

*Lakelse Lake Sockeye Rehabilitation Program:*

*Satellite Sockeye Hatchery Site  
Fry Outplant Program - Year 2*



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## **Executive Summary**

Lakelse Lake sockeye salmon are one of the approximately 28 wild stocks in the Skeena River drainage and harvested in mixed stock fisheries in southeast Alaska and northern B.C. each summer. Lakelse Lake sockeye were noted as being at biological risk, even at relatively low levels of exploitation four years ago. (Cox-Rogers, DFO, 2004). These stocks have undergone a decline from recorded numbers of thousands to documented numbers in the hundreds in the past 10 years. Fisheries and Oceans Canada Stock Assessment personnel still indicate the stocks on a decline relative to historical levels based on 2007 enumeration data. (Davies, S, DFO, 2007)

As part of the Lakelse Lake Sockeye Salmon Recovery Plan Program, Fisheries and Oceans Canada (DFO) applied for and received funding from Pacific Salmon Commission for a *Satellite Sockeye Hatchery: Fry Outplant Project Year 1* in an ongoing effort to conserve the critically declining sockeye salmon stocks in the Lakelse Lake watershed. The long term goal of this particular project would be for at least four consecutive years to assess impacts to enhance one full cycle of sockeye while habitat projects are completed to support the returning stocks. Other Outplant projects should also be considered on other tributaries such as Scully and First Avenue. Within the Lakelse Sockeye Recovery program other restoration, habitat protection and assessment, and public awareness projects remain ongoing.

The Snootli Creek Hatchery site at Bella Coola rated highest in an extensive evaluation process conducted in 2006 and 2007 for Year One funding. It had the necessary personnel, technical expertise, infrastructure and facilities already in place to maximize success and achieve a positive outcome. (Kujat, 2007) Williams Creek, the main sockeye spawning tributary to Lakelse Lake, was selected as the primary egg-take site. Year One (2006/2007) was a highly successful pilot year funded by the Pacific Salmon Commission which resulted in the release of almost 100,000 fry into Williams Creek in May 2007 (Kujat, 2007).

The logistics of the Year Two project were again jointly coordinated between the two sites and personnel. Snootli Hatchery staff worked in concert with the Sockeye Recovery Program Coordinator, the DFO North Coast Resource Restoration Biologist, the Terrace DFO Habitat Technician and Lakelse Lake Watershed Society volunteer members.

In August 2007, eggs and milt were collected from the Williams Creek (Lakelse area) and air lifted to the Snootli Creek Hatchery, Bella Coola, B.C. where they underwent fertilization and planting. The resulting fry were then ponded, marked (adipose fin clipped) and further reared until they reached a weight of approximately .7 grams. In a two day operation in late April 2008, they were airlifted back to their natal waters - Williams Creek - Lakelse Lake and released. Disease sampling was conducted at the time of the egg take and, prior to release, fish health tests were conducted on a sampling of fry by the Pacific Biological Station.

Approximately 266,000 fry were released into Williams Creek April 29<sup>th</sup> and 30<sup>th</sup>, 2008. This report summarizes the results of the Lakelse Fry Outplant Year 2 (2007/2008)

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## **Acknowledgements**

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## 1.0. Introduction

Sockeye salmon (*Oncorhynchus nerka*) are commercially the most valuable of the five species of Pacific salmon in British Columbia and historically the Lakelse area was considered the most productive salmon ecosystem in the Skeena watershed. (Rabnett, 2008).

From an archival perspective much is known about the Lakelse Lake sockeye compared to other systems. Various Fisheries and Oceans Canada projects have taken place in the area dating back to hatchery operations in the early 1920's, fish enumeration fences on two of its primary tributaries and extensive biological research in key spawning tributaries (Rabnett, 2008)

The sockeye salmon stocks in the Lakelse watershed have undergone tremendous ecological pressure and the effects are ongoing. These impacts stem from logging, linear development of highways, pipelines and hydroelectric lines, lakeside residential development and resulting channel modification. Beaver activity also plays a factor restricting fish passage to former spawning areas.

A drastic decline in the sockeye salmon population was noted by the Lakelse Watershed Society (LWS) back in 2003. They brought their concerns forward to Fisheries & Oceans Canada noting that stock escapements to Lakelse Lake had been depressed relative to historic levels. DFO's Stock Assessment Branch had also concluded in 2003 that lake densities of juvenile sockeye in Lakelse Lake were less than 5% of the rearing capacity, representing the offspring from just 750 spawners. Further work done in 2004 through 2007 indicated that the trend of stock decline still continues and escapements have not shown a positive rebound. (Davies, S, 2007) All causes of this decline are not fully understood.

The status of this stock, as in all other fisheries in the current day's environment, has biological, political, economic and social implications not just affecting the local Lakelse watershed but the larger global community. As a response to the concerns surrounding degradation of this stock and its habitat, the Lakelse Sockeye Recovery Program was launched and a Lakelse Sockeye Recovery Plan document was formulated. The Lakelse Sockeye Salmon Recovery program is a unique entity which is made up of numerous stakeholders: the Lakelse Watershed Society and Terrace Salmonid Enhancement Society (two non profit groups) Kitselas First Nations, as well as federal and provincial government agencies including Fisheries and Oceans Canada, BC Ministry of Environment, Ministry of Forestry, and BC Timber Sales.

Some of these stakeholders were involved in reviewing the status of stocks and habitat, identifying the limiting factors, developing potential projects and placing these projects in a logical sequence of priority. These projects were ranked on the basis of feasibility, cost effectiveness, cost-benefit analysis, potential for immediate help to the sockeye salmon and the project's ability to address the limiting factors affecting the sockeye in this system. Projects were identified in three different categories: improved information, habitat restoration and stock enhancement. *The Pilot Satellite Sockeye Fry Outplanting Project (Year 1 – 4)* was ranked first of three enhancement projects by this group in the developing framework of the Lakelse Lake Sockeye Salmon Recovery Plan.

In general, projects proposals made to the Pacific Salmon Commission undergo rigorous scrutiny from the initial conceptual proposals through to the more detailed second submissions. The panel of experts reviewing these projects do so on the merits of sound scientific analysis. In 2006, DFO applied for and received funding from the Pacific Salmon Commission for Year 1 of this project. Prior to submission this project had undergone extensive review and received input from a number of experts in sockeye recovery and enhancement.

Within each year's project operation, there is room for input and adjustment by various regulatory processes to ensure sound scientific methods are fully integrated and employed. This allows the project to stand alone, to be transparent, open to questions of process, technique, procedure and biological soundness.

Artificial production of various fish stocks has been undertaken for decades and certainly within the sockeye salmon culture, Alaska is the noted authority. While there are many issues related to 'hatchery' raised fish versus wild salmon, of particular importance is the prevention of the horizontally transmitted infectious hematopoietic necrosis virus or IHN. In the late 70's almost 70% of the Alaskan sockeye production was lost due to this virus (McDaniel et al., 1994) This disease typically causes high mortality within a juvenile population through the destruction of the major organs such as the kidneys and liver. Prevention of IHN transmission is therefore paramount and usually undertaken through stringent disinfection throughout the hatchery

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environment, disease screening, use of virus free water supplies and effluent disposal, and segregation of eggs and fry through the production process.

The other principal disease worth noting is bacterial kidney disease (BKD) which was also screened for during disease sampling of the Fry Outplant project. BKD is a systemic infectious disease that is slowly progressive, frequently fatal and seldom presents itself in fish until they are 6 - 12 months old. It readily cultures at 15–18 C and can be transmitted from female to eggs. Although it occurs mainly in freshwater, significant fish mortality can also occur in salt water (Banner, et al, 1983). As a result of infection, juvenile anadromous salmonids such as sockeye are unable to acclimatize to salt water and die.

So the credibility of facilities such as the Snootli Creek Hatchery is based on rigorous standards, adhering to the Alaskan Sockeye protocols. (McDaniel et al, 1994) Over the last several years this facility has gained notoriety by way of their professional techniques and capabilities. It is clear that this benchmark will not be lowered or compromised at either end of the project to put their reputation in jeopardy.

Based on success of Year 1, funding was obtained for the Fry Outplant Project - Year 2 in 2007. The principal purpose of the Fry Outplant Project Year 2 was to carry on with the conservation of Lakelse Sockeye stocks and move from a year of 100,000 eggs to an operational year taking 300,000 eggs. This partnership with PSC is critically important as the Lakelse Sockeye Recovery Program team works towards conserving the stock while also attempting to reverse the declination and thereby promote natural production.

The Lakelse Sockeye Recovery program has also successfully completed a number of other projects, funded by PSC and other sources, which include habitat restoration works on Scully, North Hatchery and Salmon Creeks. These projects have been collaborative in nature involving personnel from various government levels, First Nations (Kitselas, Gitanyow and Nuxalk) and the Lakelse Watershed Society – a non-profit volunteer organization. The Fry Outplant Year 2 particularly addressed capacity building at the Snootli Creek Hatchery site with respect to First Nations and their assistance with the sockeye rearing, feeding and marking programs. It is hopeful that this work will also further reinforce strong educational and stewardship opportunities within the surrounding community regarding this run of sockeye salmon.

The Lakelse sockeye population is significantly jeopardized but it is believed that recovery is feasible – financially and biologically - provided the Lakelse Sockeye Program is funded, maintained and coordinated... The Fry Outplant project strives to conserve this stock while the Lakelse Recovery Program stakeholders continue to target other projects relating to habitat protection and restoration.

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## 2.0 Study Area

Though historically all tributaries entering into Lakelse were prime spawning grounds for the Lakelse sockeye, recently this has been reduced to two main tributaries – Williams Creek and Schulbuckhand (Scully) Creeks. Focus by this project has therefore been placed on Williams Creek as it is the last main spawning ground used by the remaining stocks.

Williams Creek is located near Lakelse Lake approximately 20 kilometres south of the City of Terrace in northern British Columbia. It drains a westward facing basin and flows into Lakelse Lake which, in turn, flows into the 18 kilometre long Lakelse River. Lakelse River is a Skeena River Tributary that enters the Skeena approximately 150 kms from its mouth.

Though there are several significant tributaries flowing into Lakelse Lake, Williams Creek is considered the main spawning area for this sockeye stock at the present time.



**Figure 1. Illustrates Lakelse Lake, Williams Creek – south of Terrace, B.C.**



**Figure 2. Illustrates Specific Spawning and Release Sites**



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### 3.0. Methods

#### 3.1. Pre-Operation:

In July of 2007 “*Applications for the Introduction or Transfer of Fish*” were made and approved for the transport of the eggs/milt and for the returning fry. Due to poor returns in the various historical tributaries, applications were made for potential selection of brood stock from Williams, Scully Hot Springs Channel, Scully Groundwater Channel, Scully South, Hatchery and Granite Creeks inclusive. Snootli Creek Hatchery has the capability of segregating stocks and therefore brood stock collected from various sources could be assured of complete isolation and return to their natal stream. As a courtesy, BC Parks were also informed of the project as Williams Creek project sites lie within Parks boundaries. The Provincial Ministry of the Environment - Conservation Officers were also informed of the egg take and the fry releases.

Similar to Year 1, expert technical staff from Snootli Creek Hatchery arrived in Terrace in August ahead of the egg take/spawning to help conduct a training session for all personnel who would be assisting with the spawning. While here, they also assisted Terrace staff with pre-egg take brood stock collection. The training was to ensure that the Alaskan sockeye protocols were addressed and that the various step-by-step procedures were familiar to those who would be involved. Year Two provided for the inclusion of personnel from the Gitga’at First Nations who were conducting a PSC funded sockeye program later in the fall of 2007.

Prior to egg takes, a brief inspection of the Williams Creek site was conducted by the Snootli Creek Hatchery Operations Manager with DFO Terrace staff to pre-plan the egg take and capture brood stock to be held until the following morning.

#### 3.2. Brood Stock

Potential brood stock were captured in Williams Creek using 4 1/8” mesh tangle gill nets the afternoon of August 20 by Terrace DFO staff and the Operations Manager of the Snootli Creek Hatchery. Twenty four ripe females were selected and held in cages overnight. Their status was checked at intervals throughout the holding period and then once again, for the last time, at approximately 8:30 p.m. Holding pens were secured fully submerged in a deep pool to reduce the risk of tampering by Park area visitors or wildlife.

In addition to holding stock, several net sets were done the following morning to capture the balance of the required fish for that day’s operation.

This operation and related logistics was done over a three day period – August 21, 23 and 27, 2008... No spawners were present in any of the other identified, licensed tributaries during that time though it was noted that a better than expected return in Scully South was observed by September 9<sup>th</sup> at the culvert installed on Highway 37. Local testimonials from members of the Lakelse Watershed Society indicates that spawning historically occurred almost 3 full weeks following the return of the Williams Creek fish. (Maxwell, I, 2007) This leaves conjecture by some that the two runs are distinct from one another though environmental factors need to be explored.

Spawning adults were noted to have returned to Lakelse Lake by August 9<sup>th</sup> (roughly 100), with 40 pairs in the first 50 meter reach and 6 – 7 pairs in the next 50 meter reach of Williams Creek. Pairs of spawners were noted at the Highway 37 bridge site by August 14, 2008. (10 pairs)



**Figure 3. Net sets – Brood Stock**

### 3.3. Egg Take/Spawning:

Spawning procedures adhered strictly to the Alaskan sockeye protocol (McDaniel et al, 1994) to reduce potential transmission of IHN virus and BKD. Almost all personnel who were assisting with the procedure had been previously trained and familiarized with these steps prior to the egg take. Other personnel joining the team, including the members of the Gitga'at contingent, received on site training before entering into the process.



**Figure 4. – Spawning rack – Hanging Sockeye**

Spawning was done in the field. Sufficient on-hand personnel provided primarily by the Lakelse Watershed Society allowed for simultaneous collection of milt from the males while egg-takes with females were done a short distance away. Eggs and milt were immediately stored in large ice filled 'coolers' and kept chilled enroute to Terrace-Kitimat Regional Airport onward to Bella Coola.

Throughout the procedure, a solution of 1:100 iodophor (Ovadine) was used between each fish to disinfect tools, equipment and personnel involved in the various procedures.

Where applicable, all personnel wore disposable, surgical-type gloves. Fresh gloves were used when handling each fish. Each step in the sockeye protocol procedure was done by one individual.

The females were dispatched with a sharp blow to the head. The ventral area was washed down with the disinfecting solution and a 'j-cloth'. This cloth was returned to the disinfecting solution and rinsed between each fish. The female was then immediately hung, tail up, on a portable spawning rack using lightweight twine "tailers", each on a single pegs appropriately spaced to ensure and maintain physical separation from each other. Individually, the females were then bled out by cutting the gills with a disinfected knife.

After being removed from the spawning rack, each female was held tail down by one technician while the vent area and belly was wiped down with dry paper towel by another. This second technician cut the fish anteriorally from the vent upward carefully allowing the eggs to drop into a disinfected, smooth plastic collection bowl. Collection bowls were replaced between each fish with a clean, sterilized one.

The eggs were then transferred from the initial collection bowl to disposable, individually numbered plastic, lidded containers. Ovarian fluid (2 ml) was removed (see Disease Screening below) The lid was then secured and the container placed on crushed ice in a large portable cooler. This was intended to stabilize temperatures during the operation and throughout transportation. Each female fish was then tagged with a waterproof, sequentially numbered tag and transferred to the disease sampling area for collection of tissues samples related to BKD disease screening. (See also Disease Screening below for IHN procedures)

Males were handled with the same disinfecting protocols as the females. Individual personnel handled individual tasks relating to the fish handling. Gloves, j-cloths and paper towels were all replaced between each fish. They were dispatched and had their vents swabbed with disinfectant solution and dried with clean, dry paper towels. They were then held, tail slightly down, and milt was physically expressed into an individually pre-labelled, sequentially numbered "whirl-pak" bags. Each bag was sealed and placed in the large cooler on ice in preparation for transport.

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A total of 92 females and 94 males were collected and used for a target number of 300,000 eggs.

The portable cooler (containing eggs and milt) and the Snootli Creek Operations Manager were then relocated from the field to the Kitimat-Terrace Regional airport and air transported on a flight (approximately 1 hour and 20 minutes) back to Bella Coola via a chartered Cessna 185 originating from Bella Coola.

This operation was done over a three day period during peak spawning of the Williams Creek stocks. Brood stock operations occurred on August 21, 23 and 27<sup>th</sup> in an area just downstream from the Highway 37 Bridge at Williams Creek. Spawning of the Lakelse Sockeye stocks was first noted on August 9<sup>th</sup> and continued until roughly the first week of September. This project occurred during the peak spawning period.

Sockeye were also noted in Scully Creek (South) approximately two weeks later which was the first time fish has returned in numbers in several years. No fish were noted in the First Avenue for the third straight year. Run times on these fish were usually 3 – 4 weeks following the return of the Williams Creek fish. This issue will be hopefully be addressed in Year 3 and 4.



**Figure 5. Females ready for disease sampling**

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### 3.4. Disease Screening:

For the purposes of disease screening for BKD, the females were tagged with a waterproof identification number immediately following spawning. They were laid on a flat surface in sequential order, protected from wind, sunlight and rain. A separate team of technicians, segregated from the spawning area worked on obtaining and packaging these tissue samples. Surgical scalpels used for sampling were initially disinfected in isopropyl alcohol. They were then further disinfected by flame using a small, portable butane torch. Once the blade had cooled, a posterior kidney sample was removed from each female, placed in sterilized, individually labelled whirl-pak bag which was immediately put in a small cooler with frozen gel 'paks'. Disinfection occurred between each sampling throughout the process.



*Figure 6. Ready for BKD sampling*

For the purposes of disease sampling for IHN, 2ml sterilized pipettes were used to collect ovarian fluid from each female's eggs. Fluid was drawn from the numbered egg containers and placed in corresponding numbered, sterilized, screw cap vials. These vials were then placed in a small cooler containing gel ice 'paks'.



*Figure 7. Drawing up Ovarian Fluid – IHN*

The ovarian fluid samples and the kidney samples were kept chilled and shipped to Pacific Biological Station – Fish Pathology Laboratory, in Nanaimo, B.C. for processing. These samples are ideally received by fish pathology technicians fresh, chilled and within a 24 hour window of time. The samples must remain chilled (not frozen) and transportation logistics is important to maintain these parameters.

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### **3.5. Fertilization and Planting**

At the Snootli Creek Hatchery facility the fertilization took place in a segregated building under stringent disinfection procedures. Two technicians worked on samples as the eggs and milt underwent a 2 X 2 matrix fertilization procedure to promote genetic diversity

The eggs from each female were divided evenly into 2 separate containers and each of these received half the milt from 2 individual males. These egg samples were then recombined and water was added to the eggs/milt mixture to activate fertilization. The samples were then rinsed with a 100ppm iodine solution. Disposable surgical type gloves were worn by the technician and were discarded between all samples.

The samples were then taken by an additional waiting outside the facility to the incubation area. The eggs were placed in individually numbered and labelled Heath trays containing 100ppm iodine. After 15 minutes, the tray was gently pushed back into place. Water flows were set at 15/lpm.

Segregation of each female's eggs is critical to the operational process. Once information was received from Pacific Biological Station (PBS) regarding disease sampling results, eggs from females indicating a moderate to high indication of BKD or IHN were destroyed. For the Lakelse Year 2 Project that represented one female sample indicating high indications of BKD. Her eggs were removed and destroyed. Those fish identified low-moderate BKD (3 females) remained segregated throughout the rearing process. The ability to segregate stocks was one of the critical factors in the overall selection of a facility for this project prior to Year One of the Fry Outplanting program.

### **3.6. Incubation**

Water flows were monitored and maintained at 15/lpm in all heath tray stacks. Incubation temperatures were monitored with temperature recorders in the head boxes and selected Heath stacks. Eggs were noted as eyed between 301 and 305 Accumulated Thermal Units (ATU's). From October 15 – 20, 2007, average egg weight and diameter was assessed for each female. Dead eggs were removed, enumerated and discarded. Plastic "saddles" were added to the Heath trays by November 15, 2008.

### **3.7. Ponding and Rearing**

The fish were ponded into 4 tubs on February 18, 2008 with the offspring from the three low BKD positive females segregated into their own tub.

### **3.8. Marking**

All Fry Outplant stocks were marked with an adipose "fin clip" to make them notable and distinct from the wild stocks. This would allow for future assessment of survival rates and returns. Unfortunately, the Kitwanga Sockeye Enhancement program (2006/2007) also marked their stock with the same means. Adipose clipping was a significantly less expensive means of marking stocks.

### **3.9. Fry Release**

Based on temperature data maintained on Williams Creek, the normal emergence of wild fry were calculated to occur from mid-April through until the first week of May. To confirm emergence for the purposes of the Fry Outplant release, a small Incline Plane Trap (IPT) was set in the slower waters of Williams Creek, downstream of the Highway 37 Bridge several days before the Fry Release. A small number of wild sockeye, smaller numbers of coho and one lamprey eel were collected thus confirming that natural emergence was occurring and the Lakelse Fry Outplant release scheduled timing was appropriate.

Pending feeding regimes, air craft availability and natural emergence of wild fry, the Lakelse fry were scheduled for release on April 29 and 30<sup>th</sup> provided there was suitable weather conditions for flights. Two aircraft originating from Bella Coola were chartered for the Lakelse fry transport and tightly scheduled over the course of two days. Fry were removed from the ponding area at Snootli Creek Hatchery and transferred to 40 kg of water in 77 litre rubber containers complete with air stones. Air was delivered from a portable cylinder through a flow meter and manifold system at a rate of 0.5 lpm. They were then ground transported by Snootli Creek Hatchery to the Bella Coola Airport for flights to Terrace, B.C.. One technician accompanied the fry on each load. Once at the Terrace airport, the fry were off-loaded from the aircraft, the air supply reconnected to

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a portable air cylinder, flow meter and manifold and then taken to Williams Creek. There they were transferred to in-stream holding pens and released at nightfall on both evenings.



**Figure 8. Off Loading Fry at Terrace Airport**



**Figure 9. In-stream Holding Pens at Williams Creek Site**

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### 3.10. Post Fry Release

As a follow-up, a pilot sampling project that involved beach seining on Lakelse Lake was conducted May 16, 2008 which was approximately 2 weeks after the fry release. This helped confirm the presence and health of the Fry Outplant project fry versus the local wild stocks.

Using a 25 foot sein net, two technicians made random sets in several locations easily accessible by boat including:

- 1) the BC Parks provincial campground boat launch
- 2) Williams Creek "delta"
- 3) West end of "Grunchy's Beach"
- 4) Muller Bay (Webber property)
- 5) Beach site north of Scully Hot Springs channel
- 6) Beach site south of Scully Hot Springs channel
- 7) Scully Main (Pinear property)
- 8) "Kincamp" beach



**Figure 10. Partial Image of Original Work of Art entitled "The Salmon People"  
Wool – Hand dyed and felted – Smithers BC artist Lori Knorr**

## 4.0. RESULTS

### 4.1. Spawning

Approximately 322,000 eggs were transported to Snootli Hatchery for incubation and rearing. Average eggs per female were 3573. Operationally this phase of the project went very smoothly. DFO technicians from Snootli Creek Hatchery and the Terrace area worked with volunteer members of the Lakelse Watershed Society over a three day operation to collect the target number of eggs and milt within acceptable population limits. In addition, 3 members of the Gitga'at First Nations who were scheduled to do a Pacific Salmon Commission project near Hartley Bay (Hanging Lakes) were also invited to attend and assist with this operation to gain knowledge of the Alaskan protocols and field experience.

Target numbers for Year Two of this project were 300,000. The only fully viable spawning area for this stock remains at Williams Creek so the decision to take all brood stock from this location was made at the time of the project. Provisions for acquiring brood stock from all of the main tributaries to this watershed were made well in advance through the Transplant Application process. Stock could have been taken from Scully South three weeks later but it should be noted that no other stocks were available to collect during the window of time this operation took place.

### 4.2. Ponding and Rearing

Ponding occurred on February 18, 2008 with results as summarized.

#### SUMMARY OF EGGTAKES AND INCUBATION SURVIVAL OF LAKELSE (WILLIAMS CREEK) 2007 BROOD SOCKEYE

| Egg take<br>Date | Brood stock used |            | Egg<br>Target | Estimated<br># of eggs | Actual<br>Total<br>Planted | Inc,<br>Morts<br>at eyed | Total<br>Live | Eyed<br>%<br>Survival | Egg<br>Recovery<br>Per female |
|------------------|------------------|------------|---------------|------------------------|----------------------------|--------------------------|---------------|-----------------------|-------------------------------|
|                  | #<br>Females     | #<br>Males |               |                        |                            |                          |               |                       |                               |
| 21-Aug           | 34               | 34         |               | 119000                 | 126147                     | 14127                    | 112020        | 88.80%                | 3710                          |
| 23-Aug           | 41               | 42         |               | 143500                 | 146520                     | 22514                    | 124006        | 84.63%                | 3574                          |
| 27-Aug           | 17               | 18         |               | 59500                  | 59539                      | 16152                    | 43387         | 72.87%                | 3502                          |
| <b>TOTALS</b>    | <b>92</b>        | <b>94</b>  | <b>300000</b> | <b>322000</b>          | <b>332206</b>              | <b>52793</b>             | <b>279413</b> | <b>84.11%</b>         | <b>3595</b>                   |

Figure 11. Summary of Brood Stock – Snootli Creek Hatchery

#### SNOOTLI CREEK HATCHERY REARING SUMMARY – LAKELSE STOCK

| Rearing<br>Container | Initial<br>Ponding<br>Size<br>(grams) | Initial<br>Ponding<br># | Release<br>Size<br>(grams) | Release<br># | Release<br>Biomass | Final Rearing<br>Density<br>Kg/M3 | %<br>Growth<br>Per Day | # Days<br>Reared |
|----------------------|---------------------------------------|-------------------------|----------------------------|--------------|--------------------|-----------------------------------|------------------------|------------------|
| 12                   | 0.180                                 |                         | 0.740                      | 39614        | 29.31              | 11.36                             | 4.44%                  | 70               |
| 13                   | 0.160                                 |                         | 0.630                      | 44221        | 27.86              | 10.80                             | 4.20%                  | 70               |
| 15                   | 0.120                                 |                         | 0.500                      | 42447        | 21.22              | 8.23                              | 4.52%                  | 70               |
| 16                   | 0.130                                 |                         | 0.510                      | 42178        | 21.51              | 8.34                              | 4.18%                  | 70               |
| 17                   | 0.150                                 |                         | 0.570                      | 46442        | 26.47              | 10.26                             | 4.00%                  | 70               |
| 18                   | 0.160                                 |                         | 0.620                      | 42849        | 26.57              | 10.30                             | 4.11%                  | 70               |
| 19                   | 0.180                                 |                         | 0.760                      | 8611         | 6.54               | 5.55                              | 4.60%                  | 70               |
|                      | 0.154                                 | 279412                  | 0.619                      | 266362       | 159.49             | 9.26                              | 4.29%                  | 70               |

Figure 12. Rearing Summary



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### 4.3. Marking

From April 1 to 23<sup>rd</sup>, a total of 268,788 Lakelse Sockeye were marked with an adipose clip by a marking crew arranged by the Nuxalk First Nations assisting with this program. The average marking by this crew was 15,811 fry per day.

### 4.4. Release

Fry were flown from Bella Coola Airport to the Kitimat-Terrace Regional Airport April 29 and 30<sup>th</sup> using a loading of approximately 8.5 kg of fish to 40 kg of water in 77 litre garbage pails. Oxygen was metered into each of the pails at about 1/8 lpm per bucket. Loads were transferred to a vehicle and trucked to Williams Creek where they were then transferred to in-stream portable pens and held until nightfall for acclimatisation. They were released at approximately 9:45 p.m. each night.



**Figure 13. Fry Arrive at Williams Creek**



**Figure 14. Fry Release – Holding Pens**

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#### 4.5. Beach Seins

The May 16<sup>th</sup> beach seins on Lakelse resulted in the capture of 32 sockeye fry, six of which were Fry Outplant stocks. The largest set found 20 wild sockeye fry north of the Scully Hotsprings channel. Length of these fry ranged from 35-40mm. It was noted that the Outplant fry were larger than the wild sockeye fry. (Maxwell, 2008) Temperatures ranged from 7 to 12. with the lower temp being quite close to Williams Creek. All sites sampled were easily accessible beach locations with sandy bottom substrate rather than flooded grasses and bush areas.



*Figure 15. Cooperation – A Joint Effort  
First Nations, Government and Community Involvement* and J. Willis

#### **5.0. DISCUSSION AND CONCLUSION**

- Egg takes for this project went very smoothly by ensuring that all personnel involved were well versed and familiar with the sockeye salmon protocols prior to the actual egg take. Adequate personnel is critical. Staff from DFO – Snootli Creek Hatchery - Bella Coola and small number from the Terrace area worked with a large and very necessary contingent of volunteer members of the Lakelse Watershed Society. In addition, organizational plans allowed for the inclusion of 3 members of the Gitga'at First Nations to participate in the brood stock collection process.
- Despite two different geographic locations, this project went extremely well with no significant barriers or difficulties to report. Organization, joint cooperation, continuity and attention to detail were pivotally important at both ends but easily achieved.
- The absence of any "First Avenue" tributary returns (those that historically spawned in Hatchery, Granite and Salmon Creeks) raised the questions of transplanting to reseed these areas from this group of fry. (Year 2).  
Shortly before the Fry release, discussions with DFO personnel took place regarding the possibility of placement of fry or spawning adults next season into Hatchery Creek which had undergone habitat restoration works funded by Pacific Salmon Commission.

The issue was also raised with DFO personnel on the Application for Transfer committee.

Testimonials from Lakelse Watershed Society members who have formerly conducted stream walks and enumeration are clear that the stocks from these tributaries appear to have disappeared. The peak timing of these runs is typically 6 weeks after the Williams Creek spawning and three weeks

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after the Scully adult returns. This has led to many believing that they may be somehow distinct from those sockeye returning to Williams and Scully Creeks. This may, however, be due to variations in temperature affecting ATU's and other environmental factors and this should be confirmed in future investigations.

Recommendations were that for Year 2 fry release all stocks should be placed back in their natal stream, Williams Creek. However, for the Year 3 project some consideration should be placed on addressing the possibility of reseeded First Avenue tributaries through the Transplant applications. By that time, + 3 years of stock absence would seem to indicate that these creeks may no longer have viable self-sustaining populations. This may open up the possibility of using brood stock from Williams, but should also include stocks from Scully, to widen genetic diversity as transplants back into First Avenue tributaries. A technical meeting to discuss these options with various experts is planned for summer, 2008.

- The inclusion of the Nuxalk technical assistance should be noted. Under the overall guidance and mentoring of the Assistance Operations Manager at Snootli Creek Hatchery, these technicians very successfully took over all routine processes of the care of the fry including feeding, cleaning and marking of Lakelse stocks. The health and quality of the fry returning to Lakelse was very obvious and noted. The support, capacity building and employment opportunities offered to the Nuxalk First Nations is a beneficial aspect of this Fry Outplant Program.
- The integration of the Lakelse Watershed Society volunteer members is pivotally important to this Fry Outplant program under current conditions. They provided the bulk of the manpower required for the brood stock collection and disease sampling and were also present to assist at the Fry release. This program could not function without their support, interest and involvement as other available manpower was lacking. They are a valued and highly involved stakeholder of the overall Lakelse Sockeye Recovery Program.
- Provided that their programs continue, the inclusion of the Gitga'at personnel is important to allow them to gain the necessary background information and technical experience with egg takes and disease sampling. This sharing of resources could also extend to joint cooperation with their funded projects at time and resources permit.
- Target numbers of 300,000 are in place for Year 3 – therefore + 100 females should be acquired for brood stock to compensate for mortalities. Only 92 were used for Year 2 and one female's eggs were discarded due to high indications of BKD thus lowering potential for numbers of fry for release.
- Until indicated otherwise, cargo shipment via Air Canada Cargo must be chilled using gel pak freezing units only forbidding the use of ice. Samples for disease screening should be labelled "biological samples" and must remain chilled, not frozen, en-route to Pacific Biological Station. (PBS) It is possible to utilize frozen samples but not under ideal circumstances. If that is the case, samples should be frozen immediately and remain frozen until received by PBS.
- Heightened security at the Terrace-Kitimat Regional Airport now requires that the airport Authority must be contacted prior to chartered flights requiring access to the tarmac. 9 egg takes and fry releases. Escort fees apply.
- Areas of interest regarding the Lakelse Sockeye Salmon stocks specifically noted by Snootli Creek personnel were as follows:

Feeding:

Notations from Snootli Creek Hatchery staff were as follows: "again these fish were aggressive feeders with the best growth rates we have achieved with any group of Sockeye. There was nothing else out of the ordinary." (Willis, 2008)

- Though almost 270,000 fry were released into Williams Creek this May, issues such as predation, lakeshore use by residents and Park users and degradation of habitat remain limiting, unmeasured factors. Unfortunately, natural emergence and this project's fry release occurs shortly before the May

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long weekend when recreational use of Lakelse Lake and Park visitors dramatically increases. Recreational use of motor boats, “sea-doo’s” and other similar activities could create some measure of hazard to the fry using the lakeshore environment.

- The outcome of this project is, as yet, unknown. While it is hoped and assumed that the fry migrate downstream to the Lakelse Lake and rear successfully with the wild fry, an assessment program through lake sampling or smolt sampling is currently not in place. At present the main assessment planned is through determining the mark-ratio of returning adults. In 2008/2009, options for some assessment of fry, pre-smolts or smolts should be discussed and hopefully implemented, as least as a pilot program.
- The Lakelse Lake Sockeye Salmon Recovery Plan is ongoing and this project serves to conserve this valued stock while other restoration, enhancement and assessment projects continue in attempt to conserve and maintain this valued stock.



*Figure 16. Lakelse Fry – in Holding Pen*

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## **6.0. REFERENCES**

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**APPENDIX 1**

**PROPONENT INFORMATION**

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## Proponent Information:

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**APPENDIX 2**

**Disease Screening Results**





To / À: Margaret Kujat

From / De: Christine MacWilliams, DVM  
Pacific Biological Station  
Nanaimo, BC  
(250) 729-8377

Subject / Object: **2007 DISEASE SURVEILLANCE SCREENING RESULTS**

|                                                                             |
|-----------------------------------------------------------------------------|
| Security Classification - Classification de sécurité<br><b>UNCLASSIFIED</b> |
| Our file - Notre référence<br><b>2007-127</b>                               |
| Your File - Votre référence                                                 |
| Date<br><b>September 28, 2007</b>                                           |

2007-127: Lakelse Sockeye - 34 kidney and ovarian samples were received on Aug 22, 2007 (numbered 1- 34); 41 samples were received Aug 24 (numbered 35-75); 17 samples were received Aug 28 (numbered 76-92)

BKD results as of Sept 28: samples 1 – 92 have been run:  
 - samples 7, 18 and 80 were low positive for BKD by ELISA  
 - sample 35 was high positive for BKD by ELISA  
 - all other samples were negative for BKD by ELISA

Samples 6, 77, and 84 were negative when re-run.

Virology results as of Sept 24:  
 - samples 1-92 are negative for IHNV by cell culture

Our current recommendations are to segregate any low positive eggs for separate rearing and early release as unfed fry. The egg lot from the female testing high positive should be destroyed. These measures attempt to decrease the total pathogen load of *Renibacterium salmoninarum* in the hatchery and reduce the risk of an outbreak of BKD. Further results will be reported as soon as they are available. If there are any questions, please call me or Carl Westby (250) 756-7057.

Christine MacWilliams, DVM

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## **APPENDIX 3**

### **Financial Report**