

**MCINTYRE CREEK  
SALMON INCUBATION PROJECT  
2006-2007**



**Salmon Fry Release**

**YUKON RIVER SALMON RESTORATION AND ENHANCEMENT  
FUND**

**Project # CRE65-06**

**March 2007 Final Report**

## Table of Contents

<b>Abstract</b> .....	3
<b>Introduction</b> .....	4
<b>2005/2006 Season Activities</b> .....	4
<b>Ponding and Rearing of Fry</b> .....	4
<b>School and Community Involvement</b> .....	6
<b>Fry Marking</b> .....	7
<b>2005/2006 Thermal Marking</b> .....	8
<b>Fry Releases</b> .....	8
<b>Fry Trapping</b> .....	9
<b>Site Preparation and Upgrades</b> .....	10
<b>Security System</b> .....	10
<b>2006/2007 Activities</b> .....	11
<b>Broodstock Collection</b> .....	11
<b>Incubation and Evaluation of Fertilization Success</b> .....	11
<b>Monitoring and Maintenance</b> .....	12
<b>2006/2007 Thermal Marking</b> .....	12
<b>Egg Picking</b> .....	13
<b>Upcoming Season</b> .....	14
<b>Appendices</b> .....	15



McIntyre Hatchery Site

## Abstract

As it has done for the last five seasons, the Northern Research Institute (NRI) at Yukon College operated the McIntyre Creek Salmon Incubation Project for the 2005-2006 season. The NRI works very closely with Yukon College Renewable Resource Management students (RRM), Fisheries and Oceans Canada, other partner organizations and contractors to operate the site.

Education and public outreach on Chinook salmon research and management continues to be a major objective for McIntyre: the facility is operated by RRM students, hosts a variety of public events, and is involved with development and testing of a variety of techniques used in hatchery programs.

Chinook fry reared at the McIntyre Creek project from the 2005 broodstock were coded wire tagged and released between July 5, 2006 and July 24, 2006. A total of 73,548 Chinook fry were tagged and released in 2006 - 36,366 Tatchun Creek salmon and 37,182 Takhini River salmon.

Approximately 97,000 Chinook eggs were incubated in 2006: about 49,000 were taken from Tatchun Creek Chinook and about 48,000 were taken from Takhini River Chinook. Eggs and milt were transported from each site to the McIntyre facility where eggs were fertilized and then planted into health stack incubation trays.

The initial egg fertilization estimates completed in the fall of 2006 were 85.7% on average for those of Takhini River origin and approximately 50% for those of Tatchun Creek origin (based on estimates from 1 batch of eggs). Subsequent survival estimates suggest that approximately 46,000 (of 49,000) Tatchun eggs and approximately 46,000 (of 48,000) Takhini eggs survived to alevins. Re-enumeration of Chinook fry will be completed in April or early May before tagging commences.

The results of thermal marking trials on the 2005-2006 cohort were assessed by the DFO Whitehorse otolith lab in spring 2006. Four pre-hatch rings were visible on thermally marked Tatchun Creek fry and 3 or 5 pre-hatch rings were visible on thermally marked Takhini fry.

This year all incubation units were upgraded to increase the efficiency of thermal marking and all Chinook at the McIntyre facility were thermally marked over the incubation period. Otoliths from 2006-2007 will be assessed by the DFO otolith lab in spring of 2007.

Fry trapping during the spring and summer of 2006 was completed by Y2C2 and Yukon College students, with the assistance of the Education Coordinator from Fisheries and Oceans Canada. Fry trapping was conducted at Tatchun Creek in July and at Flat Creek in late June.

## **Introduction**

The McIntyre Creek Salmon Incubation Project was administered by the Northern Research Institute (NRI) in 2005-2006 as has been the case in the past five seasons. The NRI provides administration and coordination services while working with Yukon College Renewable Resource Management (RRM) Students, Fisheries and Oceans Canada (DFO), Yukon Youth Conservation Corps (Y2C2), Streamkeepers North Society, as well as Whitehorse and various community schools, to carry out the educational and salmon culture objectives of the project.

Education and public outreach continue to be important objectives at McIntyre. Five Yukon College RRM students were involved with the maintenance and monitoring for 2006/2007 - four second-year students (graduating this year), as well as a first year student manager trainee. High School students worked and volunteered during the tagging and the Y2C2 program provided students to conduct fry trapping. Thirteen classes from Yukon schools toured the site on field trips, including Yukon College Developmental Studies Biology students. McIntyre provided thirteen public schools with eggs for the Salmon in the Classroom Program to help students gain experience and an understanding of incubation site management and operations. In addition, NRI and the Streamkeepers North Society hosted an open house at the McIntyre Incubation site in celebration of Ocean's Day.

McIntyre Hatchery operates with Chinook salmon from the Takhini River and Tatchun Creek in the Yukon Territory. The McIntyre hatchery is located on an unnamed groundwater tributary to McIntyre Creek alongside Mountainview Drive in road right-of-way, within the City of Whitehorse.

(See Appendix A: Maps of Project Locations)

## **2005/2006 Season Activities**

### **Ponding and Rearing of Fry**

RRM students transferred Chinook fry into Capilano troughs on March 23, 2006. Students were scheduled to look after daily feeding and cleaning until the last of the fry were released in late July 2006. Fry were placed into three troughs: one of Takhini thermally marked fry, one of Tatchun thermally marked fry, and one of Tatchun non thermally-marked fry. Less than 3000 Tatchun fry did not receive otolith thermal marks due to equipment malfunction. The equipment could not be repaired before tagging and broodstock release.

Flow in each of the troughs was initially set at 60 litres per minute (LPM) and was increased over the rearing period to about 100 LPM. The flow was increased to a maximum of 400 LPM by mid May in an attempt to reduce excrement accumulation as a result of increased feeding.

Fry were fed Skretting Nutra Plus feed. Food was distributed using 24 hour Ziegler belt feeders. In early April the total amount of food fed daily was less than 300 grams/day. By mid May feeding was increased to 1200 grams/day and in June, up to 1800 grams/day. Eighteen hundred grams/day was continued until the first batches of fry were tagged and released.

Almost 904 thermally marked and non thermally-marked Tatchun fry died during the rearing period. There were approximately 1102 Takhini River fry mortalities during rearing. Fry grew from between 0.3-0.4 grams at emergence to an average of 1.3-1.6 grams (Takhini) and 2.4 grams (Tatchun) at the time of release.

Troughs were cleaned daily using brooms and flow control to gently channel the settled solids to the trough outlet. The fish screen at the downstream end of the channel was cleaned daily to prevent obstruction of the screen and backwatering of the channel. Skretting feed has been purchased and is on site for the 2007 rearing season.

(See Appendix B: McIntyre Creek - 2005/2006 Broodstock Fry Samples)



Ponding Fry



Measuring fry length



Measuring fry weight.

### **School and Community Involvement**

Thirteen classes visited the McIntyre site in the spring of 2006, twelve of them as part of their participation through the Salmon in the Classroom program. Yukon College Developmental Studies Biology students and Community Stewards from the Yukon communities also toured the site. High school students have also been involved with tagging, fry trapping and adult carcass monitoring.

On June 8, 2006 the Northern Research Institute and Streamkeepers North Society hosted an Oceans Day Open House, with refreshments, handouts, displays, quizzes, and prizes at the site. The event proved successful, drawing over 30 local people to the celebration of Ocean's Day to learn more about salmon and the McIntyre Incubation project.



Takhini Broodstock Public Release Activities

## **Fry Marking**

McIntyre hatchery uses a number of techniques to mark salmon fry. Marking provides a way of easily identifying salmon from wild stock as well as from a specific hatchery. Marking provides a wealth of information including fish movements, migration patterns, and various statistics such as mortality rates and harvest levels. One method used to mark salmon at McIntyre is coded wire tags (CWT). A magnetized tag etched with a specific batch code is injected into the nose cartilage of the salmon fry. The code identifies the origin and release circumstances of any fish subsequently recaptured. All fry are anesthetized when tagged and the adipose fin removed to help identify the salmon as a tagged fish. A quality control check is made on the tagged fish to ensure that the tag has been correctly magnetized. The presence of the tag in the salmon is verified using a magnetic tag detector. Another method of marking used at McIntyre is otolith marking. By varying the temperature of water flowing over the pre-hatched eggs, rings are produced on the otolith, which are visible throughout the salmon's life. This method is being tested as a possible alternative to CWT in the future.

Professional tagger, Phyllis Nelson was hired to do the coded wire tagging in 2006. Phyllis was able to tag about 42,000 fry between July 4<sup>th</sup> and July 10<sup>th</sup>. Phyllis worked with a tagging team that included RRM students and students from Porter Creek High School. All the fry were unable to be tagged as the CWT order was lost in delivery and could not be replaced in the time Phyllis was scheduled at the site. McIntyre was able to borrow some CWT from Fisheries and Oceans. However, they were not the correct tags for the tagging machine and would not work. Northwest Marine Technology Inc. was very supportive and agreed to replace the lost tags. Due to prior commitments, Phyllis could not extend her contract to wait for the replacement tags. However, we were lucky to get Nigel Young, who has worked with us before, to finish tagging the remaining 30,000+ fry. The remaining fry were tagged by July 23, 2006. A total of 2857 fry that were too small to be tagged were marked by an adipose clip.

In early 2007, NRI purchased Coded wire tags in preparation for the upcoming tagging season and Phyllis Nelson has again been contacted to schedule tagging for June 2007.

(See Appendix C: McIntyre Coded Wire Tagging Summary 2006)



Adipose fin clipping

### **2005/2006 Thermal Marking**

About 33,000 of the Tatchun salmon released in 2006 were thermally marked as well as coded wire tagged and adipose clipped. Fry otoliths were examined by the DFO otolith lab in April and again at the time of release to record the type of thermal mark and evaluate marking success. The lab identified a clear band of 4 pre hatch rings on the thermally marked otoliths.

About 37,000 of the Takhini River salmon released in 2006 were thermally marked as well as coded wire tagged and adipose clipped. Fry otoliths were examined by the DFO otolith lab in April and again at the time of release to record the type of thermal mark and evaluate marking success. The lab identified a clear band of either 3 or 5 pre hatch rings on the thermally marked otoliths. Equipment failure was responsible for three trays (approx. 10,000) of Takhini fry only receiving three of the five desired otolith markings.

### **Fry Releases**

The release of fry from the 2005-2006 broodstock year was carried out between July 5<sup>th</sup> and July 23<sup>rd</sup>, 2006. Releases were carried out by the Fisheries and Oceans Education Coordinator (DFO EC), Y2C2 volunteers and the McIntyre student manager with volunteers and the public being invited to assist.

A total of 10,767 fry were released into Flat Creek (tributary to Takhini River) on July 5<sup>th</sup>. The fry weighed about 1.3 grams with an average fork length of 53.4 mm. A second group of about 22,500 fry was released into the Takhini River on July 17<sup>th</sup> 2006. Fry weighed an average of 1.6 grams with an average fork length of 55.4 mm. At least ten public volunteers assisted with this release. The last release into the Takhini River was of 5,000 fry weighing an average of 1.6 grams on July 18th, 2007.

A group of 22,000 fry were released at Tatchun Creek on July 21st, 2006. At the time of release the average fork length was 60.2 mm with a weight of 2.4 grams on average. A

second release of 16,000 fry was completed at Tatchun Creek on July 24th. The average fork length of fry in this release was 58.6 mm.



Fry in transport tank with oxygen diffuser



Oxygen meter monitored during transport.



Tatchun Fry Release: Buckets used to adjust transport tote water to creek temperature.

## Fry Trapping

Fry trapping with a minnow trap is a method of catching fry to determine the abundance and health of wild fry in a system or area. Fry trapping was completed at Flat Creek on June 23<sup>rd</sup>, 2006 by Y2C2 students with training provided by the DFO EC. A total of 19

juvenile Chinook salmon were captured: 3 were of wild origin (age 1+), 4 were of hatchery origin (age 1+), and 12 were from school releases (age 0+). The fry of hatchery origin (1+) were the largest (89 mm fork length on average), followed by fry of wild origin (1+) (85 mm fork length on average), and school release fry (0+) at 62 mm fork length on average.

Tatchun fry trapping completed on July 24<sup>th</sup>, 2006 immediately following the second release of hatchery raised fry suggested that fry released on this date (58.6 mm mean fork length) were about the same length as wild fry at 58.04 mm mean fork length. Hatchery raised fry (fry captured from the first and second release combined) were slightly larger on average than wild fry.

Depending on availability of graduating Yukon College students, they will begin fry trapping at Flat Creek in May 2007. A proposal will also be submitted to the Y2C2 Program asking them to carry out fry trapping at Flat Creek, and at other sites if time permits, in 2007.

(See Appendix D: Tatchun Creek Fry Trapping Data 2006 and Appendix E: Flat Creek Fry Trapping Data 2006)

### **Site Preparation and Upgrades**

The student manager and other RRM students completed several upgrade projects throughout the 2005/2006 season: some were in preparation for the 2006/2007 incubation season, some in preparation for ponding and rearing, and some in preparation for continuing with the trial otolith marking project. They included:

- Replacement of the walkway across ground water creek including four sets of stairs for access around rearing troughs.
- Stripping and painting of all walkways.
- Installing a screen door on the 'tagging' shed.
- Upgrades on the incubation boxes to minimize leakage.
- Repairing all of the nets and holding tubes required for broodstock collection.
- Design upgrade of the thermal marking units with heaters and thermostats installed by a professional electrician.
- Repair and re-insulating of all incubation unit doors.
- Repairing egg trays in preparation for the incubation season.
- Rerouting of water pipes to allow for efficient water flow to all four Capilano troughs.
- Repair, maintenance and cleaning of Capilano troughs to prepare for rearing fry in 2007.

### **Security System**

Spectrum Security continues to monitor the alarm system. The student manager or a delegated student carried a pager with text capability, the number of which was at the top

of Spectrum's alarm call-out list. The system is easily adapted to changing personnel at the site. A cell phone is on site to enable students or contractors to request assistance. The student manager could be contacted at all times in case of emergency (with or without pager) through a personal cell phone.

## **2006/2007 Activities**

### **Broodstock Collection**

In 2006, Chinook broodstock were caught by drift netting the upper Takhini River between August 22<sup>nd</sup> and August 25<sup>th</sup>. Chain link pens (4' x 4' x 8') were placed in an eddy to hold the salmon until ripe. Females were placed in 8" diameter by approximately 36" long PVC tubes, with clothesline barriers at each end, inside the pens to reduce stress and potential injury to the fish.

A total of 48,000 eggs were taken from 7 female Takhini River Chinook. Eggs were transported to McIntyre for fertilization. Eggs were kept in zip lock bags in coolers, with ice packs. Milt, collected in whirl pacs after the eggs, was transported in a separate cooler with ice packs to keep the milt between 2 and 10 degrees C. The collection team included the DFO EC, student manager, student trainee, and volunteers (including DFO staff).

(See Appendix F: Takhini River Chinook Egg Take 2006)

Tatchun Creek broodstock were collected between August 17<sup>th</sup> and August 28<sup>th</sup>, 2006. Most fish were captured through angling, as the high numbers of fish on the spawning grounds and in the pools made it difficult to net a small number at a time. It was also much easier to select suitable fish (ripe but not yet spent) through angling. Fish were held until ripe in 8" diameter by approximately 36" long PVC tubes, with clothesline barriers at each end. These were placed under cover in the creek. Water velocity through the tubes was minimized by using large rocks when eddies were not sufficient. About 49,000 eggs were taken from 9 females.

(See Appendix G: Tatchun Creek Chinook Egg Take 2006)

### **Incubation and Evaluation of Fertilization Success**

Each batch of eggs collected from both the Takhini River and from Tatchun Creek was fertilized with milt from at least two males and planted into heath trays within the designated incubation box. Flow was set at about 9 LPM.

To estimate fertilization success, ten eggs from each of the seven Takhini females were held in separate isolation baskets within a heath stack and checked after 24 and 48 hours to determine percent fertilization. Fertilization success was estimated at between 80% and 90%, with an average fertilization success of 85.7% (41,000 of 48,000 eggs).

Estimates of fertilization success for Tatchun Creek eggs were available for only 1 batch of eggs where fertilization success of a 10 egg sub-sample was estimated at approximately 50%.

### **Monitoring and Maintenance**

The Yukon College student manager and other students undertook regular checks of the site once the eggs were fertilized and placed in the incubation boxes. They visited the site daily to check temperatures and water flows, to clean intakes and downstream screens, as well as tend to egg and fry requirements once eggs had reached between 200-250 ATU.

Water samples were collected from the groundwater channel, downstream of the Capilano troughs and fish screen, and immediately upstream of McIntyre Creek. Phosphate levels in the groundwater channel were well within the water license limits above and below the incubation site, as well as in the McIntyre Creek main channel.

(See Appendix H: Water Sample Report)

### **2006/2007 Thermal Marking**

In 2006, each incubation box was equipped with heaters and thermostats to provide for more efficient thermal marking. With the upgraded design, Chinook could be marked beyond the egg development stages to alevin and free swimming fry. Water was heated within a reservoir and cycled through a heat stack system and back into the reservoir, allowing all incubation trays containing eggs from one area (i.e.: Tatchun) to be thermally marked at one time. The lower water reservoirs were heated with 1000 watt livestock water immersion heaters.

Water flow through the Tatchun Creek Chinook incubation trays was manipulated for a period of eight days in late October and early November prior to hatching. Eggs were held in the heat stacks that alternated between 9 degrees C warm water periods and 4 to 4.5 degrees C cold water periods. The system was on a 24 hour schedule (24 hours warm-24 hours cold) for a total of four cycles to produce four otolith pre-hatch marks (Tatchun=4H). A trickle of cold water was used to regenerate oxygen levels within the reservoir. Water at a temperature of 4-4.5 degrees C could be connected or disconnected to the drain pipe. During the thermal marking, eggs began to hatch. Tatchun otolith marking was completed by November 19, 2006 (at approximately 20% hatch). The heater was then turned off. All trays of Tatchun Chinook were marked with 4 prehatch/during hatch otolith marks.

In early March 2007, water flow within the Takhini egg trays containing alevins was manipulated for completion of Takhini River Chinook otolith marking trials. All Takhini River Chinook received a total of 5 post hatch otolith marks. A sample of Chinook fry otoliths will be examined by the Department of Fisheries and Oceans Otolith Lab in April 2007.

(See Appendix I: McIntyre Thermal Marking 2006/2007)

### **Egg Picking**

RRM students removed dead eggs from the incubation trays between October 15<sup>th</sup> and November 23<sup>rd</sup> 2006. Trays were continually monitored for mortalities and fungus problems. Students removed dead eggs, distinguished by their opaque colour, with egg tweezers when necessary.

Based on dead egg removal, about 46,000 (95% survival) eggs were estimated to have survived to hatch from the Tatchun Creek batch. Approximately 46,100 eggs were estimated to have survived to hatch from the Takhini River batch showing a 97% survival rate from green eggs. Takhini River egg survival estimates were higher than the estimated number of fertile eggs. This indicates that the conservative fertility estimates were low, and/or the egg picks were inaccurate compared to the number of actual fertile eggs. These numbers will be further verified through fry counts in early April and again during tagging in the summer of 2007, and will yield more accurate survival data and population counts.

(See Appendix J: Takhini Chinook Eggs Survival 2006/2007 and Appendix K: Tatchun Chinook Eggs Survival 2006/2007)



Dead Egg Picks from Incubation Trays

## **Upcoming Season**

RRM students have currently been busy preparing the site for rearing and have moved the 2006 fry to the Capilano troughs. The food supply is on site, and the fry have begun to feed. Due to cold weather and freezing during the month of March some of the move had to wait to ensure proper water levels and flows. From the initial appearance and health of the fish we expect to be tagging by mid to late June. This will be one of the larger batches we have had in the past few years. We expect to have Phyllis back to manage the tagging again this year and have purchased extra coded wire tags in anticipation of a large release.

With the graduation of Yukon College Renewable Resource Management students, we will be saying good-bye to our exceptional and hard working student manager – Dawna Hope and the other 2<sup>nd</sup> year students that have been involved throughout the past 2 years. William Linklater has been working with Dawna over the past year and will assume responsibility as student manager for the site and will continue to work at the site over the summer and next school term.

There will more work over the next year to increase the efficiency of the project and salmon handling and continue to upgrade the site.

The Northern Research Institute at Yukon College would like to thank the following students for their assistance and commitment to the McIntyre Hatchery Site over the past year:

- Dawna Hope, 2<sup>nd</sup> Year RRM
- Jesse Walchuck, 2<sup>nd</sup> Year RRM
- Milada Pardovicoa, 2<sup>nd</sup> Year RRM
- Nicole Johnston, 2<sup>nd</sup> Year RRM
- William Linklater, 1<sup>st</sup> Year RRM
- Shirley Hill, 2<sup>nd</sup> Year RRM

## **Appendices**

Appendix A: Maps of Project Locations

Appendix B: McIntyre Creek - 2005/2006 Broodstock Fry Samples

Appendix C: McIntyre Coded Wire Tagging Summary 2006

Appendix D: Tatchun Creek Fry Trapping Data 2006

Appendix E: Flat Creek Fry Trapping Data 2006

Appendix F: Takhini River Chinook Egg Take 2006

Appendix G: Tatchun Creek Chinook Egg Take 2006

Appendix H: Water Sample Reports

Appendix I: Thermal Marking Data 2006

Appendix J: Takhini River Egg Survival 2006

Appendix K: Tatchun Creek Egg Survival 2006

Appendix L: Financial Summary March 2006