

Fisheries and Oceans Canada  
Resource Restoration Unit  
3177 Tatlow Road  
Smithers, BC  
VOJ 2N0

Attention: Lana Miller – Resource Restoration Biologist

## **LAKELSE SOCKEYE ADULT MONITORING**

### **Fry Outplant Program - Sockeye Return 2014**



## *Executive Summary*

In July 2014 Hidden River Environmental Mgmt. was contracted to establish the ratio of enhanced vs wild Sockeye adults returning to Williams Creek. In conjunction with this, marking all fish (with a hole punch) seined at the mouth of the creek, followed up with gillnetting farther upstream at the peak spawning period would also give a population estimate for the 2014 brood year. Seining results indicated that enhanced fish (no adipose fin) made up approximately 3.3% of the total 2014 Sockeye escapement to Williams Creek. One thing to note is that there was no five year old component of returning enhanced fish in 2014 and in some years five year olds make up the higher percentage of returning fish. Gillnetting upstream provided recapture data that gave us a population estimate of 6862 Sockeye adults. A recommendation for future monitoring would be to carry the program into mid-September as many Sockeye were observed still schooling at the creek mouth well past the last seining date of August 25th.

## *Introduction*

Lakelse Sockeye runs have been a concern for Fisheries and Oceans Canada (DFO) for the past decade. In 2005 the “Lakelse Sockeye Recovery Program” was initiated and during subsequent years the Pacific Salmon Commission provided funding for various Lakelse Sockeye rehabilitation, restoration, and enhancement projects including the Lakelse Sockeye Fry Outplant project.

The Fry Outplant project ran from 2006 to 2014, with the exception of 2009 during which no funding was available. Broodstock was collected in Williams Creek with incubation and rearing taking place at Snootli River Hatchery in Bella Coola. All fry were adipose clipped at approximately one gram prior to release back into Williams Creek. This year marked the final release of Sockeye fry to Williams Creek. To monitor the success of the program and the overall health of the natural population, a sample of the 2014 Sockeye return was obtained through seining and gill netting on Williams Creek. The ratio of hatchery versus wild returns will be used to give insight on the success of the 2010 and 2011 brood releases, returning as three and four year old age classes. Because the project was not conducted in 2009, there is no enhanced component of the five year old age class returning. The number of mark/recaptures will also be used to generate a population estimate.

## *Methods*

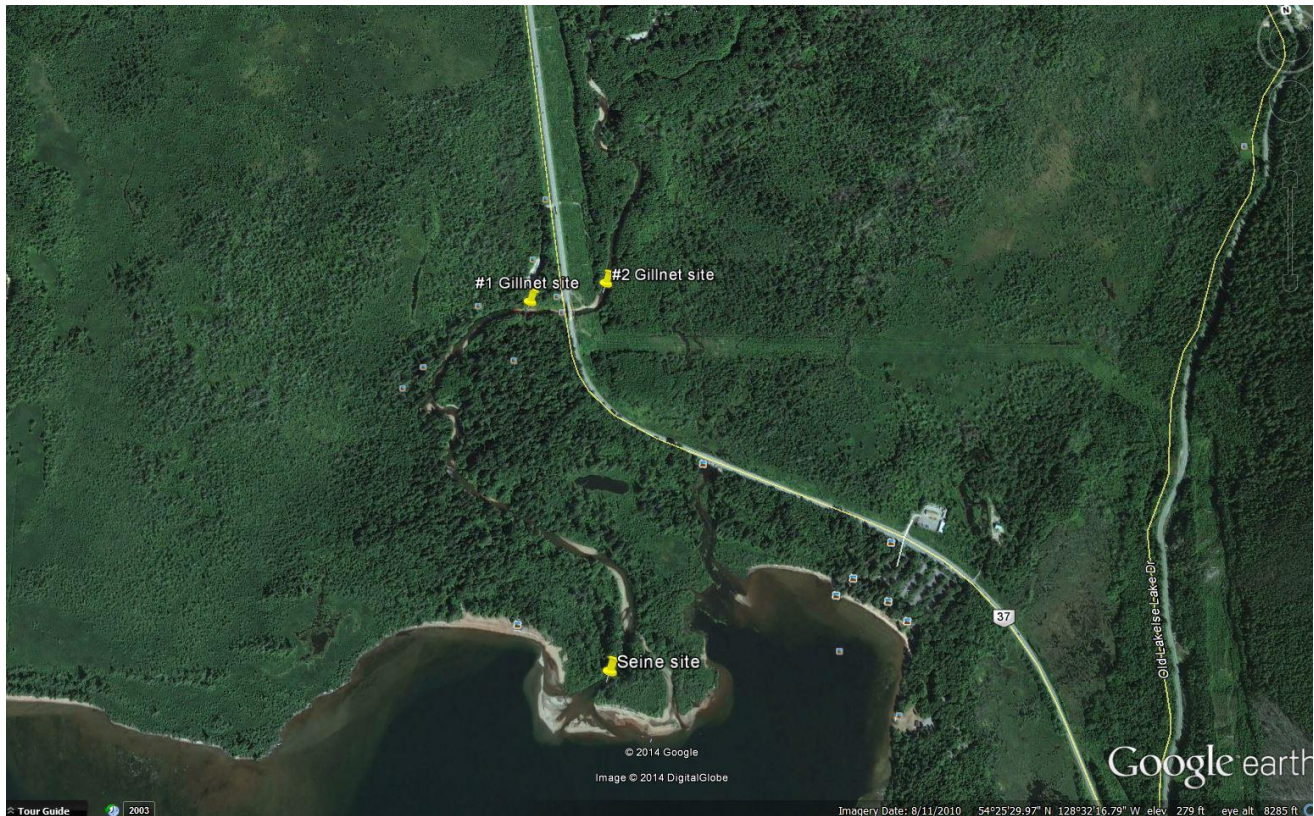
Seining was carried out from 09:00 AM - 12:00 PM on August 4<sup>th</sup>, 8<sup>th</sup>, 11<sup>th</sup>, 15<sup>th</sup>, 18<sup>th</sup> and 24<sup>th</sup> 2014. Seining was conducted approximately 500m upstream of the mouth of Williams Creek. At approximately 400m from the mouth, a stop net was set across the width of the creek to prevent fish from eluding the seine by swimming downstream. The stop net also prevented the local population of spawning adults from swimming upstream into the seine area. After the stop net was secured, a 50 meter seine with a three inch mesh size was set by boat. Starting on the west side of the creek the seine net was fed across the creek below the old fence sill where a deep pool existed and the majority of Sockeye were holding. From the east side of the creek the seine was pulled downstream and then pursed off against the west bank of the creek. Once secured, the Sockeye were assessed and documented based on origin (wild/enhanced-no adipose), sex (male/female), and maturity (adult/jack). Before releasing the fish, a hole punch was used to mark the gill

plate of each Sockeye to enable recognition of recaptures. Additional hole punches were applied in subsequent samples to enable recognition of double and triple recaptures.

In addition to seining, six gill net sets were completed near the Williams Creek Bridge (HWY 37 crossing) approximately 1200m from the mouth of the creek. Gill netting was completed on August 22<sup>nd</sup> and 29<sup>th</sup> 2014 from 09:00AM - 12:00PM, and September 7<sup>th</sup> 2014 from 09:00AM - 12:00PM. A gill net was set 200m upstream of the bridge and 300m downstream of the bridge on each day for a total of six sets. The net (70'x 30mesh deep with 4 inch mesh) was set by hand starting on the north side of Williams Creek. The net was fed across to the South side of the creek and drifted downstream approximately 100m before being closed off on the North side of the creek. Once secured, the Sockeye were quickly removed, assessed and documented based on origin (wild/enhanced-no adipose), sex, maturity, and presence of a gill punch (recaptures). A hole punch was not used to mark the gill plate during the gill net sets. All captures without a gill punch were recorded as "new" captures during the gill net sets while all captures with a gill punch where assumed to be recaptures from seining.

Data collected from both seining and gill netting has been used to estimate the percentage of enhanced returns from the Fry Outplant Program. In addition, data collected from both seining and gill netting was submitted to the Department of Fisheries and Oceans (Stock Assessment) to generate a mark recapture population estimate.

#### Location



## Results

Seining sample sizes ranged between 119 and 325 individuals, including recaptures (Table 2). Sample sizes peaked at 325 individuals near the middle of the sampling period (Table 2). The number of recaptures in each sample varied from 11 to 26 individuals. Of the 91 recaptures, 8 were double recaptures and 3 were triple recaptures (Tables 1 and 2).

Table 1. Sockeye Seining Data

Seining Count	Aug 4	Aug 8	recaps	Aug 11	recaps	Aug 15	recaps	Aug 18	recaps	Aug 25	recaps
Mk Male	1	4	1	2	1	8		8		5	
Male	109	187	17	122	5	147	13, 2d	98	14,3d,2t	61	7,2d,1t
Mk Female				1		3		4	1	3	
Female	27	59	2	92	5	143	6	93	6	45	2, 1d
Mk Jack								2			
Jack	2	1				3		14		5	
Totals	139	251	20	217	11	304	19, 2d	219	21,3d,2t	119	9,3d,1t

d= double recapture

t= triple recapture

Mk = marked (hatchery)

Table 2. Sample Population Total

Seining Total Sample	Aug 4	Aug 8	Aug 11	Aug 15	Aug 18	Aug 25	Total
Sample Total=	139	271	228	325	245	132	1,340
Total Recaps=	0	20	11	21	26	13	91
Total Less Recaps=	139	251	217	304	219	119	1,249

The total sample population obtained by seining was comprised of 752 Males, 470 females, and 27 jacks, for a total of 1,249 Sockeye (Table 3). There were 28 marked males, 11 marked females and 2 marked jacks captured over the six seining events (Table 3). The data for returning Sockeye caught by seining indicates that the enhanced component was approximately 3.3% of the total escapement.

Table 3. Total Marked vs. Unmarked

*Marked vs Unmarked	Male	Female	Jack	Total
Marked	28	11	2	41
Unmarked	724	459	25	1,208
*Total	752	470	27	1,249

\* totals do not include recaptures

Unmarked = wild

The ratio of male to female captures were comparative during the six gill net sets (Table 4). In comparison to seining, jack captures were noted to be significantly lower (Tables 3 and 4). All recaptures were originally captured during seining; the rest of the sample population was captured for the first time during one of the six gill net sets (Table 4). No additional mark was given to account for gill net recaptures.

Table 4. Sockeye Gill Netting Data

Gill Netting Count	Aug 22				Aug 29				Sept 7			
	Site 1	Recaps	Site 2	Recaps	Site 1	Recaps	Site 2	Recaps	Site 1	Recaps	Site 2	Recaps
Marked Male		2	1				2		6		1	

<b>Male</b>	<b>14</b>	<b>9, 1d</b>	<b>29</b>	<b>7</b>	<b>37</b>	<b>12</b>	<b>36</b>	<b>10</b>	<b>33</b>	<b>4</b>	<b>33</b>	<b>2</b>
<b>Marked Female</b>					<b>1</b>		<b>3</b>		<b>1</b>		<b>2</b>	<b>2</b>
<b>Female</b>	<b>20</b>	<b>4, 1d</b>	<b>26</b>	<b>6</b>	<b>21</b>	<b>9</b>	<b>45</b>	<b>6</b>	<b>31</b>	<b>2</b>	<b>18</b>	<b>1</b>
<b>Marked Jack</b>												
<b>Jack</b>			<b>1</b>						<b>1</b>		<b>1</b>	
<b>Totals</b>	<b>34</b>	<b>15, 2d</b>	<b>57</b>	<b>13</b>	<b>59</b>	<b>21</b>	<b>86</b>	<b>16</b>	<b>72</b>	<b>6</b>	<b>55</b>	<b>5</b>

d= double recapture

Sample sizes from each gill net set ranged from 47 to 102 individuals (Table 5). A total of 441 Sockeye were captured during the gill net sampling period, including recaptures (Table 5). Of the 441 Sockeye, 78 were recaptures including 2 double recaptures (Table 4/Table 5).

**Table 5. Gillnetting Sample Population Total**

	22-Aug		29-Aug		07-Sep		
<b>Gill Netting Total</b>	<b>Site 1</b>	<b>Site 2</b>	<b>Site 1</b>	<b>Site 2</b>	<b>Site 1</b>	<b>Site 2</b>	<b>Total</b>
<b>Sample Total</b>	51	70	80	102	78	60	441
<b>Total Recaps</b>	<b>17</b>	<b>13</b>	<b>21</b>	<b>16</b>	<b>6</b>	<b>5</b>	<b>78</b>
<b>Total Less Recaps</b>	<b>30</b>	<b>57</b>	<b>59</b>	<b>86</b>	<b>72</b>	<b>55</b>	<b>359</b>

363 of the 441 Sockeye that were captured during the gill net sampling period were not previously captured during seining. Of the 239 Males, 199 Females, and 3 Jacks: 12 males and 9 females were enhanced fish (Table 6). The data for the gillnet sets indicates that the enhance component was approximately 4.77% of the total escapement.

**Table 6. Total Gillnetting Marked vs. Unmarked**

<b>Marked vs Unmarked</b>	<b>Male</b>	<b>Female</b>	<b>Jack</b>	<b>Total</b>
Marked	12	9	0	21
Unmarked	227	190	3	420
Total	239	199	3	441

The 2014 Sockeye preliminary escapement, generated from the collected mark/recapture data (jacks are not used), was estimated to be 6862 individuals (DFO Stock Assessment).

Stop net in place



Setting seine net



Pursing seine net above stop net



Extracting remaining few Sockeye hiding in undercut bank



## *Discussion/ Recommendations*

The 2014 adult sockeye assessment was a relative success, handling over 1600 fish for an estimate of approximately 6862 adult returns. The percentage of marked (enhanced) fish represented 3.3% (seining) and 4.77% (gillnetting) of the total escapement to Williams Creek.

Based on the seining data, males were more prevalent than females throughout the sampling period. Of note during the seining operations was that the females would not get hooked up in the seine net and hide in the undercut banks or slip under the lead line while tangled males were being taken out of the net. This may have biased the male/female ratio. One recommendation would be to also “stop net” the undercut bank and try to leave all tangled males close to the lead line for the staff in dry suits to take out, eliminating the lead line from coming up.

As the season progressed, more and more sockeye were spawning in the lower portion of the seining area. Although care was taken not to scare fish into the seine area while moving the boat from the lake to the seining area before the stop net was in place, it was inevitable that some fish moved upstream, likely resulting in a higher amount of recaptures. A remedy for this would be to leave the stop net at the site instead of transporting it by boat each time and install it across the creek ahead of the boat arrival. This though would lend itself to possible vandalism of the net or unauthorized use of it, because of public accessibility to the location.

### **gillnetting**



During gillnetting fish were not hole punched, so it is not known how many recaptures there were, wild or enhanced. Therefore the projected percentage for enhanced fish from the gillnetting data is likely less accurate than the projection from the seining data. Unfortunately there was a communication failure at the start of seining and hole punches were applied to either side of the fish captured. If hole punches were specific to one side the remaining side could have been used to establish gill net recaptures.

There was no enhanced 5 year old component for this brood year. Otolith ageing in the past few years has shown that five year olds can range from 40% to 95% in comprising the total escapement. Considering the large number of larger fish this year (noted by the sampling crew) the actual enhanced contribution may have been substantially higher than this study indicates if there had been an enhanced component to the 2009 brood year. The 2015 returns will once again have enhanced age classes, three, four, and five year olds returning.

The last seining date was on August 25 2014, but an inspection of the creek mouth on September 5<sup>th</sup> showed schools of Sockeye still waiting to enter the creek. It is recommended that future sampling efforts extend into mid-September which may provide a more accurate estimate of population size and enhanced contribution.

Recaptured enhanced male Sockeye



## Acknowledgements

We would sincerely like to thank the following individuals who all contributed to the success of the project:

**Mike Jacubowski (DFO)** – for the guidance and the use of the seine nets.

**Wade Larson (DFO)** – for the boat.

**Ian Bergsma, Rob Dams, James Powell, Sandy Devcic (all DFO)** – for their knowledge, experience and leadership.

**Amanita Coosemans (Balanced Ecological Mgmt.), Kasia Kistowska (McElhanney), and Aaron McMillan (Kitselas First Nation)** – for all the hard work.

**Ted Wilson, Larry Proteau, Dale Kluivers, Andrea Komlos, Frank Doyle, Terry Brown, Mariah Devcic, Dylan Powell, and Lukas Bos (all volunteers)** – for unselfishly coming out and receiving nothing but cuts to the fingers and water in the boots.

**Lana Miller (DFO)** – for the unscrupulous editing and giving me the opportunity to take on this project.

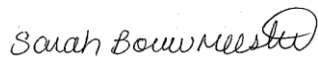
Should you require any further information or have any questions or concerns, please do not hesitate to contact me at 250-638-8878.

Sincerely,



Mitch Drewes

Sincerely,



Sarah Bouwmeester, BNRS