



# TA'AN KWÄCH'ÄN COUNCIL

## FOX CREEK SALMON RESTORATION PROJECT

CRE-54-14

**FINAL REPORT 2014**

*Prepared for: The Yukon River Panel & The Pacific Salmon Commission*

*Prepared By: Ta'an Kwach'an Council  
Lands Resources & Heritage Department  
&  
EDI Environmental Dynamics Inc.*

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## ABSTRACT

One Technician Steward was hired in the summer of 2014, while Coralee Johns Fish and Wildlife Steward remained as the Lead Steward this year; her wages were In-kind contributions of Ta'an Kwäch'än Council; to carry out a range of salmon related stock and habitat activities in Ta'an Kwäch'än Council Traditional Territory. The Stewards focused on implementing Year 7 of the *Chinook Salmon Stock Restoration Plan for Fox Creek*, conducting the monthly bio-physical monitoring of juvenile Chinook salmon and the monitoring of adult salmon returns during the spawning period. Stewards participated in the coded wire tagging and the annual Chinook fry release at the North Klondike highway crossing on Fox Creek, where 17,100 fry were released. Juvenile Chinook salmon were documented utilizing Fox Creek as overwintering and rearing habitat. No adult salmon were documented in the creek during the spawning period. Stream walks were limited this year due to bear activity in the area. Other suitable enumeration options should be investigated to assist with documenting returning adults in future years. As well, trail maintenance of the access trail along Fox Creek is required for next year, to improve safe access to the creek for all monitoring components.

Numerous training and mentorship opportunities were undertaken this year, including water quality technician training through the Yukon River Inter-Tribal Watershed Council and mentorship on juvenile chinook assessments and restoration works with AvF Research and Development and Sean Collins of DFO. The Stewards were also active in the community, with Coralee Johns, delivering the salmon educational component to the TKC Family Fish camp and Summer Culture camp August 11-15, 2014.

## ACKNOWLEDGMENTS

Coralee Johns has been the Lead Steward since 2010, and Shawna Tizya completed her second year as Technician Steward. Coralee Johns TKC Fish and Wildlife Steward provided daily supervision, direction and administrative support to the project. Testloa Smith of TKC assisted with field work in May; before the Technician Steward started and assisted as needed. Various TKC staff assisted Coralee or Shawna out in the field when one was not available. Al von Finster (AvF Research & Development) assisted with providing direction on our Fox Creek. TKC Elder, Norman Adamson began with a prayer and assisted with the fry release on July 13, 2014 along with other organizations and the general public. DFO's Sean Collins oversaw this years' project, providing guidance on the biological sampling for carcass recovery. Several students from the Yukon Government's Yukon Conservation Corps (Y2C2) helped the Stewards with monitoring work. Staff of Whitehorse Rapids Fishway and Hatchery collected broodstock and held eggs until they were eyed. TKC was fully licensed, to transport the eyed eggs to McIntyre Creek Incubation Facility (operated by the Yukon Research Center) where they were raised (primarily by Yukon College students) until they were ready to be released. Jody Inkster of the Yukon River Inter-Tribal Watershed Council (YRITWC) provided the Stewards with water quality training techniques and Coralee Johns took the Lead to conduct water quality testing in the TKC Traditional Territory as a part of their Water Quality Monitoring Program (2006—Present) for the Yukon River basin above and below Whitehorse, to develop baseline data during the open water season. EDI Environmental Dynamics Inc's Meghan Marjanovic, assisted with final reporting.

Funding for this project was provided by the Yukon River Panel's Restoration and Enhancement Fund.

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- Fox Creek Stream Walks 2014 Report
- Fox Creek Chinook Fry Release 2014 Report
- McIntyre Creek Incubation Facility Operations Report

## Introduction

The Ta'an Kwäch'än Council (TKC) initiated a Community Stewardship program in 2007, which focused on building capacity and increased involvement of TKC citizens in conservation and restoration of wild salmon stocks and habitats within the TKC Traditional Territory. The TKC has received funding through the Yukon River Panel Restoration and Enhancement Fund from 2007 to 2014. The Fox Creek Salmon Restoration Project has been a large component of this program over the years, as a restoration plan was developed in 2008 to help restore an extirpated Chinook salmon stock to Fox Creek and improve harvest opportunities for TKC citizens (Anderton 2008a).

While the Community Stewardship program has continued on a seasonal basis since 2007 and has involved salmon related monitoring across the Traditional Territory, the focus of recent the program has been on the implementation of the *Chinook Salmon Stock Restoration Plan for Fox Creek* (referred to as the 'Restoration Plan', Anderton 2008), shifting from capacity building project to restoration a project.

The 2014 project represents Year 7 of the Restoration Plan, where 5-year old fish, released in 2009 are anticipated to return to the creek. Major components of the 2014 project include the following:

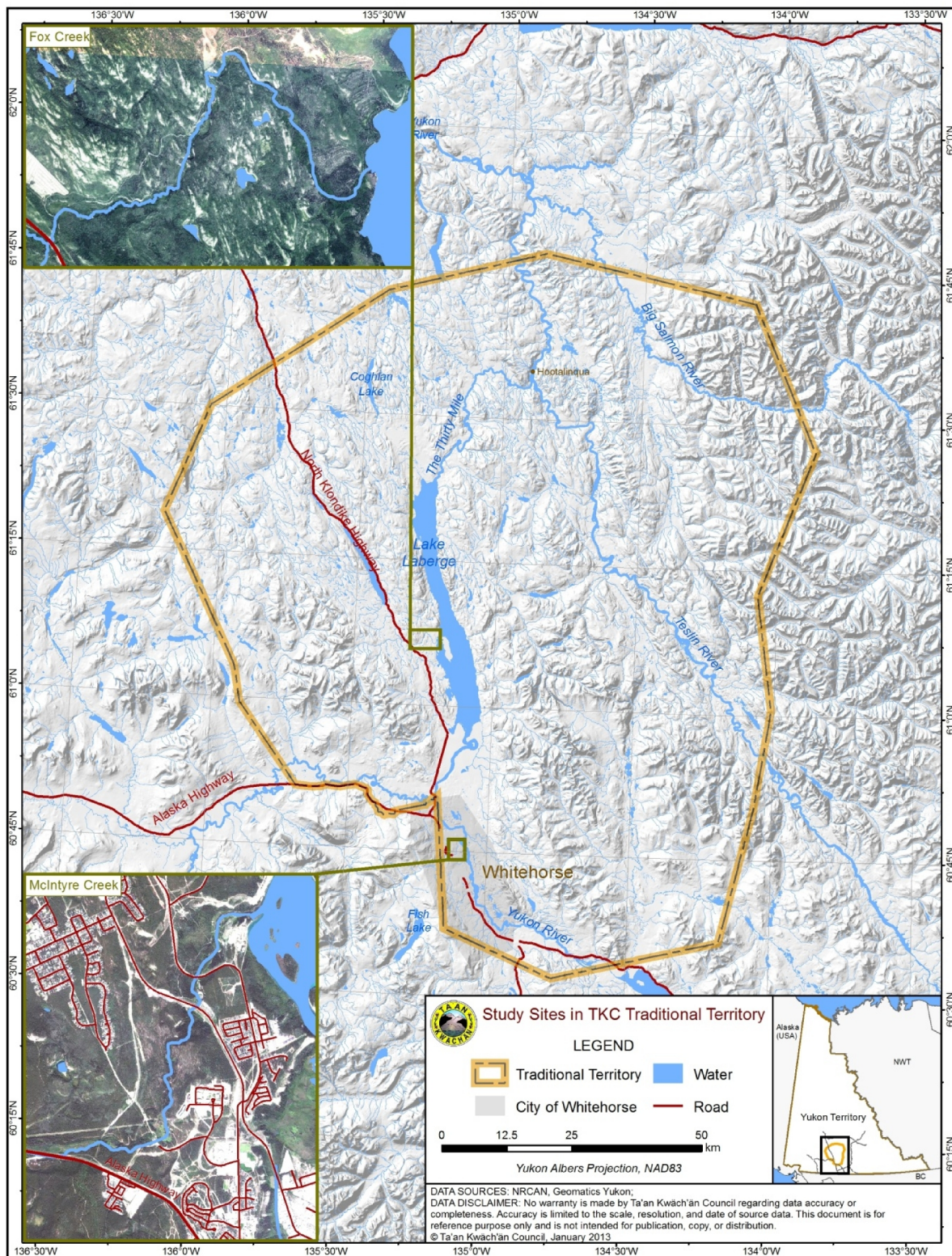
- Training of stewards (formal and through mentorship opportunities).
- Implementation of the Year 7 of the Restoration Plan, which includes:
  - Bio-physical monitoring of Fox Creek at the four designated monitoring stations on a monthly basis from May – September to monitor juvenile utilization
  - Monitoring and support of daily maintenance and operations at the McIntyre Creek Incubation Facility, where salmon fry for Fox Creek are being incubated and reared.
  - Annual fry release into Fox Creek in early July.
  - Monitoring adult salmon returns to Fox Creek through weekly stream walks and document any potential barriers to upstream migration; and
  - Collection of biological samples from Fox Creek.

Results of stewardship and restoration activities are provided each year in an updated version of this document. The Record of Activities (Appendix A) summarizes the annual activities and provides stream-specific recommendations for the following year. It should be noted that this report is intended to provide a description of project activities and outcomes, but not a comprehensive analytical or otherwise interpretive description of project results. More detailed results can be found in the appendices.

## PROJECT LOCATION

The TKC Traditional Territory encompasses a portion of the upper Yukon River Watershed, including the South Big Salmon River, a portion of the Teslin River (*Hodilin Chù*), the "30 Mile" portion of the Yukon River (*Tágà Shāw Jädäļ*), Lake Laberge (*Tàa'an Män*), the Yukon River between Lake Laberge and Marsh Lake (*Tàkwädàdhāni*), a portion of the lower Takhini River (*Nakhū Chù*), the M'Clintock River (*Gyū Chù*), as well as a variety of smaller tributaries to these water bodies. Field investigations in 2013 were conducted on the Yukon River mainstem near Whitehorse (*Kwanlin*), Fox Creek (*Kwätän'aya Chù*), tributary to Lake Laberge and McIntyre Creek (*Tätsān Chù*), tributary to the Yukon River.





## Project Planning and Implementation

Project implementation was guided by an approved work plan, as required by the Yukon River Panel. Stewardship activities were planned based upon available salmon-related information for the TKC Traditional Territory, including relevant past R&E projects (CRE-93N-04; Anderton 2005), and the Record of Activities from the 2008-2013 TKC Stewardship Projects (CRE-54; Marjanovic 2008, 2009; TKC 2010, 2011, 2012, 2013).

Both the lead and technician steward positions were filled by young TKC citizens. Fish and Wildlife Steward, Coralee Johns has been working on the Stewardship Project since 2007. Community Technician Steward, Shawna Tizya was hired for her second year in the program.

The project was based out of the TKC Lands, Resources and Heritage office in Whitehorse, YT and most field equipment was supplied by TKC from past surplus funds from the R&E and TKC contribution dollars. Dawna Hope, TKC Senior Manager of Lands, Resources and Heritage (LRH), oversaw the overall planning and administration of the project, once she started with TKC on July 21, 2015. Coralee Johns, the TKC Fish and Wildlife Steward, helped coordinate project planning and supervised all field work and reporting. Other TKC LRH staff contributed to the project by assisting with monitoring work throughout the year.

A pre-season planning meeting was conducted by Coralee Johns and Sean Collins of Fisheries and Oceans Canada (DFO). From this meeting the Stewardship Program was directed to assist at the McIntyre Creek Incubation Facility during the early salmon life stages of eyed eggs, alevins, fry and coded wire tagging of the fry; to focus on Fox Creek juvenile monitoring of wild and enhanced rearing, and to conduct stream walk investigation for the presence of adult returns and spawners, at Fox Creek.

Yukon River Panel protocols for Canadian R&E projects were adhered to, including those for the collection and reporting of data from the sampling of juvenile salmon (YRP 2009a) and obstruction management (YRP 2009b).

Fish sampling and transport/transplant activities were conducted under license TL14-05 issued by DFO and Yukon Government.

### Recommendations:

- Review, and develop where necessary, safety protocols specific to stewardship activities;
- Coordinate pre- and post-season meetings with project partners;
- Continue emphasis on employing young TKC citizens in stewardship positions;
- Continue to integrate stewardship activities into TKC LRH Department by identifying opportunities for other department staff to contribute skills, expertise and time to the Stewardship Project;
- Continue to build linkages between stewardship activities and goals, and existing TKC programs such as Culture Camps and Family Fish Camp;
- Provide education and awareness about the Chinook salmon decline and best practices and conservation efforts towards tangible results with TKC Citizens and youth and the general public;
- Attend Yukon River Panel meetings on an annual basis, for updates, the pre-season outlook and to gain knowledge and understanding on the marine ecology, the Yukon River system and Alaskan Tribal communities.



## Training

Project training needs were determined on an individual basis, depending on each Steward's existing credentials, certificates and experience. Opportunities for training included both formal (first aid and bear safety) and informal training opportunities such as workshops, mentoring and experiential learning with professional biologists. All training opportunities were in kind contributions from TKC and or other organizations time and efforts.

In 2014, the Stewards did not require any formal training, as all certificates were up to date. Field mentoring opportunities included the following:

- Juvenile Chinook utilization and habitat assessments of the Fox Creek and the stream channel restoration works with Al von Finster;
- Water quality technician training from the Yukon River Inter-Tribal Watershed Council (YRITWC), including recertification for Coralee Johns and first year training for Shawna Tizya; the YRITWC supplied the equipment and sample bottles to conduct water quality sampling every two weeks during the open water season within the TKC Traditional Territory as a part of their Water Quality Monitoring Program. The United States Geological Survey (USGS) are providing the shipping and analytical costs towards this 10 year project. All documents will be shared with YRITWC, respected First Nations and the Yukon River Panel upon request and completion.

### Recommendations:

- Match formal training opportunities to meet career development goals of stewards;
- Ensure all TKC staff assisting with the program in the future are trained in predator defence and certified for firearm use (Possession and Acquisition Licence – PAL). Note TKC LRH staff completed a 'Predator Defence and Firearms Handling Course' through Arctic Response Canada Ltd. from March 18-19, 2015. Staff will undertake PAL certification prior to the field season.
- Continue to encourage partnerships and mentorship training opportunities with other agencies; and,
- Continue to develop opportunities for Stewards to communicate information about Yukon River salmon and the project to TKC citizens through presentations, articles in the TKC newsletter, articles on the newly updated TKC website (taan.ca), and by including citizens in Stewardship activities (e.g. fry release into Fox Creek).

## Fox Creek Restoration Project - Methods & Results

The *Chinook Salmon Stock Restoration Plan for Fox Creek* was developed in 2008, and outlines methods for each year of the multi-year program. The Restoration Plan recommended that the program be undertaken for two full Yukon River Chinook life-cycles, or twelve years (Anderton 2008a). Planning and operations for the second restoration life-cycle was to be guided by outcomes of the first-cycle. With each year of the project, there is ongoing bio-physical monitoring, trail maintenance, fry releases, stream walks during the spawning period, and broodstock collection and egg incubation.



The 2014 project year, represents Year 7 of the Restoration Plan, when adults are expected to return from the Year 1 and Year 2 fry releases, as well as jacks potentially from Year 3 and Year 4 releases. This year was also the sixth consecutive year of fry releases to the creek.

The following sections summarize the methods and results of each project component and any recommendations for future years of the project. More detailed results are included in the monitoring reports in Appendix B.

## BIO-PHYSICAL MONITORING

### Methods

Monitoring at four stations is conducted monthly from May to September each year. The stations include:

- MS08-01 – located upstream of the North Klondike Highway Crossing approximately 2 km
- MS08-02 – located at the North Klondike Highway Crossing (staff gauge is located here)
- MS08-03 – located approximately 4-5 km downstream of the highway crossing
- MS08-04 – located at the mouth of the creek

Sampling this year was also conducted at the emergence site from 2013, where the first returning adult Chinook were documented.

Each monthly monitoring event includes:

- Juvenile Chinook sampling using four minnow traps per station,
- Measurements of fish fork length and weight,
- Collection of water temperature and dissolved oxygen at each station, and
- A water level reading from the staff gauge (located at MS08-02).

For each juvenile Chinook captured, the TKC stewards record whether the fish is hatchery raised (adipose fin clipped) or wild (adipose fin present). A sub-sample to a maximum of 30 hatchery fry per station were anaesthetized, measured for fork length (nearest millimeter) and weighted (nearest 0.1 gram). Salmon were blotted prior to weighing and the scales used were calibrated and placed on a level surface.

In 2014, sampling events took place in May, June, July and October. The sampling conducted in May typically documents hatchery and wild fish that have overwintered successfully in the creek. Sampling in June represents baseline conditions prior to the annual fry release. The July sampling event occurs after a few weeks after the fry release, and subsequent monitoring events provide information on distribution and growth rates of juvenile salmon in the stream. Of note, no sampling was conducted in August 2014 due to a grizzly bear being present in the area. The September 2014 sampling event was also postponed to early October 2014.

## Results

A total of 81 juvenile Chinook salmon were captured during the four monitoring events (May, June, July, and October). Five of the 81 juvenile Chinook captured were wild fish with adipose fins present, while the remaining fish had clipped adipose fins and were assumed to be hatchery raised fry released in the creek. Other species captured during the project included a total of 46 slimy sculpin, 2 Arctic grayling fry, and 1 longnose sucker fry.

Water temperature and dissolved oxygen data was collected consistently at each monitoring station during each event, however the staff gauge measurement from the MS08-02 station was not consistently recorded (only for the July and October 2014 monitoring event).

Sampling was conducted by Coralee Johns, Shawna Tizya, Testloa Smith, Claudia Wickert, Tammy Joe, Shailyn Drukis (Y2C2 Leader) and Clayton Kane.

During the May 2014 monitoring event, eight hatchery fish were captured at the MS08-02 station, three hatchery fish were captured at MS08-03 and two hatchery fish were captured at the 2013 emergence site. In addition to the hatchery fish captured with their clipped adipose fins, three wild fish were captured at MS08-03 and one wild fish was captured at the 2013 emergence site. Juvenile Chinook fork lengths and weights ranged from 70 mm to 91 mm and 3.5 g to 7.9 g, respectively. The fork lengths indicate that all fish are 1+ age class, and have successfully overwintered in the creek.

During the June 2014 monitoring event, only six juvenile Chinook were captured. All Chinook captured had clipped adipose fins (hatchery raised fry) and had fork lengths from 90 mm to 122 mm, and weights of 8.1 to 8.3 g, indicating 1+ fish. It is assumed that these fish should be starting their outmigration downstream to the Yukon River.

The July 2014 monitoring event took place 15 days after the 2014 fry release (July 13, 2014). A total of 36 juvenile Chinook salmon were captured at the MS08-02 station where the hatchery fry had been released, all but one of these fish captured had clipped adipose fins. A single juvenile Chinook was also captured at the MS08-03 station (it was not recorded whether this fish had a clipped adipose fin due to time constraints and a medical emergency). Juvenile Chinook salmon fork lengths collected during this monitoring event ranged from 54 mm to 65 mm, with fish weights of 1.3 g to 3.7 g, suggesting that all fish are 0+.

No sampling took place in August due to safety concerns attributed to grizzly bears in the area. There was also no sampling conducted in September 2014, due to scheduling conflicts, and a fall monitoring event was conducted instead in early October 2014. In October, 21 juvenile Chinook were captured, and all had clipped adipose fins. Fish fork lengths ranged from 55 mm to 83 mm, with fish weights of 2.0 to 5.8 g, indicating some growth since the July 2014 event. These fish were all captured around the release site (MS08-02).

A summary of fish capture numbers at each station is provided in Table 1 below. Additional details on each monitoring event are provided in individual monthly reports in Appendix B.

**Table 1.** Number of juvenile Chinook salmon captured during the 2014 bio-physical monitoring program.

Monitoring Events	MS08-01	MS08-02	MS08-03	MS08-04	Emergence Site (2013) <sup>1</sup>	TOTAL
May 26-27, 2014	0	8	6	0	3	<b>17</b>
Jun 26-27, 2014	6	0	0	0	0	<b>6</b>
Jul 28-29, 2014	0	36	1	0	0	<b>37</b>
Oct. 2-3, 2014	0	21	0	0	n/a	<b>21</b>
<b>TOTAL</b>	<b>6</b>	<b>65</b>	<b>7</b>	<b>0</b>	<b>3</b>	<b>81</b>

Notes: <sup>1</sup> - No sampling at emergence site in October.

## MCINTYRE CREEK INCUBATION FACILITY

Juvenile Chinook raised for the Fox Creek Salmon Restoration Project are incubated at the McIntyre Creek Incubation Facility (MCIF) using broodstock collected from the Whitehorse Rapids Fish Ladder. Operations for the 2013-14 season were managed by Yukon College's Darrel Otto, with assistance from the TKC Stewards and Yukon Government Y2C2 crews.

### 2013-14 Year:

Chinook salmon arrived at the facility in the eyed-egg stage in October 2013, and after that the TKC assisted with daily operations to clean trays and remove any discoloured eggs. During December 2013 and January 2014, the eyed-eggs had developed in alevins. During this stage of development, the TKC continued to visit the site daily and clean screens and monitor flows and water temperatures. In April 2014, DFO determined when the fish were ready for transport to the troughs. In the troughs, the young fry were fed daily and rates of flow, water levels and temperature were monitored. The MCIF reported at least one major unforeseeable incident which affected eyed-egg survival, resulting in a large loss of eyed-eggs. Regardless of the loss, 17,100 fry were still available for release in 2014.

Each Chinook salmon raised at the hatchery was applied with a coded wire tag and the adipose fin was clipped. An estimated total of 17,100 fry were incubated for the 2014 release.

A brief summary of work completed at the MCIF in 2013-14 is provided in Appendix B.

### 2014-15 Year:

For the 2015 release, approximately 50,000 eggs were moved to the MCIF in October 2014 and are currently at the MCIF. An update on the current survival rate is not available at this time.

## FRY TRANSPORT & RELEASE

Fry releases into Fox Creek have taken place annual from 2009 to present. The 2014 fry release was scheduled for July 13, 2014. Several TKC staff, a TKC elder and TKC and college students assisted with the release. A total of 17,1000 fry were transported from the MCIF to the Fox Creek release site. To date, over 205,338 fry have been released into the creek.

Water temperature and dissolved oxygen were closely monitored within the transport tote and were all within suitable ranges during transport. Once at Fox Creek, the tote water temperature was gradually increased using water from Fox Creek, to allow the fry to become accustomed to the warmer water at the release site. Prior to release, a prayer was shared by Elder Norman Adamson. No fry mortalities occurred during transport or release.

A brief summary report with more details of the fry release is provided in Appendix B.

## TRAIL MAINTENANCE

In 2009, a foot path was completed along the length of Fox Creek from the mouth of the creek at Lake Laberge to the North Klondike Highway crossing to provide access to the creek for monitoring activities. The foot path was built from 2007 to 2009, by the TKC Stewards with assistance from Y2C2 crews. Brush saws and brush cutters were used for trail clearing. Trail maintenance was completed during the 2012 program with the assistance of Y2C2 trail crews.

No trail maintenance was conducted in 2014. Many sections of the trail were overgrown and trail maintenance should be a priority for the 2015 program, as easy and safe access to the creek is required for all project components. In particular, a well-maintained trail will allow for better sight lines for detecting bears and preventing close encounters (see next section below regarding bear encounters in 2014).

## MONITORING ADULT SALMON RETURNS & BARRIERS

### Methods

Stream walks from the mouth of Fox Creek to the highway crossing are conducted on a weekly basis from July through August, to detect the presence of Chinook salmon returning to the creek. As mentioned above in this document, 2014 represented the potentially return of four and five-year old Chinook released in 2009 and 2010, as well as the potential return of jacks from the 2010 and 2012 releases.

The Fox Creek trail is used for access to the area, and represents approximately 14 km of rugged trail. Stream walks were typically conducted over two days. During the walk, observers were looking for the presence of live adult Chinook, Chinook carcasses, and spawning redds. Observers were to describe any fish observed including markings, injuries, size, sex and behaviour. If carcasses were found, scale samples and heads were collected for submission to DFO. The location of any spawning evidence was recorded using a GPS and the site was flagged with ribbon. Observers also documented any potential obstructions or barriers to adult upstream migration.

### Results

Stream walks were conducted by the TKC Stewards as well as Sean Collins of DFO during four events:

- July 23/24 – TKC Stewards & J. Bunbury (TKC Citizen)

- August 6/7 – TKC Stewards
- August 15 – S. Collins (DFO)
- August 20/21 – TKC Stewards

No adult salmon or carcasses were documented during any of the stream walks. The Stewards did observe more bears, bear sign and eagles in the area this season. In particular, grizzly bears were observed in the area quite frequently, with the Stewards running into one grizzly bear on August 21, 2014. TKC attempted to hire a TKC citizen (in-kind) for the purpose of carrying a firearm during the stream walks to act as a Bear Monitor. However, a suitable applicant was not hired, which limited the ability of the Stewards to complete additional surveys of the stream.

Large beaver dams were noted in the upper reaches of the creek upstream of the highway crossing, but no significant barriers were identified in the lower reaches of the creek during the stream walk surveys or regular monthly monitoring events. Thus it appears that access for any returning adult spawners has been maintained in 2014.

A brief summary report with more details of the stream walks completed in 2014 is provided in Appendix B.

## Discussion

The TKC Community Stewardship and Fox Creek Salmon Restoration Project have seen many successes since the onset of the program in 2007. Over the years, the Stewardship program has served to increase the capacity of the TKC LRH Department as well as TKC citizens for this type of salmon restoration work. The restoration of Chinook salmon to Fox Creek has been a high priority for TKC, and the R&E project has shifted from one of capacity building to focus on restoration in recent years. The 2013 year marked the return of the first adult spawners to Fox Creek, and a total of 205,338 hatchery-raised fry have been released to date in the creek from 2009-2014.

Results from 2014, are similar to other years of the project, with both hatchery-raised and wild juvenile Chinook salmon utilizing Fox Creek for rearing and overwintering habitat. During the May and June 2014 sampling event, 1+ juvenile Chinook were captured, indicating that they had successfully overwintered in the creek. On July 13, 2014, a total of 17,100 fry were released to the creek. Sampling after the release date in July and October 2014, provided information on distribution and growth of the released fry, as the fry fork lengths and weights had increased from July to October 2014.

Since this represents Year 7 of the Restoration Plan, a significant amount of data has been collected for the program to date, including juvenile Chinook fork lengths and weights. While the data is reported on an annual basis, it would be valuable to look at all data as a whole. There is also continuous water temperature data available for the creek, which TKC has been collecting with DFO and Al von Finster. There is therefore a strong dataset of temperature and fish condition and growth that could be reviewed and analyzed to offer insights into the condition of hatchery-raised fry in Fox Creek during the program. Additional monitoring stations and sampling events may be warranted to allow for proper



statistical analysis. Of note, only 81 juvenile Chinook were captured in 2014 during four sampling events, as the August and September monitoring events did not take place.

One difficulty with the 2014 project, was that no adult Chinook salmon were documented spawning in the creek in 2014. Observers conducted stream walk surveys during four two-day events from July 23 to August 21, 2014. The extent of the survey coverage and the frequency of surveys were limited this year by bear activity in the area. While the TKC LRH Department attempted to hire a bear monitor to join Stewards during stream walks as a precautionary safety measure, no suitable candidates could be hired. As such, survey effort was limited and no adult Chinook were documented. TKC has since undertaken training of LRH staff in Predator Defence Training (March 2015), and will seek to certify staff in firearm use (PAL certification) prior to field work in 2015.

Also, while the stream walks have successfully observed returning spawners on one occasion in 2013, this method may not be the most effective for monitoring and enumerating adult salmon returns, as there is a high probability that observers could miss spawners or carcasses could be removed quickly by wildlife. TKC could use suitable technology such as Didson Sonar or underwater video cameras installed near the creek mouth to effectively observe returning adults and provide a better means of enumerating returning salmon. Stream walks would still be required to attempt to locate spawning locations and document any obstructions.

## Program Recommendations

Given the results and discussion above, the following recommendations are listed below to help improve the program in future years.

### *Planning, Implementation and Training:*

- Coordinate **pre- and post-season meetings** with project partners.
- Continue to **employ young TKC citizens** in stewardship positions.
- Provide **education and awareness about the Chinook salmon** decline and best practices and conservation efforts towards tangible results with TKC Citizens and youth and the general public (through news articles, articles on the TKC website, articles in TKC newsletters, etc.) .
- **Attend Yukon River Panel meetings** on an annual basis, for updates, the pre-season outlook and to gain knowledge and understanding on the marine ecology, the Yukon River system and Alaskan Tribal communities
- **Continue to build partnerships and mentorship training opportunities** for Stewards with other agencies, such as the Yukon College, MCIF, DFO, and YRITWC.
- TKC will ensure all LRH staff are fully certified in **predator defence training and firearms use**.

*Fox Creek Restoration Project:*

- With the expected release of up to 50,000 fry in 2015, the program should consider establishing **additional release sites** and staggering release dates to accommodate the larger numbers of fry.
- The **intensity of fish sampling during the bio-physical monitoring events should be increased**, with more stations established along the creek and an effort to at least sample monthly
- **Develop standard datasheets for each bio-physical monitoring event** to help collect consistent data, including water temperature and dissolved oxygen at each monitoring station, and water level at the staff gauge (this was often missed during the monitoring events).
- Based on recommendations under the Restoration Plan, **stream gauging** should be conducted during regular monitoring events. Discharge data has been collected sporadically during other years of the program. A space for this data could be added to the standard datasheet noted in the above recommendation.
- **A database** should be developed to house all of the bio-physical monitoring data. This would create a central location for all data and allow for easy access for any multi-year analysis. The continuous water temperature data could also be housed in this database.
- Develop an **adult enumeration plan** for expected future adult returns of the program. Consider options such as Didson sonar and underwater video cameras. Of note, the 2012 fry release was the largest fry release to date (>80,000 fry released) for the project and therefore effectively enumerating returns from this year should be a high priority.
- Continue to **monitor beaver activity** and potential obstructions to migrating adult salmon, during all monitoring events. A map of the status of beaver dams along the creek should be conducted in July prior to the spawning period.
- Many sections of the Fox Creek access trail were overgrown in 2014 and **trail maintenance** should be a priority for the 2015 program, as easy and safe access to the creek is required for all project components (particularly line of sight for early-detection of bears).

## References

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## ***Appendix A – Record of Activities***

## **Fox Creek Chinook Salmon Stock Restoration Plan**

### **Fox Creek Drainage Area 399.4 km<sup>2</sup>**

Fox Creek enters the west side of Lake Laberge north of the Deep Creek residential area and campground, approximately halfway along the length of the lake. Fox Creek is crossed by the North Klondike Highway approximately 8 km upstream from Lake Laberge. Chinook salmon spawned in the creek at one time (von Finster, pers. comm), but spawning has not been reported since the 1970s. The creek is accessible from the highway and at various points along the Fox Creek Road and other 4x4 roads and trails.

### **2014**

Activities associated with Year 7 of the *Fox Creek Chinook Salmon Stock Restoration Plan* were implemented this year. This included monthly bio-physical monitoring at four monitoring stations (MS08-01, MS08-02, MS08-03, and MS08-04) as well as at the 2013 emergence site (spawning site) during some events. Monitoring was conducted in late-May, late-June, late-July and early-October. There was no late-August event due to safety concerns associated with bear activity in the area. Y2C2 crews assisted with some sampling.

A total of 17,100 fry were released in the creek this year. These fry had been raised at the McIntyre Creek Incubation Facility (where the Stewards assisted with cleaning and monitoring from October 2013-July 2014), and were tagged with wire coded tags and clipped adipose fins prior to release.

No trail maintenance was completed on the Fox Creek access trail.

Four stream walk events were conducted by the Stewards and DFO during the spawning period to attempt to document returning adult salmon. Walks were conducted on July 23/24, August 6/7, August 15, and August 20/21, 2014. No carcasses or adult spawners were observed. Surveys were limited due to safety concerns again with bears in the area.

Stewards did not participate in broodstock collection this year as the Whitehorse Rapids Fishway, Lawrence Vano took on the role. Approximately 50,000 eggs have been allocated to the Fox Creek program for the 2015 release (i.e. Year 8 of the Restoration Plan).

### **Recommendations for 2015:**

- Coordinate the release of hatchery fry in July (consider increasing number of release sites and stagger release dates to accommodate the large number of expected fry).
- Meet with Whitehorse Rapids Fishway Hatchery staff to discuss broodstock collection for 2016 release.
- Continue monthly bio-physical monitoring components of the plan:
  - o Consider increasing number of stations to increase sample size



- Develop standard datasheets to be used for monitoring work to allow for consistent data collection (water temperature, dissolved oxygen, water level at staff gauge, discharge data).
  - Enter all data into a central database (including continuous water temperature data).
- Conduct trail maintenance along entire trail in June and /or July prior to spawning period.
- Continue to monitor beaver activity and potential obstructions to migrating adult salmon, during all monitoring events. A map of the most up to date status of beaver dams along the creek should be conducted in July prior to the spawning period.
- Develop an adult enumeration plan for expected future adult salmon returns, looking at technologies such as sonar or underwater video.
- Conduct stream walks to locate spawning locations.

***Appendix B – Supporting Documents – Individual Monitoring Reports 2014***



## Fox Creek Bio-Physical 2014

### OVERVIEW

<b>Project Name:</b>	Fox Creek Bio-Physical Monitoring 2014
<b>Date:</b>	May 26/27, 2014
<b>General Location:</b>	Fox Creek Bridge from North Klondike Hwy to mouth @ Lake Laberge
<b>Field Samplers:</b>	Coralee Johns, Testloa Smith, Claudia Wickert
<b>Report Prepared By:</b>	Shawna Tizya and Coralee Johns

## OBJECTIVE OF WORKS

The purpose of the bio-physical monitoring work on Fox Creek is to monitor the extent of juvenile Chinook utilization as part of the plan to restore Chinook salmon stocks to Fox Creek. The monitoring work is outlined in the Fox Creek Chinook Salmon Stock Restoration Plan. The bio-physical monitoring includes monthly minnow trapping from May to September at four monitoring stations (MS08-01, MS08-02, MS08-03, and MS08-04), in addition to measurements of water temperature, dissolved oxygen and water depth. The restoration plan also includes identifying suitable rearing, overwintering and spawning habitats; monitoring of beaver activity and barriers to migration, and the observation of returning adult spawners and their redds during the spawning period.

This memo report summarizes monitoring completed in May 2014 – which represents baseline data for the beginning of the 2014 open water season, prior to any additional fry releases.

## METHODS

- 1) During each sampling event, four minnow traps (mesh sizes 1/4" and 1/8") were set at each of the four stations, in addition to two traps at the 2013 emergence site, for a total of 18 traps.
- 2) Water temperature and dissolved oxygen was measured at each station and the water level as indicated on the staff gauge at the hydrometric station at MS08-02 was noted.
- 3) All juvenile Chinook salmon that were captured during fish sampling were enumerated and a sub-sample to a maximum of 30 per station were anaesthetized, measured for fork length (nearest millimetre) and weighed (nearest 0.1 gram). Fish were blotted prior to weighing and the scales used were calibrated and placed on a level surface. The presence or absence of the adipose fin was noted (to denote whether the fish was hatchery raised or wild).
- 4) Habitat descriptions were noted and GPS points collected, with photos for reference from year to year to detect ecosystem changes.

## RESULTS

A total of 17 juvenile Chinook salmon were captured during the May 2014 monitoring event, including eight Chinook at MS08-02, six at MS08-03, and three at the emergence site (Table 1). Only slimy sculpin was captured at MS08-01 and at MS08-04. Slimy sculpin were also captured at MS08-02 and at the emergence site. One of the traps at MS08-04 had been pulled out of the water when the crew returned to the site, likely from wildlife.

All eight Chinook salmon captured at MS-02 had clipped adipose fins suggesting that they are hatchery released fish from the 2013 release (Table 1). At the MS08-03 station and the emergence site, there was a mix of wild and hatchery fish.

Chinook salmon fork lengths ranged from a minimum of 70 millimetres to a maximum of 91 millimetres (Table 1). The fish weights ranged from 3.5 g to 7.9 g. Based on the timing of this sampling event and the fork lengths of the fish, it appears that these juvenile Chinook salmon have overwintered in the creek, and are within the 1+ age class.

Water temperature and dissolved oxygen data for each station is recorded in Table 2. There was no staff gauge measurement for the May 2014 event.

**Table 1. May 2014 fish sampling results (CH – Chinook Salmon, CCG – Slimy Sculpin, FL – Fork Length).**

May 27, 2014	MS08-01				MS08-02			
	CH FL (mm)	Weight (g)	Clipped adipose?	Other Species	CH FL (mm)	Weight (g)	Clipped adipose?	Other Species
	-	-	-	1 CCG	76	7.9	Y	1 CCG
					87	6.2	Y	
					74	4.4	Y	
					71	4.7	Y	
					73	3.9	Y	
					70	3.5	Y	
					72	4.0	Y	
					70	4.0	Y	
	TOTAL: 1 CCG				TOTAL: 8 CH, 1 CCG			
	MS08-03				Emergence Site			
	75	3.6	Y		81	5.6	N	1 CCG
	81	4.9	N		73	3.9	Y	
	87	6.1	N		72	4.6	Y	
	80	5.0	Y					
	91	7.2	Y					
	79	4.5	N					
	TOTAL: 6 CH				TOTAL: 3 CH, 1 CCG			
	MS08-04 - Mouth							
	-	-	-	2 CCG				
	TOTAL: 2 CCG							



**Table 2 – Minnow trap set data including water depth, water temperature, and dissolved oxygen.**

MS08-01 – May 26, 2014 @11:37 am

Minnow Trap #	1	2	3	4
Water Depth	37 cm	30 cm	40 cm	44 cm
Water Temperature	8.6 °C			
Dissolved Oxygen Saturation	91 %			
Dissolved Oxygen	9.7 mg/L	Comments: Water is brownish in colour.		

MS08-02 – May 26, 2014 @12:17 am

Minnow Trap #	5	6	7	8
Water Depth	37 cm	34 cm	32 cm	54 cm
Water Temperature	8.3 °C			
Dissolved Oxygen Saturation	93 %			
Dissolved Oxygen	9.0 mg/L	Comments: n/a		

MS08-03 – May 26, 2014 @2:19 pm

Minnow Trap #	13	14	15	16
Water Depth	37 cm	73 cm	61 cm	34 cm
Water Temperature	9.8 °C			
Dissolved Oxygen Saturation	96 %			
Dissolved Oxygen	10.0 mg/L	Comments: Turbid water, brownish in colour.		

EMERGENCE SITE – May 26, 2014 @2:40 pm

Minnow Trap #	17	18	19	20
Water Depth	58 cm	27 cm		
Water Temperature	10.1 °C			
Dissolved Oxygen Saturation	95 %			
Dissolved Oxygen	9.9 mg/L	Comments: n/a		

MS08-04 (MOUTH) – May 26, 2014 @1:24 pm

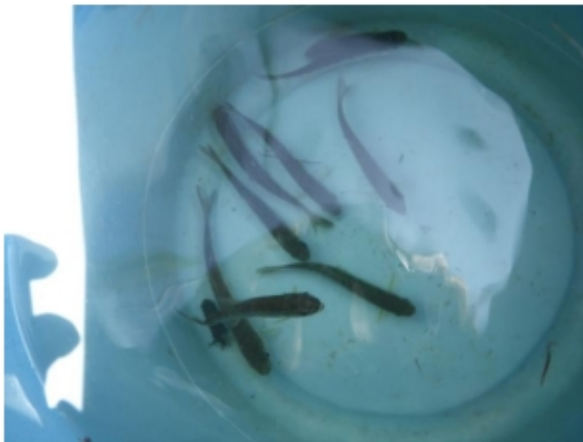
Minnow Trap #	9	10	11	12
Water Depth	25 cm	29 cm	37 cm	39 cm
Water Temperature	8.7 °C			
Dissolved Oxygen Saturation	95 %			
Dissolved Oxygen	10.2 mg/L	Comments: Water is grey in colour.		

## PHOTOS



*Beautiful Chinook with its  
Adipose Fin*

*Coralee Sampling a Juvenile  
Chinook @ MS-08-2*



*Juvenile  
Chinook ready for sampling  
@ MS-08-2*

*Looking downstream @  
substrate towards the  
bridge.*



*Sampling Station @  
MS-08-2  
Below bridge.*

*Vandalized trap done by  
(Otter, Lynx. Or Beaver)*





## Fox Creek Bio-Physical 2014

### OVERVIEW

<b>Project Name:</b>	Fox Creek Bio-Physical Monitoring 2014
<b>Date:</b>	June 26/27, 2014
<b>General Location:</b>	Fox Creek Bridge from North Klondike Hwy to mouth @ Lake Laberge
<b>Field Samplers:</b>	Coralee Johns, Tammy Joe, Y2C2 Leader Shailyn Drukis
<b>Report Prepared By:</b>	Shawna Tizya and Coralee Johns

## OBJECTIVE OF WORKS

The purpose of the bio-physical monitoring work on Fox Creek is to monitor the extent of juvenile Chinook utilization as part of the plan to restore Chinook salmon stocks to Fox Creek. The monitoring work is outlined in the Fox Creek Chinook Salmon Stock Restoration Plan. The bio-physical monitoring includes monthly minnow trapping from May to September at four monitoring stations (MS08-01, MS08-02, MS08-03, and MS08-04), in addition to measurements of water temperature, dissolved oxygen and water depth. The restoration plan also includes identifying suitable rearing, overwintering and spawning habitats; monitoring of beaver activity and barriers to migration, and the observation of returning adult spawners and their redds during the spawning period. This memo report summarizes monitoring completed in June 2014.

## METHODS

- 1) During each sampling event, four minnow traps (mesh sizes 1/4" and 1/8") were set at each of the four stations, in addition to two traps at the 2013 emergence site, for a total of 18 traps.
- 2) Water temperature and dissolved oxygen was measured at each station and the water level as indicated on the staff gauge at the hydrometric station at MS08-02 was noted.
- 3) All juvenile Chinook salmon that were captured during fish sampling were enumerated and a sub-sample to a maximum of 30 per station were anaesthetized, measured for fork length (nearest millimetre) and weighed (nearest 0.1 gram). Fish were blotted prior to weighing and the scales used were calibrated and placed on a level surface. The presence or absence of the adipose fin was noted (to denote whether the fish was hatchery raised or wild).
- 4) Habitat descriptions were noted and GPS points collected, with photos for reference from year to year to detect ecosystem changes.

## RESULTS

A total of six juvenile Chinook salmon, sixteen slimy sculpin and one Artic grayling were captured during the June 2014 monitoring event (Table 1). Juvenile Chinook were only



captured at MS08-01. All six juvenile Chinook salmon captured had clipped adipose fins suggesting that they are hatchery released fish from the 2013 fry release (Table 1). No wild salmon were captured.

Chinook salmon fork lengths ranged from a minimum of 90 mm to a maximum of 122 mm (Table 1). The fish weights ranged from 8.1 g to 8.3 g. Based on the timing of this sampling event and the fork lengths, these juvenile Chinook salmon are within the 1+ age class and have overwintered in the creek (2013-14). It is expected these fish should soon be starting their outmigration downstream and out the Yukon River to the Bering Sea to complete the ocean portion of their life cycle.

Water temperature and dissolved oxygen data for each station is recorded in Table 2. There was no staff gauge measurement for the June 2014 event.

**Table 1 – June 2014 fish sampling results.**

June 27, 2014	MS08-01				MS08-02			
	CH FL (mm)	Weight (g)	Clipped adipose?	Other Species	CH FL (mm)	Weight (g)	Clipped adipose?	Other Species
	97	8.1	Y	6 CCG, 1 GR	-	-	-	-
	113	8.3	Y					
	122	8.1	Y					
	112	8.1	Y					
	90	8.3	Y					
	100	8.2	Y					
	TOTAL: 6 CH, 6 CCG, 1 GR				TOTAL: NFC			
	MS08-03				MS08-04 - Mouth			
	-	-	-	3 CCG	-	-	-	3 CCG
	TOTAL: 3 CCG				TOTAL: 3 CCG			
	Emergence Site							
	-	-	-	4 CCG				
	TOTAL: 4 CCG							

**Note:** CH – Chinook Salmon, GR – Arctic Grayling, CCG – Slimy Sculpin, NFC – No Fish Caught, FL – Fork Length

**Table 2 – Minnow trap set data including water depth, water temperature, and dissolved oxygen.**

MS08-01 – June 26, 2014 @11:15 am

Minnow Trap #	1	2	3	4
Water Depth	68 cm	29 cm	25 cm	30 cm
Water Temperature	8.7 °C			
Dissolved Oxygen Saturation	89 %			
Dissolved Oxygen	9.4mg/L	Comments: n/a		

MS08-02 – June 26, 2014 @12:10 am

Minnow Trap #	5	6	7	8
Water Depth	19 cm	24 cm	57 cm	43 cm
Water Temperature	9.5 °C			
Dissolved Oxygen Saturation	93 %			
Dissolved Oxygen	9.6 mg/L	Comments: MT 6 – small grayling fry observed nearby.		

MS08-03 – June 26, 2014 @2:00 pm

Minnow Trap #	13	14	15	16
Water Depth	55 cm	54 cm	36 cm	32 cm
Water Temperature	11.4 °C			
Dissolved Oxygen Saturation	93 %			
Dissolved Oxygen	9.2 mg/L	Comments: Full to partial sun, large woody debris cover.		

MS08-04 (MOUTH) – June 26, 2014 @12:45 pm

Minnow Trap #	9	10	11	12
Water Depth	37 cm	72 cm	40 cm	37 cm
Water Temperature	9.9 °C			
Dissolved Oxygen Saturation	94 %			
Dissolved Oxygen	9.8 mg/L	Comments: Partial sun, overhanging vegetation cover.		

EMERGENCE SITE – June 26, 2014 @2:20 pm

Minnow Trap #	17	18	19	20
Water Depth	45 cm	18 cm		
Water Temperature	11.9 °C			
Dissolved Oxygen Saturation	93 %			
Dissolved Oxygen	9.2 mg/L	Comments: Partial to full sun, overhanging vegetation cover.		

## PHOTOS



*Abandoned beaver dam a few hundred meters upstream of MS08-03.*

*Shailyn and Coralee walking down to MS08-03 to pull traps and measure fish.*





## Fox Creek Bio-Physical 2014

### OVERVIEW

<b>Project Name:</b>	Fox Creek Bio-Physical Monitoring 2014
<b>Date:</b>	July 28/29 2014
<b>General Location:</b>	Fox Creek Bridge from North Klondike Hwy to mouth @ Lake Laberge
<b>Field Samplers:</b>	Coralee Johns, Shawna Tizya, Clayton Kane and Testloa Smith
<b>Report Prepared By:</b>	Shawna Tizya and Coralee Johns

## OBJECTIVE OF WORKS

The purpose of the bio-physical monitoring work on Fox Creek is to monitor the extent of juvenile Chinook utilization as part of the plan to restore Chinook salmon stocks to Fox Creek. The monitoring work is outlined in the Fox Creek Chinook Salmon Stock Restoration Plan. The bio-physical monitoring includes monthly minnow trapping from May to September at four monitoring stations (MS08-01, MS08-02, MS08-03, and MS08-04), in addition to measurements of water temperature, dissolved oxygen and water depth. The restoration plan also includes identifying suitable rearing, overwintering and spawning habitats; monitoring of beaver activity and barriers to migration, and the observation of returning adult spawners and their redds during the spawning period.

This memo report summarizes monitoring completed in July 2014, following release of the 2014 Chinook fry (July 13, 2014).

## METHODS

- 1) During each sampling event, four minnow traps (mesh sizes 1/4" and 1/8") were set at each of the four stations, in addition to two traps at the 2013 emergence site, for a total of 18 traps.
- 2) Water temperature and dissolved oxygen was measured at each station and the water level as indicated on the staff gauge at the hydrometric station at MS08-02 was noted.
- 3) All juvenile Chinook salmon that were captured during fish sampling were enumerated and a sub-sample to a maximum of 30 per station were anaesthetized, measured for fork length (nearest millimetre) and weighed (nearest 0.1 gram). Fish were blotted prior to weighing and the scales used were calibrated and placed on a level surface. The presence or absence of the adipose fin was noted (to denote whether the fish was hatchery raised or wild).
- 4) Habitat descriptions were noted and GPS points collected, with photos for reference from year to year to detect ecosystem changes.

## RESULTS

A total of 37 juvenile Chinook salmon, 25 slimy sculpin and 1 longnose sucker were captured during the July 2014 monitoring event (Table 1). Juvenile Chinook were only captured at MS08-02 and MS08-03. All but one juvenile Chinook salmon captured at MS08-02 had clipped adipose fins, suggesting that most were hatchery released 0+ fish from the 2014 fry release (July 13, 2014). The single Chinook captured at MS08-03, was released immediately with no data collected due to timing constraints, as a medical emergency for one of the stewards had taken place.

Chinook salmon fork lengths ranged from a minimum of 54 mm to a maximum of 64 mm (Table 1). The fish weights ranged from 1.3 g to 3.7 g. No 1+ juvenile Chinook were captured, suggesting that juvenile outmigration had taken place since the last June 2014 monitoring event. Water temperature and dissolved oxygen data for each station is recorded in Table 2. The staff gauge measurement for the July 2014 event was 0.26 m.

**Table 1 – July 2014 fish sampling results.**

	MS08-01				MS08-02			
	CH FL (mm)	Weight (g)	Clipped adipose?	Other Species	CH FL (mm)	Weight (g)	Clipped adipose?	Other Species
July 29, 2014	-	-	-	4 CCG	59	2.1	Y	7 CCG
	TOTAL: 4 CCG				58	2.0	Y	
	MS08-03				57	1.4	Y	
	n/a	n/a	n/a	6 CCG	58	1.3	Y	
	TOTAL: 1 CH, 6 CCG				62	2.2	Y	
	MS08-04 (Mouth)				58	1.8	Y	
	-	-	-	8 CCG, 1 LSU	63	2.2	Y	
	TOTAL: 8 CCG, 1 LSU				58	2.1	Y	
	Emergence Site				58	2.9	Y	
	-	-	-	-	57	1.5	Y	
	TOTAL: NFC				57	1.4	Y	
					56	2.8	Y	
					57	2.8	Y	
					62	2.5	Y	
					58	1.9	Y	
					59	1.8	Y	
					57	2.1	Y	
					58	2.0	Y	
					57	1.9	Y	
					64	2.7	Y	
					59	2.0	Y	
					61	2.2	Y	
					61	2.0	Y	

	CH FL (mm)	Weight (g)	Clipped adipose?	Other Species	CH FL (mm)	Weight (g)	Clipped adipose?	Other Species
					55	1.8	Y	
					58	2.0	N	
					60	2.7	Y	
					59	2.7	Y	
					58	2.5	Y	
					56	2.4	Y	
					54	2.3	Y	
					57	2.5	Y	
					62	3.1	Y	
					57	2.7	Y	
					61	3.6	Y	
					59	3.7	Y	
					58	3.4	Y	
					TOTAL: 36 CH, 7 CCG			

Notes: CH – Chinook salmon, CCG – Slimy Sculpin, LSU – longnose sucker, FL – Fork Length, NFC – No Fish Caught

**Table 2 – Minnow trap set data including water depth, water temperature, and dissolved oxygen.**

MS08-01 – July 28, 2014 @11:42 am

Minnow Trap #	1	2	3	4
Water Depth	58 cm	56 cm	22cm	30 cm
Water Temperature	12.4 °C			
Dissolved Oxygen Saturation	88 %			
Dissolved Oxygen	8.6 mg/L		Comments: n/a	

MS08-02 – July 28, 2014 @11:59 am

Minnow Trap #	5	6	7	8
Water Depth	36 cm	38 cm	35 cm	37 cm
Water Temperature	12.6 °C			
Dissolved Oxygen Saturation	90 %			
Dissolved Oxygen	8.8 mg/L		Comments: n/a	

MS08-03 – July 28, 2014 @2:20 pm

Minnow Trap #	13	14	15	16
Water Depth	44 cm	50 cm	40 cm	29 cm
Water Temperature	13.3 °C			
Dissolved Oxygen Saturation	93 %			
Dissolved Oxygen	9.0 mg/L		Comments: n/a	



MS08-04 (MOUTH) – July 28, 2014 @1:06 pm

Minnow Trap #	9	10	11	12
Water Depth	86 cm	29 cm	27 cm	41 cm
Water Temperature	12.8 °C			
Dissolved Oxygen Saturation	93 %			
Dissolved Oxygen	9.1 mg/L		Comments: n/a	

EMERGENCE SITE – July 28, 2014 @2:33 pm

Minnow Trap #	17	18
Water Depth	44 cm	39 cm
Water Temperature	13.3 °C	
Dissolved Oxygen Saturation	93 %	
Dissolved Oxygen	9.0 mg/L	Comments: n/a

## PHOTOS



*Coralee taking notes at the emergence site.*

*Looking upstream at the MS08-01 area from the North Klondike Highway.*



*Shawna taking a water depth at MS08-01 above the North Klondike Highway.*





## Fox Creek Bio-Physical 2014

### OVERVIEW

<b>Project Name:</b>	Fox Creek Bio-Physical Monitoring 2014
<b>Date:</b>	August 2014
<b>General Location:</b>	Fox Creek Bridge from North Klondike Hwy to mouth @ Lake Laberge
<b>Field Samplers:</b>	Coralee Johns and Shawna Tizya
<b>Report Prepared By:</b>	Shawna Tizya and Coralee Johns

## OBJECTIVE OF WORKS

The purpose of the bio-physical monitoring work on Fox Creek is to monitor the extent of juvenile Chinook utilization as part of the plan to restore Chinook salmon stocks to Fox Creek. The monitoring work is outlined in the Fox Creek Chinook Salmon Stock Restoration Plan. The bio-physical monitoring includes monthly minnow trapping from May to September at four monitoring stations (MS08-01, MS08-02, MS08-03, and MS08-04), in addition to measurements of water temperature, dissolved oxygen and water depth. The restoration plan also includes identifying suitable rearing, overwintering and spawning habitats; monitoring of beaver activity and barriers to migration, and the observation of returning adult spawners and their redds during the spawning period.

This memo report summarizes monitoring completed in August 2014.

## METHODS

- 1) During each sampling event, four minnow traps (mesh sizes 1/4" and 1/8") were set at each of the four stations, in addition to two traps at the 2013 emergence site, for a total of 18 traps.
- 2) Water temperature and dissolved oxygen was measured at each station and the water level as indicated on the staff gauge at the hydrometric station at MS08-02 was noted.
- 3) All juvenile Chinook salmon that were captured during fish sampling were enumerated and a sub-sample to a maximum of 30 per station were anaesthetized, measured for fork length (nearest millimetre) and weighed (nearest 0.1 gram). Fish were blotted prior to weighing and the scales used were calibrated and placed on a level surface. The presence or absence of the adipose fin was noted (to denote whether the fish was hatchery raised or wild).
- 4) Habitat descriptions were noted and GPS points collected, with photos for reference from year to year to detect ecosystem changes.

## RESULTS

The stewards observed more eagles and bears this season. Grizzly bear encounters on Fox Creek during the stream walks and sampling event resulted in no minnow trapping being conducted in August 2014. TKC took the initiative to hire a TKC citizen (in-kind) for the purpose of carrying a firearm while the Steward technicians conducted the sampling; however, a citizen with these qualifications was not hired and therefore no minnow trapping was conducted in August 2014.

DFO identified that observing the stream for adult spawners and redds was of high importance for the program, and results from the stream walks are covered in another memo.



## Fox Creek Bio-Physical 2014

### OVERVIEW

<b>Project Name:</b>	Fox Creek Bio-Physical Monitoring 2014
<b>Date:</b>	October 2/3, 2014
<b>General Location:</b>	Fox Creek Bridge from North Klondike Hwy to mouth @ Lake Laberge
<b>Field Samplers:</b>	Coralee Johns, Shawna Tizya, Clayton Kane and Testloa Smith
<b>Report Prepared By:</b>	Shawna Tizya and Coralee Johns

## OBJECTIVE OF WORKS

The purpose of the bio-physical monitoring work on Fox Creek is to monitor the extent of juvenile Chinook utilization as part of the plan to restore Chinook salmon stocks to Fox Creek. The monitoring work is outlined in the Fox Creek Chinook Salmon Stock Restoration Plan. The bio-physical monitoring includes monthly minnow trapping from May to September at four monitoring stations (MS08-01, MS08-02, MS08-03, and MS08-04), in addition to measurements of water temperature, dissolved oxygen and water depth. The restoration plan also includes identifying suitable rearing, overwintering and spawning habitats; monitoring of beaver activity and barriers to migration, and the observation of returning adult spawners and their redds during the spawning period.

This memo report summarizes monitoring completed in October 2014, to provide data on juvenile Chinook utilization prior to winter 2014/15.

## METHODS

- 1) During each sampling event, four minnow traps (mesh sizes 1/4" and 1/8") were set at each of the four stations, in addition to two traps at the 2013 emergence site, for a total of 18 traps.
- 2) Water temperature and dissolved oxygen was measured at each station and the water level as indicated on the staff gauge at the hydrometric station at MS08-02 was noted.
- 3) All juvenile Chinook salmon that were captured during fish sampling were enumerated and a sub-sample to a maximum of 30 per station were anaesthetized, measured for fork length (nearest millimetre) and weighed (nearest 0.1 gram). Fish were blotted prior to weighing and the scales used were calibrated and placed on a level surface. The presence or absence of the adipose fin was noted (to denote whether the fish was hatchery raised or wild).
- 4) Habitat descriptions were noted and GPS points collected, with photos for reference from year to year to detect ecosystem changes.



## RESULTS

A total of 21 juvenile Chinook salmon and 1 juvenile Arctic grayling were captured during the October 2014 monitoring event (Table 1). Juvenile Chinook were only captured at MS08-02 and the grayling was captured at MS08-03.

All 21 juvenile Chinook salmon captured had clipped adipose fins, suggesting that all are hatchery released 0+ fish from the 2014 fry release. Chinook salmon fork lengths ranged from a minimum of 55 mm to a maximum of 83 mm (Table 1). The fish weights ranged from 2.0 g to 5.8 g.

A staff gauge measurement was collected at the highway bridge (at MS08-02) on October 3, 2014 at 2:50 pm: 0.35 m.

**Table 1 – October 2014 fish sampling results.**

	MS08-01				MS08-02			
	CH FL (mm)	Weight (g)	Clipped adipose?	Other Species	CH FL (mm)	Weight (g)	Clipped adipose?	Other Species
October 3, 2014	-	-	-	-	83	5.8	Y	
	TOTAL: NFC				72	3.9	Y	
	MS08-03				79	4.9	Y	
	-	-	-	1 GR	74	4.3	Y	
	TOTAL: 1 GR				69	3.6	Y	
	MS08-04 (Mouth)				66	2.8	Y	
	-	-	-	-	65	2.7	Y	
	TOTAL: NFC				66	3.0	Y	
	Emergence Site				63	2.9	Y	
	-	-	-	-	65	2.6	Y	
	TOTAL: No Traps Set				69	3.5	Y	
					60	2.5	Y	
					72	3.9	Y	
					67	2.7	Y	
					63	2.7	Y	
					66	3.4	Y	
					74	4.3	Y	
					55	2.2	Y	
					63	2.6	Y	
					64	3.2	Y	
					70	3.3	Y	
					TOTAL: 21 CH			

**Note:** CH – Chinook Salmon, GR – Arctic Grayling, NFC – No Fish Caught, FL – Fork Length

**Table 2 – Minnow trap set data including water depth, water temperature, and dissolved oxygen.**

MS08-01 – October 3, 2014 @2:20 pm

Minnow Trap #	1	2	3	4
Water Depth	-	-	-	-
Water Temperature	2.6 °C			
Dissolved Oxygen Saturation	89 %			
Dissolved Oxygen	10.9 mg/L	Comments: No depth data collected for the Oct 2/3.		

MS08-02 – October 3, 2014 @2:50 pm

Minnow Trap #	5	6	7	8
Water Depth	-	-	-	-
Water Temperature	2.5 °C			
Dissolved Oxygen Saturation	90 %			
Dissolved Oxygen	11.1 mg/L	Comments: No depth data collected for the Oct 2/3.		

MS08-03 – October 3, 2014 @4:45 pm

Minnow Trap #	13	14	15	16
Water Depth	-	-	-	-
Water Temperature	3.3 5 °C			
Dissolved Oxygen Saturation	91 %			
Dissolved Oxygen	10.9 mg/L	Comments: No depth data collected for the Oct 2/3.		

MS08-04 (MOUTH) – October 3, 2014 @4:06 pm

Minnow Trap #	9	10	11	12
Water Depth	67 cm	92 cm	72 cm	65 cm
Water Temperature	-			
Dissolved Oxygen Saturation	-			
Dissolved Oxygen	-	Comments: Missing temp and DO data.		

EMERGENCE SITE – n/a

Minnow Trap #	17	18
Water Depth		
Water Temperature		
Dissolved Oxygen Saturation		
Dissolved Oxygen	Comments: No traps set at this site.	

## PHOTOS

No photos taken this sampling event.



## *Fox Creek Stream Walk 2014*

### OVERVIEW

<b>Project Name:</b>	Fox Creek Stream Walk 2014
<b>Date:</b>	July - August 2014
<b>General Location:</b>	Fox Creek Bridge from North Klondike Hwy to mouth @ Lake Laberge
<b>Field Samplers:</b>	Coralee Johns, Shawna Tizya, John Bunbury, David Bunbury
<b>Report Prepared By:</b>	Shawna Tizya

## OBJECTIVE OF WORKS

The Fox Creek stream walks are conducted from late July, through August to detect the presence of spawning Chinook salmon returning to the creek, as part of the Fox Creek Chinook Salmon Stock Restoration Plan. The 2014 program represents Year 7 of the Restoration Plan, when 5-year old Chinook salmon are expected to return to the creek. These salmon were released into the creek as fry in 2009, the first fry release of the Restoration Plan.

Stream walks involved 14 km of hiking over rugged terrain. The Stewards collected information on suitable spawning habitat areas and beaver dams.

The stream walks were conducted during four events:

- July 23/24 – CJ/ST/JB
- August 6/7 – CJ/ST
- Aug 15 – Sean Collins (DFO) upstream section
- August 20/21 – CJ/ST (ran into grizzly bear on 21)

## METHODS

- 1) Record/count how many salmon are at the locations along Fox Creek.
- 2) Describe fish observed, do they have any markings/injuries on them? Identify if they are large or small Chinook.
- 3) Take scale sample's when we find salmon that died after spawning, DFO also asks we take the heads for identification purposes.
- 4) GPS location of the observation, mark waypoint on GPS then write in field notebook, tie and affix labeled ribbon/flagging to a nearby tree at eye level.
- 5) Photograph as much as possible, take notes on photo identification numbers
- 6) Observe Chinook behaviour.
- 7) Are they below an obstruction, and not able to pass or attempting to pass through.

## RESULTS

The Stewards observed more eagles and bears this season. The Stewards encountered a grizzly bear on Fox Creek during the stream walks. TKC took the initiative to hire a TKC citizen (in-kind) for the purpose of carrying a firearm while the Steward technicians conducted the sampling; however, a citizen with these qualifications was not hired and therefore stream walks were limited due to safety concerns.

During the four stream walk events, no carcasses or spawning salmon were observed in the creek. However, note the surveys were limited in extent and frequency due to safety concerns with bears.

Large beaver dams were noted in the upper reaches of the creek upstream of the highway crossing, but no significant barriers were identified in the lower reaches of the creek during the stream walk surveys or regular monthly monitoring events. Based on the observation available, it appears that access for any returning adult spawners has been maintained in 2014.

*Note: TKC has since undertaken training of TKC LRH staff in Predator Defence Training (March 2015), and will seek to certify staff in firearm use (PAL certification) prior to the next field season to ensure stream walks can be conducted safely in 2015.*



## *McIntyre Creek Incubation 2013-2014*

### PROJECT OVERVIEW

**Project Name:** McIntyre Creek Incubation Monitoring 2014

**Date:** 2013-2014

**General Location:** Mountain View Drive

**Field Samplers:** Coralee Johns

**Report Prepared**

**By:** Shawna Tizya



## INTRODUCTION

The objective of all salmonid enhancement facilities associated with Yukon College, must maintain an up to date Fish Health Management Plan. Guidelines that meet the National Aquatic Animal Health Program requirements help control and reduce incidence and/or transmission of disease during hatchery activities. These guidelines are necessary to protect all aquatic resources. Following the procedures in the associated watershed and at field locations during related activities.

The operations of McIntyre Creek Incubation Facility were managed by Yukon College's Darrel Otto for the 2013-14 season, with assistance from Ta'an Kwäch'än Council's Community Stewards and the Yukon Government Y2C2 crews.

Chinook salmon arrived at the facility in the eyed-egg stage in October 2013. They are transported to incubation trays to be monitored on a daily basis, where trays are kept clean of any debris. The ground water system that feeds the facility, keeps water temperatures between 4-6 degrees year round.

In January 2014, the eyed eggs developed into the alevin stage, and were fully 'buttoned up' (yolk sac is almost absorbed) by April 2, 2014. At this point, we transferred the young fish into troughs and continued monitoring and feeding them, to prepare the fry for clipping and tagging in the last week of June and then release the second week of July.

## OVERVIEW

- As of October 31, 2013 the TKCs operational duties involved visiting the site daily, checking the incubation trays with only opening the tray for a ten minute time period flushing out the debris that settles at the bottom of every tray, then picking any discoloured eggs and looking for any bacterial growth. If not checked on a daily basis the bacteria will grow at a rapid rate and suffocate the live eyed eggs.
- During the months of December 2013 and January 2014, the eyed eggs developed into alevins. At this stage they are the most vulnerable and cannot be disturbed. TKC still maintains and visits the site on a daily basis cleaning the stream screens, monitoring water flows, and water temperature.
- On April 2, 2014, the Department of Fisheries and Oceans (DFO) analysed the full development of the fish and determined their strength to transport them into troughs.
- Prior to any transport of fish, all equipment was disinfected and inspected by DFO.
- Immediate feeding, rate of flow, water levels, and temperature were monitored.
- The fry had to get divided into two groups/troughs because of them growing into the juvenile stage with fork lengths between 35-55mm. They were fed 120g of fish feed per trough each morning.

## McIntyre Creek Operation Procedures / Fish Health

1. Fish are monitored daily and observed for any unusual behaviour.
2. Observations are made every day during normal maintenance operations.
3. If fish behavior becomes problematic contact management or DFO.
4. Mortalities are removed on a daily basis, and tubs/troughs are cleaned daily.
5. Cleaning may not involve more than slowly sweeping the waste and pulling the standpipe to flush debris out of the trough. Must use the broom that is properly disinfected and attached to each trough for sweeping the debris.

## Photos

*Image of troughs, where the Chinook fry are held once transferred from holding trays. They are held here till adipose clipping and tagging begin, just before the fry release in July of each year.*



*The dam upstream at the McIntyre Creek Hatchery*

*New dam installed at hatchery July 2014*





## *Fox Creek Chinook Fry Release*

**Sunday, July 13<sup>th</sup>, 2014**

**TKC Staff Names:** Coralee Johns, Shawna Tizya, Brian Bell, Dawna Hope

**TKC Elder:** Norman Adamson

**Students:** Kit, Emon Williams and Pierre and Pierre's mother Trish

### OVERVIEW

The crew transported 17,100, out of each trough at the McIntyre Creek Incubation Facility on July 13, 2014. Two mortalities in the troughs were documented. TKC staff and youth volunteers began to transport water and fry into the large transport tote at 9:40 am. With everyone's hard work, the transfer was complete by 10:15am. The tote water temperature was 5.8 °C and dissolved oxygen was 10.3 mg/L (89% saturation).

The crew arrived at Fox Creek at 11:30am, at the release site upstream of the highway crossing (RS-08-02). The water temperature of the tote on arrival was 6.1 °C and dissolved oxygen of 12.4 mg/L (109% saturation). The water temperature at the release site on Fox Creek was 12.0 °C with dissolved oxygen of 8.8 mg/L (89% saturation).

At 11:50 am, the tote water temperature 6.4 °C, 88% with dissolved oxygen of 10.0 mg/ . Creek water was mixed with the tote water to warm it up close to the release and accustom the fry to their new environment. At 12:15 pm the water temperature in the tote had been increased to 10.3 °C, with a dissolved oxygen of 5.7 mg/L (55% saturation). A prayer was shared by Norman Adamson just prior to release. The release was complete by 1:00 pm.

Fox Creek appeared clear with normal flow at the time of release. The staff gauge measured 0.30 m. The Stewards did notice about a ½ foot decrease in the water level compared to last year's release, which may be due to a beaver dam just upstream from release site.

## METHODS

### **Prior to transport:**

All necessary permits, including a fish transplant licence, must be obtained prior to the day of transportation, and must accompany the fish when they are moved. Release site must be checked for adequate flow, level and temperature, prior to release, fry must be taken off feed for at least 24hrs before release to minimize the amount of excrement in the transporting tote. The manager must ensure that all required equipment and tools are available and functioning .

### **Loading:**

Staff will need to follow loading density guidelines to ensure that fry are not over crowded, considering the duration of transport. Ensure that oxygen will be adequate for transport, considering possible delays. Dip nets must not contain too many fish. Fry transfer into the tote must be done carefully and gently trying to minimize the stress to and injury that could be inflicted on the fry, or accidental release of fry at the incubation site.

### **During Transport:**

Water quality must be maintained at all times during transportation. Transport totes must be equipped with supplemental oxygen tanks and diffusing stones. Oxygen levels for saturation and concentration must be checked and maintained throughout the travel. A visually monitoring of the fry must be done every 30 minutes during transport to verify the health of fry.

### **During Release:**

Water temperature and of the tote and the creek ideally not differ by more than a few degrees when fry are released. (note temperature range at the site.) The acclimation must be slow and gradual so that gill tissue is not damaged. Fry must be released carefully into the receiving waters in calm and shady areas where they have access to cover from predators. Locations must be noted in the records. It may be necessary to provide cover.

### **After transport:**

Tote and equipment used in transport must be cleaned and disinfected after use.

## PHOTOS



Water shot of the fry before being transferred into the tote!!

Kit, Emon and Pierre begin hauling the Chinook fry from the holding troughs!!



The fry looking great in the tote before, being transported to Fox Creek.





Cora and Phoenix watching Dawna remove the fry from the tote into the buckets.

Good healthy bunch of fry being released into Fox Creek.



Respected elder Norman Adamson releasing the first batch of the fry after a prayer.

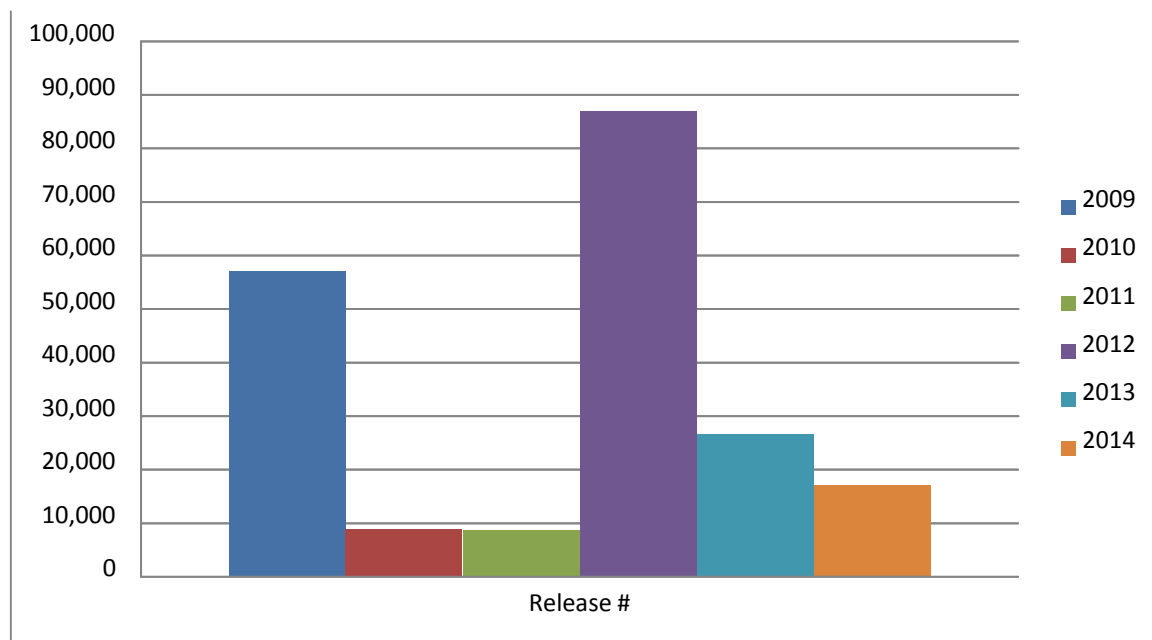




# 2014 Chinook Release

**Back row:** Shawna Tizya (Community Steward Technician), Cora-Lee Johns (Fish And Wildlife Steward) **Middle Row:** Emon Williams, Pierre (a student hired by Yukon College to help with the tagging/clipping and release stages), and Dawna Hope (TKC LRH Manager) **Front Row:** Kit and Trish.

# Chinook Salmon released from 2009-2014



**205,338 To Date**