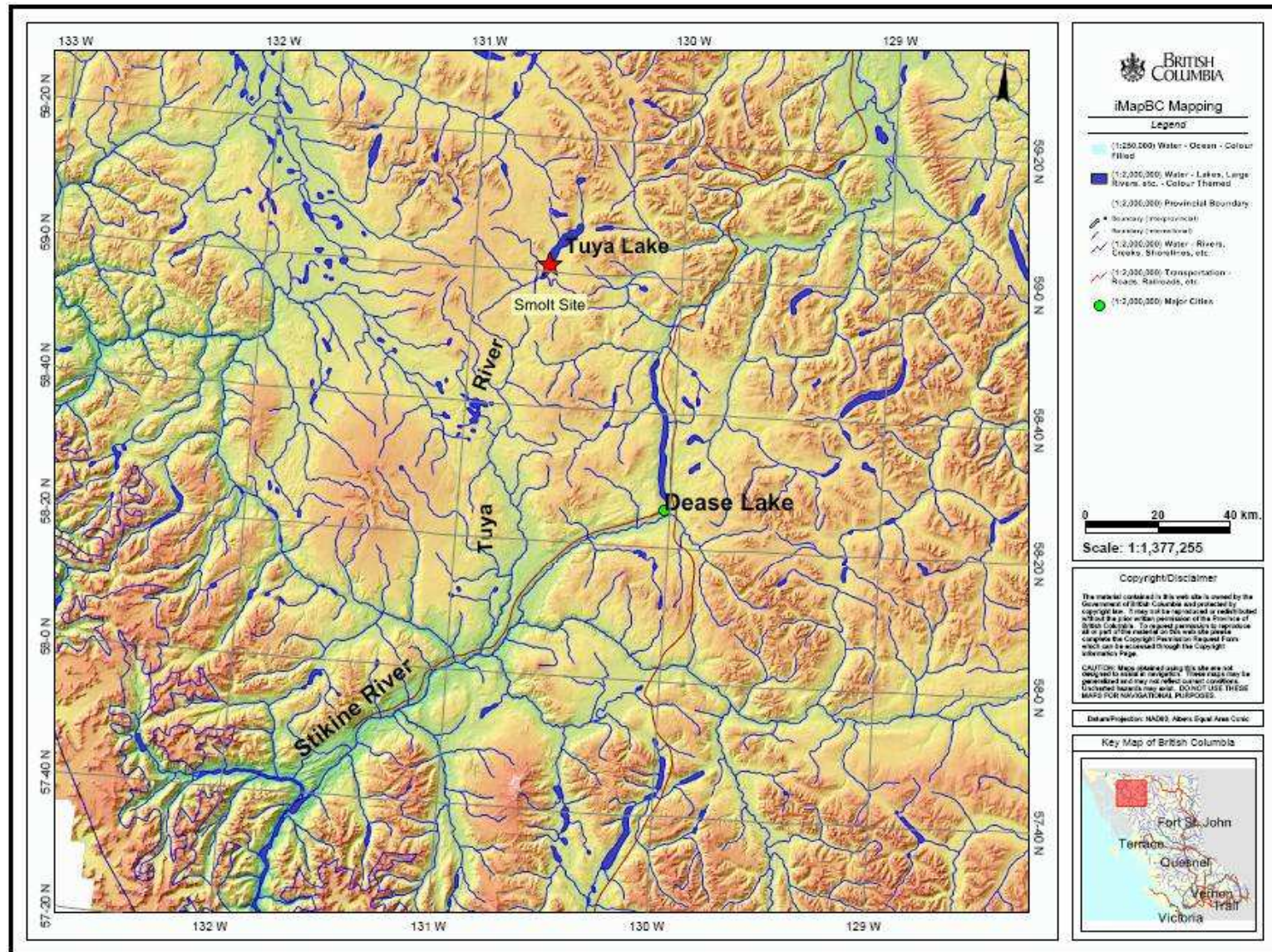


Figure 1: General location of project site

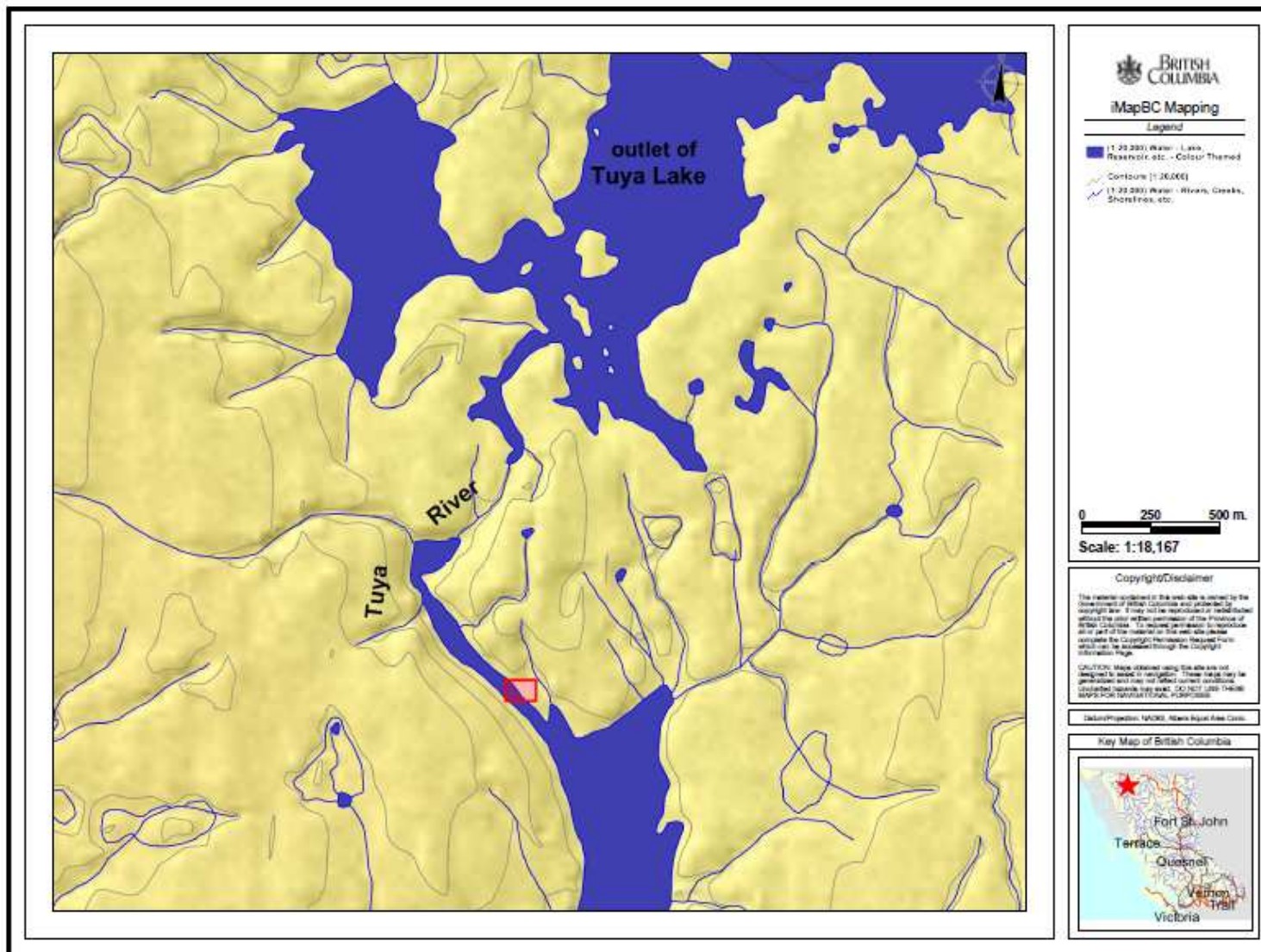


Figure 2: Specific location of smolt sampling site

METHODS

A Tahltan Fisheries Biologist and Technician flew to the sight by rotor wing on May 29th, 2012 and remained there until June 1st, 2012. The sampling site was located on the upper Tuya River approximately 1.5 km south of the lake outlet. (UTM coordinates ⁰⁹ 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 May 29th at 18:00 hrs. It was checked every hour on May 30th from 0:00 hrs to 2:00 hrs. and pulled at 10:00 hrs. The fyke net was re-set on May 30th at 20:00 hrs. in a deeper location as was safely feasible given existing water level conditions. The net was checked on May 31st at 2:30 hrs. and then pulled at 11:00 hrs.

All 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 taken to the DFO-Whitehorse Lab for otolith extraction and analysis.



Photo 1: Tuya Lake and outlet river



Photo 2: Fyke net set



Photo 3: Smolt sampling

RESULTS

General:

Unfortunately, in 2012 only 27 smolt samples were obtained. It is assumed that the smolt run might have been weak and/or there was some variation in smolt out-migration timing.

(To note, of the 5 years Tahltan Fisheries has previously conducted this project, 2012 was the only year in which the sampling target was not obtained.)

Lengths and weights:

Table 1 below provides a summary of lengths and weights by age class. (To note: the small sample size should be taken into account when reviewing this data.)

Table 1: 2012 Length and weight summary by age class

		Age	
		1+	2+
Fork Length (mm)	N	26	1
	Average	102	N/A
	Max	109	138
	Min	98	138
Weight (grams)	N	26	1
	Average	9.8	N/A
	Max	11.8	22.1
	Min	8.1	22.1

Smolt fork lengths for age 1+ fish ranged from 98 - 109 mm with an average of 102 mm (n=26). Only one age 2+ fish was captured and sampled at a length of 138 mm. The resulting length frequencies are depicted in Figure 3.

Smolt weights for age 1+ fish ranged from 8.1 – 11.8 g with an average of 9.8 g (n=26). Only one age 2+ fish was captured and sampled at a weight of 22.1 g. The resulting length/weight relationship is plotted in Figure 4.

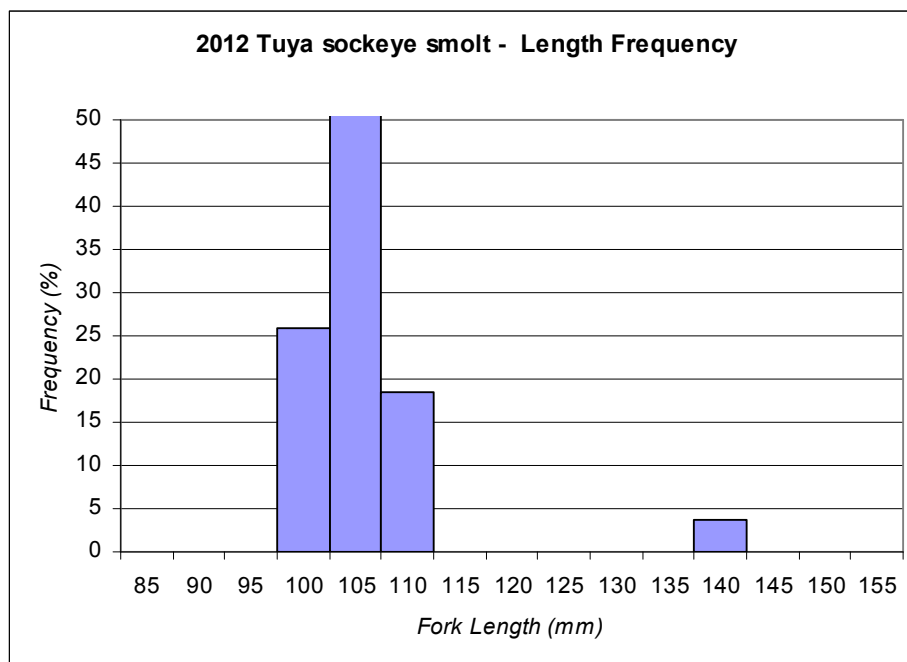


Figure 3: 2012 Tuya smolt length frequency (n=27)

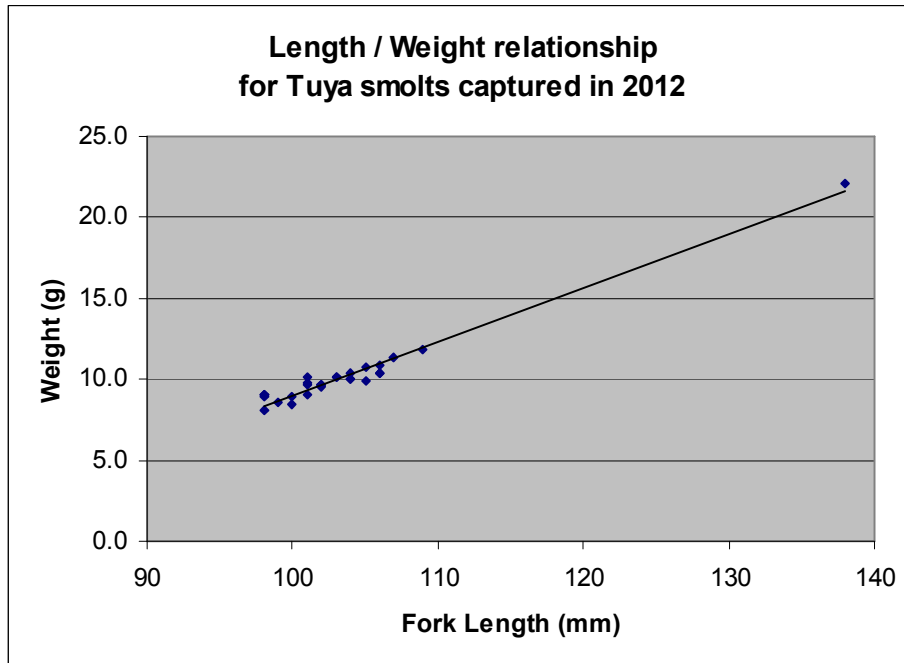


Figure 4: 2012 Tuya smolt length / weight relationship (n=27)

Thermal mark results (from otolith analysis) were not yet available during the writing of this report.

DISCUSSION

Data limitations:

As noted previously, the relatively small sample size (particularly in 2012) 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 2 and Figure 5 below. Within the 14 years in which sampling was conducted, the overall average is 10.0g. The 2012 average weight for 1+ Tuya smolts of 9.8g is very close to this overall average.

Table 2: 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 ^a	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 ^c	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 ^b	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 ^a	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 ^d	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

^aThe first outplant was in 1992 (BY 1991).

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

^c One age 3 smolt was captured at Tuya Lake in 1997.

^d In 2009 only 123 of the otolith samples were analyzed for marks (approximately half of the total samples).

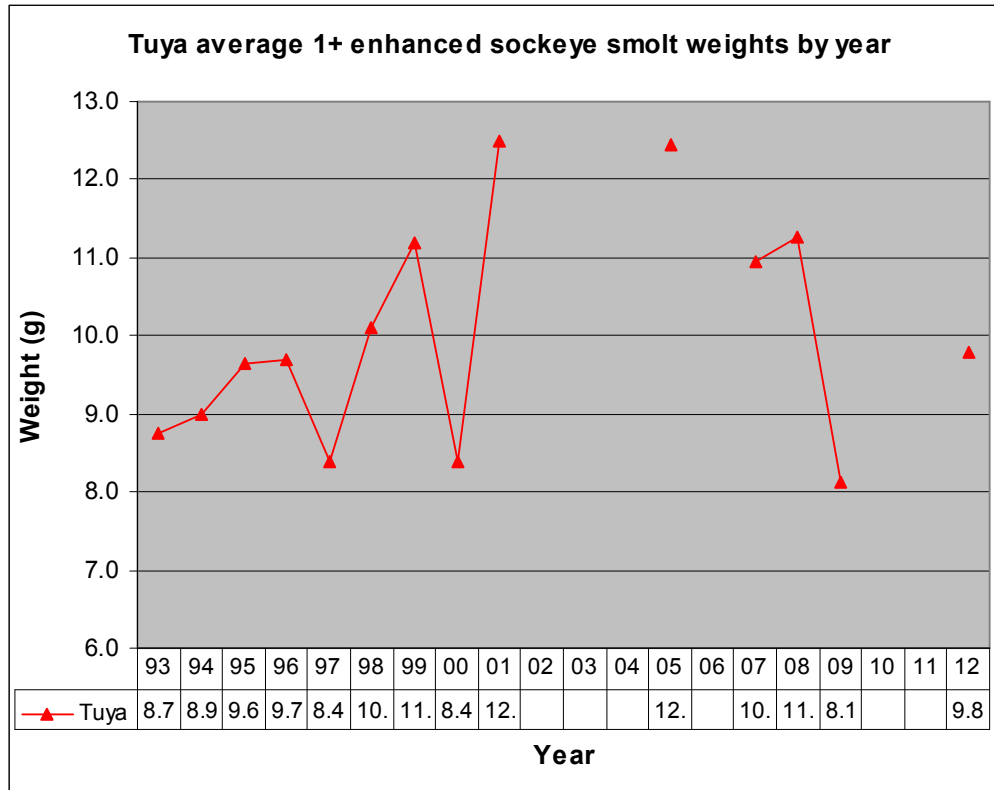


Figure 5: Comparison of average (enhanced age 1+) Tuya smolt weights

General recommendations:

Although this smolt sampling project remains limited in scope, it does provide 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.

In 2012 the project was conducted during an average timing. However, the lake was still fully iced over. Based on previous experience, the fyke net was set at the greatest depth/flow that was deemed safely possible. In regard to not achieving the sampling target in 2012, some potential contingencies were discussed during the recent Enhancement Sub-Committee meeting in late November. Such included: adjusting the field project timing based upon lake ice condition information (if available); or attempting to obtain samples in the lower Tuya River if sampling upstream is unsuccessful. However, both of these contingencies were dismissed. Smolt out-migration timing is more likely influenced by photoperiod than lake ice condition and sampling downstream was attempted years ago without any success. It was recommended that instead, project timing should remain similar and that potential improvements to the fyke net deployment be considered.

ACKNOWLEDGEMENTS

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