



**Taku River Tlingit  
Fisheries**



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# **King Salmon Lake**

## **Sockeye enhancement project - 2014**



**- Final Report -**  
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Prepared by: Richard Erhardt

For: Northern Fund of the Pacific Salmon Commission

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## INTRODUCTION

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King Salmon Lake is located approximately 100km SSE from the community of Atlin, BC. (See the map in Figure 1 below.) The lake is situated at the headwaters of King Salmon Creek which flows into the main-stem Taku River. This remote location is only accessible by float plane or helicopter. It supports a lake spawning / rearing sockeye salmon stock, the adults of which have been enumerated by TRT Fisheries since 2004.

An interest in diversifying or expanding the existing Taku enhancement program was reflected in the updated 2009 Transboundary PST arrangements. The impetus for this sockeye enhancement project also came from previous recommendations from the following projects or processes: the Taku sockeye enhancement feasibility study (2008-10), the Transboundary Panel Strategic Salmon Plan (2009), and the Taku Enhancement Production Plan (2009-2014). Due to the nature of this project and the existing Transboundary enhancement arrangements, the project involved partnerships between Canada and US agencies. As such the project was planned in a cooperative manner and with ongoing collaboration.

The main goal of the project was to conduct a relatively small sockeye egg-take ( $\leq 250,000$  eggs) in the fall season of 2014, followed by hatchery incubation and subsequent fry outplants back into the lake. The project would take a precautionary approach and be utilized within the short-term to restore sockeye production to higher levels (i.e. to improve natural production in the longer-term). In this regard, it would also take advantage of the currently apparent, underutilized rearing capacity of the lake.

### The immediate objectives for this project included:

- The collection and delivery of approximately 250K fertilized sockeye salmon eggs to the Snettisham Hatchery in Alaska.
- The application of methodologies and protocols that have been used at other Transboundary sockeye enhancement sites.

### Other longer-term objectives for the project included:

- Effective reporting and communication of project results to Transboundary representatives.
- Increasing egg-to-fry survival and utilizing the rearing capacity of the lake to improve stock productivity.
- The monitoring of results in terms of identified risks and enhanced sockeye productivity.

**Figure 1: General location of project**

## METHODS

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The appropriate permit applications for the collection and transport of fish were submitted in the spring. Associated authorizations were received from DFO and the BC Introductions and Transfers Committee in June.

On-site field work was conducted from September 12<sup>th</sup> to 16<sup>th</sup>, 2014. Transboundary project staff with previous egg-take experience provided guidance and assistance in order to ensure consistency in protocol and methods.

The capture of broodstock was accomplished by using a seine net near shore within the primary spawning area. Fish were graded and sorted by ripeness and then transferred into a short-term holding pen anchored offshore.



**Photo 1: Broodstock seining site**



**Photo 2: Broodstock holding pen**



**Photo 3: Egg-take site – racking**

Egg stripping of ripe females involved bleeding out, individual racking, washing with ovadine solution and drying. The fertilization from dispatched males also involved individual disinfection and drying. Milt from a second male was added to ensure fertilization. Subsequently, IHNV free water was added for activation prior to decanting excess water, surface disinfecting the eggs, and the process of water hardening.



**Photo 4: Egg-take site – fertilization**



**Photo 5: Egg-take site – processing**

The eggs were prepared for transport by draining and pooling the eggs of multiple females into large plastic bags with water added for suspension. The bags were then sealed and placed in transport coolers on a solution of crushed ice and ovadine. Sampling for fish pathology included IHN and BKD samples being collected from the broodstock. The fertilized eggs (and pathology samples) were transported by air to the Port Snettisham Hatchery (in Alaska) on September 14<sup>th</sup>.

## **RESULTS**

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The specific timing of field activities are outlined by date in Table 1 below. Specific locations of the project site are depicted in Figure 2. (GPS UTM coordinates for the egg-take site are: 08 621121E 6510134N.)

**Table 1: Specific field activities by date**

<b>Date</b>	<b>Main activity or task</b>
Sept. 12	Crew transported to site / Gear preparations / Construction of net pen / Begin seining of broodstock
Sept. 13	Continue seining of broodstock / Set-up egg-take site
Sept. 14	Conduct egg-take and associated sampling / Transport of eggs to the hatchery
Sept. 15	Site deconstruction and clean-up
Sept. 16	Demobilization of crew

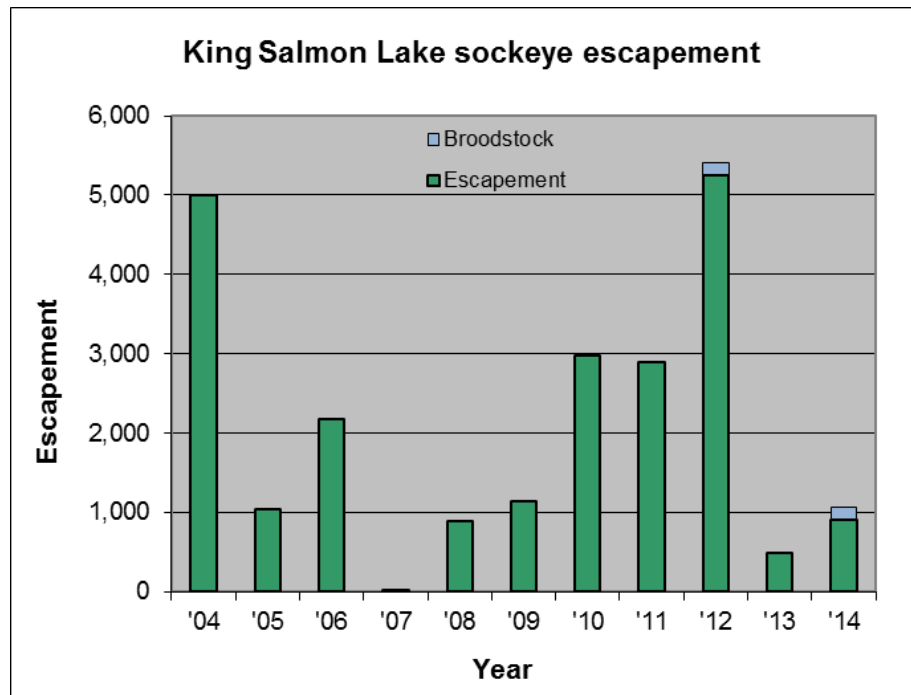


Figure 2: Project site specific locations



A total of 76 females and 91 males were collected for broodstock. Very few green fish were observed, and those collected were ripe and considered to be in good condition for an egg-take. Prior to the project there was some concern as to whether enough broodstock would be available for capture. (The adult weir count into the lake was 1,061 sockeye, while during the previous egg-take in 2012 the escapement was 5,413. See Figure 3.) Although there was some challenges in finding enough ripe females, overall an adequate number of broodstock were available in 2014. Fish were held in the net-pen for 1-2 nights and only 1 mortality was realized.

**Figure 3: Adult sockeye escapements (2004-2014)**



The egg-take was completed in one day (Sept. 14<sup>th</sup>) with the eggs being delivered to the hatchery the same afternoon. Seventy-five females and the same number males were racked for processing. Eggs from four of the females turned out to be of inadequate condition to be utilized. Therefore, an end total of 71 females were fully processed.

Based upon the November 2014 hatchery report, a total of 203,900 eggs were delivered, with the average fecundity being 2,800, and green to eye survivals at 89.3%. After the hatchery egg pick, a total of 182,067 eyed eggs have been seeded.

During the egg-take, there were 25 IHN and 29 BKD samples collected for pathology. The November 2014 ADF&G fish pathology lab report indicated the following: only two fish were Rs-positive by ELISA with both high and low levels of antigen; presumptive IHNV was detected at a high prevalence with a low proportion of fish having high virus titers suggesting a probable lower risk for vertical transmission to progeny; and similar

prevalences of virus (82.4%) and Rs (2.0%) were detected from samples of this stock in 2012.

Fry from the 2014 egg-take are expected to be planted back to King Salmon Lake this spring (i.e. in late May or early June of 2015).

## **DISCUSSION**

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Overall, the project went very well and is currently deemed to be successful. Predetermined performance measures for this project included: the egg-take target (of approximately 250,000); broodstock availability; mortality levels; and the successful use of field protocols. The delivery of 203,900 eggs to the hatchery was fairly close to the original goal, particularly with the below average escapement of broodstock. Only one adult sockeye mortality was observed during the course of conducting the project. With the assistance of experienced staff, egg-take method protocols were followed with diligence and consistency.

Subsequent performance of the project will also be gauged by monitoring results in terms of enhanced productivity. In the spring of 2014 a smolt survey was conducted to determine average lengths/weights and thermal mark (enhanced) ratios from the 2012 brood year, which was the first egg- take conducted under this project. These results are still pending and will be provided in a separate report to the NF Committee. Further monitoring needs are expected to include a sockeye smolt survey in 2016 to sample smolts from the 2014 brood year. Other monitoring may also include thermal mark (enhanced) ratios of adults returning in 2016 from the 2012 brood year.

The PSC TBR Enhancement Sub-Committee discussed the project results during meetings held November 18-19, 2014. A summary of results will also be provided to the PSC TBR Panel during the course of regular meetings this winter. Another egg-take is not proposed for 2015. It is recommended that monitoring first be completed in order to further assess project results prior to deciding whether future stock enhancement is warranted or necessary.