Coded Wire Tagging of Chinook Salmon at the Whitehorse Rapids Hatchery in 2012

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Abstract

Chinook salmon fry reared at the Whitehorse Rapids Hatchery were adipose fin- clipped and injected with decimal tags in the early summer of 2012. Tricaine methane sulphonate (MS222) was used to anaesthetize the fry prior to clipping and tagging. The 2012 release of a total of 148,488 fry in three areas upstream of the Whitehorse Rapids dam along with the main stem Yukon were:

- 10,274 into Wolf Creek on May 27,
- 30,050 into the main stem Yukon River on June 6;
- 80,482 into Michie Creek on June 6, and
- 27,682 into the Mclintock River on June 6.

The Yukon Fish and Game Association (YF&GA) staff at the Whitehorse Rapids Fishway hosted 18,615 visitors, in spite of the late Chinook run and poor summer weather. Fishway staff provided tours of the facility and information to these visitors in English, French and German. 5 % of visitors spoke German as a first language.

Fishway staff monitored the run composition and provided daily updates to DFO. In 2012, 1,037 returning adult Chinook salmon were counted at the Fishway, including 610 of hatchery origin. The hatchery component included 501 males and 109 females and represented 59% of the Whitehorse Rapids Fishway count. Local students employed at the Whitehorse Rapids Fishway also assisted hatchery staff in the collection of the 70 Chinook used for broodstock and with taking biological data from broodstock. They also assisted with the recovery of coded wire tags from the hatchery fish which were used for broodstock.

Walks were conducted on Wolf Creek for adult spawners with limited success. With the change in release numbers spawning adults are also decreasing.

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Introduction

The Yukon Fish and Game Coded Wire Tagging project in 2012 was comprised of two main components: the tagging and releasing of groups of Whitehorse Rapids Chinook salmon fry, and support of the Whitehorse Rapids Fishway salmon enumeration and natural interpretation project and other associated stewardship activities.

Groups of Upper Yukon River Chinook salmon have been tagged with coded wire tags annually in the Yukon Territory since 1985[1], when hatchery fry were first released from the new Whitehorse Rapids Fish Hatchery (WRFH). The hatchery was constructed in 1984 in concert with the construction of a fourth turbine at the Whitehorse hydroelectric facility, and the hatchery fish were produced to offset possible impacts of the hydro generating facility. In excess of 80% of all the fish tagged have originated from the hatchery have been coded wire tagged, either by Fisheries and Oceans Canada, or by Yukon Fish and Game Association (YFGA). The coded wire tagging of Whitehorse Rapids Hatchery Chinook allows biologists to distinguish hatchery Chinook from wild Chinook over the course of their life cycle, for as long as seven years for the hatchery Chinook. The benefit of being able to select wild fish to contribute to hatchery broodstock and thus ensure genetic diversity benefits the Chinook run in perpetuity. Survival estimates made possible by the assessment of clipped fish returns allows ongoing assessment of hatchery effectiveness for as long as the marking continues.

Coded-wire tags (CWT's) are small (1mm long) pieces of metal wire that are injected into the nose cartilage of juvenile salmon. Tags are microscopically encoded with information that enables biologists to identify the tag group of the salmon when the tag is recovered through sampling or fishing efforts. The adipose fin is also removed from tagged fish so that they may be visually identified (Johnson 1990). The amount of information linked to the tag code varies depending on the type of tag applied (agency only, or decimal tag) and the management of the tag groups (differentiation of release groups). In addition to distinguishing hatchery fish from wild fish, the ability to identify the release groups of the tagged fish enables scientists to use sampling data to compare the survival of groups of fish, to assess their contribution to a specific fishery or fisheries, to assess survival rates, and to learn about migrations and distributions of stocks.

The Whitehorse Rapids Fishway is used to enumerate Chinook salmon migrating to spawning grounds upstream of Whitehorse, including almost all Chinook returning from releases from the Whitehorse Rapids fish hatchery. The viewing chamber at the Fishway allows staff to distinguish and record the origin (wild or hatchery) and the sex of the migrating Chinook salmon. The YFGA interpretive program at the Fishway provides an unparalleled opportunity for locals and visitors to observe and learn about Yukon River Chinook salmon. The program seeks to foster a salmon stewardship ethic in all those who visit, and most particularly among the staff who work at the Fishway. In recent years very capable staff has returned the facility to its ranking as the most visited site in the Whitehorse area.

[1] An exception occurred in 1999 when all fry released from the Whitehorse Rapids Hatchery were marked with the removal of their adipose fin, but coded wire tags were not applied.

Conservation Project Objectives

The specific objectives of the YFGA 2012 Chinook tagging project were to:

- To purchase decimal coded wire tags (SWTs) for WRFH Chinook salmon fry reared at the Whitehorse Rapids Hatchery in YR 2011-2012.
- To employ an experienced contractor and a crew to mark the WRFH Chinook fry, including clipping adipose fins and applying CWTs to all Chinook fry of sufficient size and condition to tag.
- To contract a helicopter operator to work with WRFH personnel to load and transport marked fish out to designated release sites.
- To provide a summary report of the activities of the fry tagging and fry release, including tag retention, tagging mortality and biological sampling data for each tag group.

Stewardship Project Objectives

The specific objectives of the YFGA 2012 Fishway support project were to:

- To employ eight Fishway attendants and a manager.
- To ensure that these personnel provided interpretive services at the Whitehorse Rapids Fishway, in-season run composition data to DFO, and assisted hatchery staff with broodstock sampling and stream walk monitoring of Chinook returns at Wolf Creek.
- To provide a summary report of the activities of employees at the Fishway, including the numbers of visitors accommodated the composition of the run enumerated, and the Wolf Creek observations.

Tagging Project Materials and Methods

Coded Wire Tag Purchase

YFGA consulted with DFO Whitehorse and DFO Pacific Regional staff in Vancouver BC to determine the appropriate tag purchases for 2012. YFGA received direction to purchase decimal CWTs, rather than the "Agency-only" type tags that had been applied in the five previous years.

YFGA purchased 150,000 decimal coded wire tags from Northwest Marine Technologies. To take advantage of cost savings available only on early orders, YFGA made use of the regional DFO inventory of tags for the project, and then replaced them with tags that arrived after the tagging was completed. Tags were purchases with five separate tag codes to ensure that different tag codes could be applied to fish released at different release sites. The code groups purchased were:

- Code 18-26-85: 30,000 tags
- Code 18-26-86: 30,000 tags
- Code 18-61-03: 10,000 tags
- Code 18-13-74: 40,000 tags
- Code 18-14-79: 40,000 tags

Coded Wire Tag Application

Tagging was conducted in accordance with Whitehorse Rapids Hatchery standard procedures. Phyllis Nelson of 'Eh- Fish', a professional contractor from Vancouver who works throughout the Pacific Region and who has conducted the tagging in Yukon for over 20 years, was contracted to conduct the tagging and fin clipping. Ms Nelson, one additional tagger and four adipose fin clippers were employed. Most were students, including some who went on to work at the fish ladder after tagging ended. Operations commenced on May 22, 2012 and were completed on June 2nd.

Fry were sorted according to size and condition prior to tag application. Small or deformed fry were not tagged but were externally marked with an adipose clip. Feeding was suspended for at least 24 hours prior to tagging and resumed afterwards. Feeding was suspended again for a period of 24 to 48 hours prior to release.

Batches of approximately 50 fry were held in a nine-litre capacity plastic tub containing anaesthetic, for a minimum of two minutes prior to fin clipping. The anaesthetic used was tricaine methane sulphonate (MS222). Anaesthetic baths were changed frequently to prevent thermal shock of the fry, and to refresh the anaesthetic. Anaesthetic was prepared by mixing 30 grams of MS222 into 500 ml's of water to prepare a stock solution, and then mixing 25 ml's of the stock solution into 20 liters of water to prepare anesthetic baths. Water was at 6 degrees Celsius. Fish were left in the basins just until they become docile enough to handle, and were monitored throughout to avoid the risk of over-dosing. The number of fish anesthetized at one time varied, and depended on the size of the fish, and the speed and agility of the clippers and tagger.

Anaesthetized fry were dip netted onto the clipping section of the tagging table, where clippers used surgical scissors to remove the adipose fin. Once the fry were fin clipped, they were passed to the "clipped" section of the table, where they were accessible to a tagger for "Decimal" tag application. After tagging, each fry was immediately passed through a quality control device (QCD) to check for successful tag implantation. The QCD automatically detected, separated, and enumerated tagged and untagged specimens. Fry exited the QCD into recovery buckets of water which were supplied with a trickle flow to replenish oxygen. Recovery time of fish after the tagging procedure averaged about 2 minutes.

- Untagged fry identified and separated by the QCD were checked a second time for tag implantation. All untagged fry were then retagged with a CWT. Once tagging was complete, the recovered fry were returned to the rearing tanks where they were held for five days, and sample lots were passed through a QCD to determine CWT retention. All these activities are under the professional guidance of Phylis Nelson throughout the entirety of the project. Phyllis maintained records of fish tagged daily by tag code, of results of daily sampling for tag retention estimation, and of tagging mortalities.

Groups of tagged fry were moved to round tanks allocated for fish of their specific tag code, under the direction of the hatchery manager. The hatchery manager resumed the feeding and cleaning schedule until the day before the fry release, at which time fry were again taken off feed.

Fry Releases

YFGA consulted with DFO and Yukon Energy Corporation regarding release group sizes and release sites and verified that a transplant license was in place prior to releases. YFGA contracted Capital

Helicopters to work with WRFH personnel to load and transport marked fish out to designated release sites.

Hatchery personnel recorded sampled data and tag code data and coordinated the releases. This included setting up tanks and oxygen systems, filling tanks, driving to the Wolf Creek site, scheduling helicopter pickups, calculating loading densities based on sample data, and loading fry. YFGA paid for helicopter transport to the release sites.

The Wolf Creek public fry release was carried out on May 27, 2012. Hatchery personnel transported fry to the release site by pick-up truck in an insulated fish tote. The public were invited to release fish, and hatchery personnel and YFGA volunteers loaded and distributed bags of fry and water for the public to carry to the stream at the Wolf Creek campground.

Helicopter fry releases were all carried out on June 6, 2012. There was bad weather for the first two flights. Four flights were required for releases at the Michie Creek site; two flights were required for the McClintock River releases along with two flights for the Yukon River main stem releases for a total of 5.8 hours of flying. (Cover photo shows the loading of the helicopter bucket.)

Tagging Project Results and Discussion

Coded Wire Tagging

The 2012 release of a total of 148,488 fry in three areas upstream of the Whitehorse Rapids dam along with the main stem Yukon were:

- 10,274 into Wolf Creek on May 27,
- 30,050 into the main stem Yukon River on June 6;
- 80,482 into Michie Creek on June 6, and
- 27,682 into the McClintock River on June 6.

Fry weight at time of release ranged from 2.78 grams to 2.87 grams with an average weight of 2.83 grams which is up slightly from last year. Appendix 1 provides the summary of release data by tag group.

The total number of fry tagged and released in 2012 was 148,488. This is 10% higher than the 2011 release, and 9% higher than the recent five year average release of 136,451. Appendix 1 provides the Whitehorse Rapids Hatchery 2012 Chinook CWT release report. Historic release numbers are available in the annual Joint Technical Committee Report (JTC, 2012).

Appendix 2 provides the Whitehorse Rapids Hatchery 2011-2012 Chinook Data Summary which summarizes the collection of eggs and survival of eggs through to release in 2012.

It is interesting to note that tag recoveries through marine studies have provided information about the behaviour and location of tagged Yukon River Chinook in the Bering Sea. A recent interesting aspect of these tag recoveries is that they identify a northward migrating component in Yukon salmon within the Bering Strait (Celewycz et al. 2010). Three fry released with “Agency-only” coded wire tags in 2007 were recovered in mid-September in the Bering Strait during a surface trawl operation aboard a National Oceanic and Atmospheric Administration research vessel. These recoveries represent the most northerly recoveries of coded wire tagged Chinook salmon released in Whitehorse, Yukon.

Fishway and Stewardship Materials and Methods

YFGA hired a Fishway manager in March, two supervisors in April, and six Fishway attendants in May and June. These personnel were trained in June and provided interpretive services at the Whitehorse Rapids Fishway for the 2012 operating season.

Fishway personnel determined the sex and origin (hatchery or wild) of Chinook salmon that ascended the Whitehorse Fishway throughout the operating season. They provided daily in-season updates to DFO in the form of excel spreadsheets detailing Chinook run composition.

Fishway staff were in close communication with WRFH staff regarding run numbers and composition, and assisted hatchery personnel with broodstock separation and sampling.

Fishway staff assisted hatchery staff with Wolf Creek stream walk monitoring of Chinook returns.

Fishway and Stewardship Results and Discussion

All new staff had to complete a safety orientation at Yukon Energy Corporation, Denny attended on May 22nd with the other attendants on June 25th.

A new safety procedure was created based off of the old one. All sections of the ladder were separated, and procedures were based on hazard level of that area. A procedure was also outlined for workers, (such as YEC workers) on the ladder. Al Hammond had safety signs made for each gate leading to the ladder .

The rescue ladder and throw bags for the lower ladder were brought down by Al. All staff had to complete a small, safety training with the rescue gear. This was done last year as well, and it is very important for this to continue in future years. Each staff member threw the buoy into the weir and ladder so they could see how strong the water is. They then threw the ladder into the lower ladder to be sure that they are familiar with how to set it up.

New walkie-talkies were purchased by YEC so each staff member on the ladder can have a walkie-talkie. This is a new safety precaution. The theory being, if you are holding the walkie-talkie and fall in, the other attendant cannot call for help. Yukon River panel funding contributed to the wages for the manager and a portion for the attendants. In addition to the safety training they learned about salmon life cycles and their habitat. Students also learned how to collect scales and take lengths of the salmon.

The Fishway was open from 10am to 6pm as of June 1st. In July the hours switched to 9am to 7pm with a one hour lunch in the middle. In August the hours expanded to 9am to 9pm requiring staff to work split shifts. This season 18,615 visitors came to the Whitehorse Rapids Fishway. Visitors were provided opportunities to view the returning salmon and Fishway staff shared their knowledge about the Upper Yukon Chinook salmon resource and the coded wire tag program, by guiding visitors through the site and answering questions. Special stewardship events associated with the Fishway were the Yukon Appreciation night on August 15th, and the public fry release at Wolf Creek, on May 27th.

Visitors included people from Whitehorse, from other Yukon communities, from the United States, and from around the world. Approximately five per cent of visitors spoke German as a first language and were accommodated by an attendant fluent in German and with a German translation of the hatchery brochure. While the total number of visitors was slightly fewer than in 2011, likely due to the late arrival of the salmon and poor summer weather, the site was still the most visited attraction in Whitehorse.

Fishway staff enumerated 1,030 Chinook at the Whitehorse Rapids Fishway between August 7 and Sept 3, 2012. Hatchery personnel counted an additional 7 Chinook up to Sept 9, 2012. Of the total returning adult Chinook counted at the Fishway, 610 of the 1,037 were of hatchery origin. The hatchery component included 501 males and 109 females and represented 59% of the Whitehorse Rapids Fishway count. The wild component included 230 males and 197 females. Female Chinook made up 29.5% of the total run.

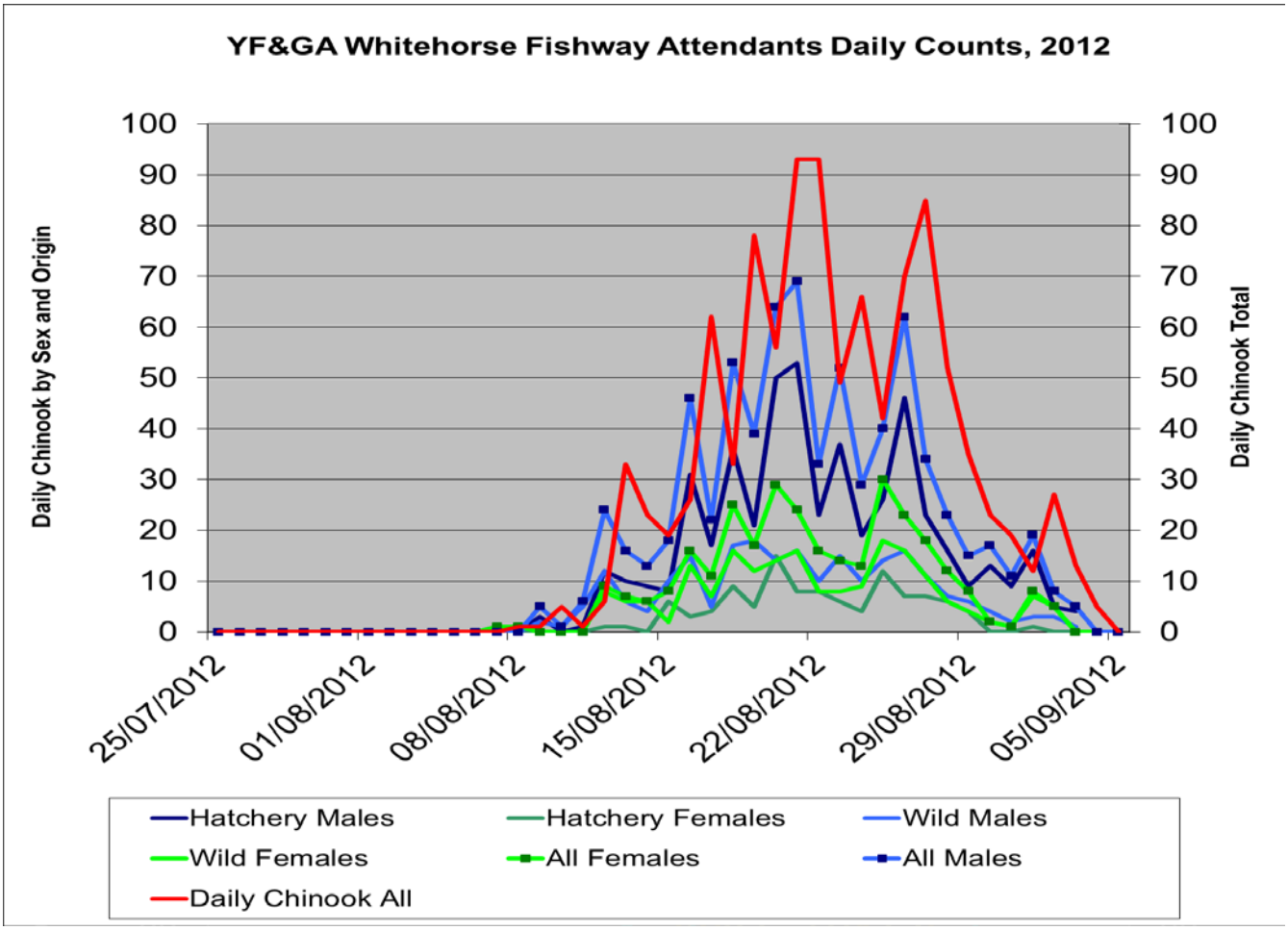

Figure 1 Whitehorse Rapids Fishway Daily Chinook Counts 2012.

The 2012 run composition is presented in Figure 2:

Fishway staff assisted WR Hatchery staff with the collection and biological sampling of broodstock. In 2012, Whitehorse Rapids Hatchery took a 27 hatchery males, 25 wild males, 3 hatchery females and 15 wild females. Coded wire tags were also recovered from broodstock. The remaining 967 Chinook, including 187 female Chinook represent the spawning escapement upstream of the Fishway (Figure 2).

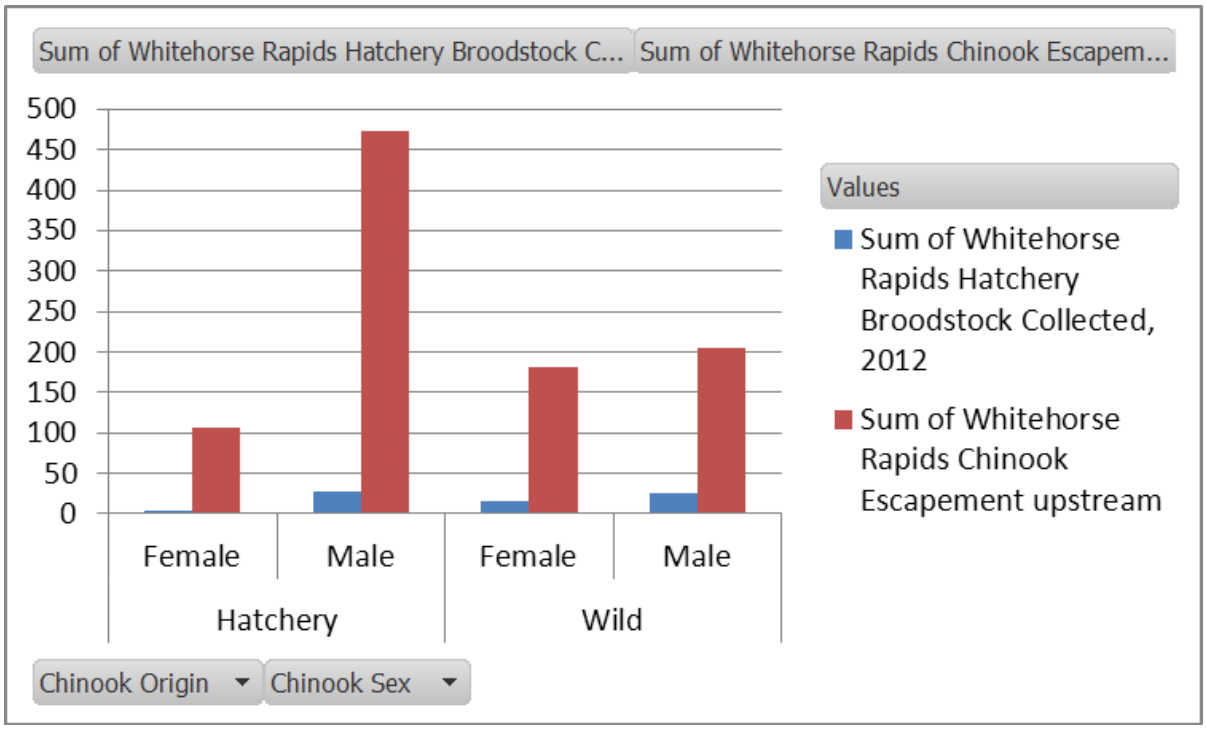

Figure 2. Chinook salmon Spawning Escapement and Broodstock at the Whitehorse Rapids Fishway in 2012, by sex and origin.

Wolf Creek walks. Chinook salmon Spawning Escapement and Broodstock at the Whitehorse Rapids Fishway in 2012, by sex and origin

Recommendations

1) A greater focus on recovery of coded wire tags in the salmon fisheries would likely make this project more valuable.
2) The Whitehorse Rapids Fishway provides an ideal venue for communicating the value of Yukon River salmon to a broad spectrum of people from the Yukon River watershed and beyond; its value in fostering stewardship of the salmon resource could be further enhanced with in-season run updates, and information brochures from the Panel.

Literature Cited

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Appendix 1: Whitehorse Rapids CWT and Associated non-CWT Groups Release Report

HATCHERY/PROJECT Whitehorse Rapids Fish Hatchery/Enhancement **SPECIES** CN-124 (Yukon River Chinook) **DATE** 16-Jun-12

CONTACT Lawrence Vano - Operations Manager

											CODED WIRE TAGGED FISH					ASSOCIATED NON-CWT FISH							
CWT TAG CODE	REP	BROOD YEAR	RUN	STUDY	EXPID	STOCK TYPE	STOCK	RELEASE	REL PERIOD	REL STAGE	CWT FINCLIP	# CWT TAGGED	# SHED CWT	SAMPLE SIZE	TAG LOSS	FINCLIP	NUMBER	PARTIAL CLIPS	ENUM METHOD	TOTAL RELEASE	LENGTH	WEIGHT	ABNORM SURV
							CODE	CODE	DDMMYY														
Ag D1 D2				R S			NAME	NAME	DDMMYY						DAYS %						mm	gm	
18-61-03		2011	2	H P		W	Yukon River	Wolf Creek	27 - 05 - 2012	FF	Adipose	10,274	103	500	3 1.0		0		C	10,274		2.8	
									27 - 05 - 2012														
COMMENTS	10,289 - 15 Mortalities = 10,274 X 99% Tag retention = 103 adipose clipped with no tag retained and 10,171 adiposed clipped with tag retained. Total Released 10,274																						
18-13-74		2011	2	H P		W	Yukon River	Michie Creek	6- 06-2 012	FF	Adipose	43,900	488	500	5 1.0		0		C	43,900		2.87	
									6- 06-2 012														
COMMENTS	43,949 - 49 mortalities =43,900 X 99% Tag retention = 439 adipose clipped with no tag retained and 43,461 adipose clipped with tag retained. Total Released 43,900																						
18-17-79		2011	2	H P		W	Yukon River	Michie Creek	6- 06-2 012	FF	Adipose	36,582	549	500	5 1.5		0		C	36,582		2.87	
									6- 06-2 012														
COMMENTS	36,633 - 51 mortalities = 36,582 X 98.5 Tag retention = 549 adiposed clipped with no tag retained and 36,033 adiposed clipped with tag retained. Toatl Released 36,582																						
18-26-85		2011	2	H P		W	Yukon River	Main Steam	6- 06-2 012	FF	Adipose	28,487	142	500	5 0.5	1,563	0		C	30,050		2.78	
									6- 06-2 012														
COMMENTS	28,493 - 6 mortalities = 28,487 X 99.5% Tag retention = 142 clipped with no tag retained and 28,345 clipped with tag retained. Untaggable fry- smalls 1,563. Total Release 30,050																						
18-26-86		2011	2	H P		W	Yukon River	McClintock	6- 06-2 012	FF	Adipose	27,682	418	500	5 1.5		0		C	27,682		2.83	
									6- 06-2 012														
COMMENTS	27,688-6 mortalities = 27,682 X 98.5 Tag retention = 415 adipose cillped with no tag retained and 27,267 adiposed clipped with tag retained. Total released 27,682																						

Appendix 2: Whitehorse Rapids 2011-2012 Chinook Data Summary

CHINOOK EGG TAKES AND PRODUCTION 2011-2012

CHINOOK EGG TAKE (BY 2011)

The following are the results of the Chinook egg take results from the green egg stage to release stage from the brood year 2011.
Total Count through Fish Way= 1,534

First Fish Through= August 5, 2011
Last Fish Through=September 6, 2011
Composition of the Migration: 205 Hatchery Females
368 Wild Females
536 Hatchery Males
425 Wild Males
Total= 1,534=741 Hatchery 793 Wild
First Day of Brood Collection=43
First Brood Female Taken= August 13, 2011 after 142 Females through Ladder
Number of Females Successfully Spawned= 43
Number of Females Lost To Holding=0
Number of Females Released Scaled Not Maturing=0
Composition of Females Collected=25 Wild -18 Hatchery
Number of Brood Males Taken=45
Composition of Males Taken= 19 Hatchery-26 Wild
Number of Males Milked and Released Back Into Fish Way= 43
Composition of Males Milked and Released=24 Wild-19 Hatchery
Date Takes: August 16 to September 3, 2011
Number of Females successfully spawned: 43
Number of Males used for spawning: 88
Estimated Number of Green Eggs Taken: 190,500
Estimated Fertilization Rate: 100%
Pre-eyed Pick Dates (150 ATU'S) = September 16 to September 24, 2011
Number of Dead Eggs Removed = 1,732 Includes 10 removed for development
Per cent Development = 98%
Dates of Shocking (300 ATU'S) = October 5 to October 23, 2011
Total Number of Shocking Mortalities= 6,286
Estimated Number of Eyed Eggs=252,176 Eyed Eggs
Adjusted Estimated Number of Green Eggs Taken =260,194
Average Fecundity per Female= 6,051 Green Eggs
Per cent Survival Green Egg to Eyed Egg Stage= 97%
Estimated Number of Eyed Eggs Donated To Fox Creek Project=102,100
Adjusted Estimated Number of Eyed Eggs Incubating - Whitehorse Hatchery Post Donation=150,076

Hatching Dates and Average ATU's=Start November 3, 2011(406 ATU's) -- End November 25, 2011(538 ATU's)
Total Number of Mortalities Eyed To Hatch Stage=1,146
Estimated Survival Eyed To Hatch =99%
Total Number of Mortalities Hatch (November 25) To February 1 (Ponding), 2012 = 322
Average ATU's Hatch to Ponding = 1002 ATU's
Total Estimated Number of Fry Ponded = 148,892
Estimated Adjusted Survival Green Egg Post Fox Creek Donation (158,094) To Ponding Stage (148,892) = 94%
Ponding Dates= February 1 to February 10, 2012 @ 1002 ATU's
Total Mortalities Ponding to May 31, 2012 (Pre Coded Wire Tagging) = 11,110
Estimated Number of Fry May 31, 2012(Pre Coded Wire Tagging) = 146,984
Per cent Survival Green Eggs (158,094) To May 31, 2012 (146,984) =93%
Dates of Coded Wire Tagging = Start May 22, 2012- End June 1, 2012
Actual Count during Coded Wire Tagging= 148,615
Discrepancy Gain = 2,000 (includes small–deformed/un-taggable fry)
Per cent Gain = 1.09%
Date of Coded Wire Tagging= May 22, 2012 to June 1, 2012
Total Number Coded Wire Tagged And Or Adipose Clipped Released =148,488

Release Information

Wolf Creek:

10,289 - 15 Mortalities = 10,274 X 99% Tag Retention
10,171 Adipose Clipped Tags Retained- 103 Adipose Clipped No Coded Wire Retained
Total Fry Released = 10,274 @2.80 Grams May 27, 2012

Total Released Wolf Creek=10,274 (10,171 Coded Wire Tagged-103 Adipose Clipped Only)
Tag Code: 18-61-03

Fry Were Released By Truck and Live Transport Tank, Public Release

Michie Creek:

43,949 - 49 Mortalities= 43,900 X 99% Tag Retention
43,461 Coded Wire Tagging And Adipose Fin Clipped, 439 Adipose Clipped No Coded Wire Tag Retained
Total Fry Released June 6, 2012 = 43,900 @ 2.87 Grams

Total Released Michie Creek= 43,900 (43,461 Coded Wire Tagged Retained And Adipose Fin Clipped -439 Adipose Fin Clipped Only)
Tag Code: 18-13-74

Fry were released by two helicopter loads

Michie Creek:

36,633 - 51 Mortalities= 36,582 X 98.5% Tag Retention
36,033 Coded Wire Tagging And Adipose Fin Clipped, 549 Adipose Clipped No Coded Wire Tag Retained
Total Fry Released June 6, 2012 = 36,582 @ 2.87 Grams

Total Released Michie Creek= 36,582 (36,033 Coded Wire Tagged Retained And Adipose Fin Clipped - 549 Adipose Fin Clipped Only)
Tag Code: 18-17-49

Fry were released by two helicopter loads

Mc Clintock River:

27,688 - 6 Mortalities= 27,682 X 98.5% Tag Retention
27,267 Coded Wire Tagging And Adipose Fin Clipped, 415 Adipose Clipped No Coded Wire Tag Retained
Total Fry Released June 6, 2012= 27,682 @2.83 Grams

Total Released McClintock River = 27,682 (27,267 Coded Wire Tagged Retained And Adipose Fin Clipped - 415 Adipose Fin Clipped Only)
Tag Code: 18-26-86

Fry were released by two helicopter loads

Main Stem Yukon River:

28,493 -6 Mortalities = 28487 X 99.5% Tag Retention
28,345 Coded Wire Tagging And Adipose Fin Clipped, 142 Adipose Clipped No Coded Wire Tag Retained
Un-taggable fry (smalls and deformities) =1,563
Total Released June 6, 2012 = 30,050 @2.78 Grams

Total Released Main Stem Yukon River = 30,050 (28,345 Coded Wire Tagged Retained And Adipose Fin Clipped -142 Adipose Fin Clipped Only Plus 1,563 smalls and deformities)
Tag Code: 18-26-85

Fry were released by two helicopter loads

Total Chinook Salmon Fry Released Upper Yukon River Basin Above Whitehorse Rapids Hydro Dam Was 148,488.