YUKON RIVER NORTH MAINSTEM STEWARDSHIP

2012

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Prepared for:

Yukon River Panel

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ABSTRACT

The primary goal of this project was to build community capacity to maintain and protect salmon and their habitats in the Dawson region through involvement and education of local youth. Two local high school students were hired as Student Stewards and supervised by an experienced field technician. Hands on training was provided to the youth as they carried out meaningful activities. These included restoring Chinook salmon to productive rearing habitats, salvaging juvenile Chinook from isolated habitats, quantitatively assessing habitats, conducting juvenile Chinook salmon growth monitoring, investigating the effects of beaver dams on upstream migration of juvenile Chinook salmon, ground-truthing GIS-based mapping, collecting DNA samples, and monitoring bio-engineering works. Project planning was conducted in consultation with DFO and informed by our record of past activities. The crew started field work on July 9 and ended on August 14, 2012. Weather and river conditions were generally favourable during the project and allowed most planned activities to be successfully completed. Juvenile Chinook salmon were present in low but workable numbers in most waters. They were nearly absent from the North Klondike River and tributaries. The Public Day was held on August 14, and the Student Stewards demonstrated the skills they had acquired and shared their knowledge with the participants. Assessment sampling took place on September 15 - 16. The project was successful and, we believe, will contribute significantly toward meeting our long term goal for the future of salmon.

INTRODUCTION

In the early 2000s Tr'ondëk Hwëch'in elders and other Dawson locals raised concerns that salmon rearing and spawning habitat had been diminishing within the Tr'ondëk Hwëch'in traditional territory. Technical investigations by the YFWMB Dawson Area Community Steward and the Department of Fisheries and Oceans Salmon Enhancement Program (SEP) staff on non-spawning streams in the Dawson area confirmed that beaver dams and other non-permanent barriers had obstructed the upstream movement of salmon fry into known rearing and overwintering habitat. (Jones, 2005, von Finster 2005b & 2005c) Additionally, significant numbers of fry were found after the spring freshet in isolated pools in the Klondike River valley (von Finster 2004 & 2005a).

This provided an opportunity for the DDRRC to hire local youth for a project that would engage them in salmon habitat restoration, conservation and management activities. The model chosen by the DDRRC was to hire two local high school students and an older, experienced local field supervisor. A pilot project took place in 2006, and provided important information for the planning of the 2007 project. The project has been conducted every year since. Pre-season planning and in-season implementation has built on the results of past seasons. These results are recorded in the "Record of Activities" which is updated at the conclusion of each field season. The Record is provided in Appendix D.

PROJECT GOAL AND IMPLEMENTATION STRATEGY

The goal of the 2012 project was to continue to develop and maintain community capacity in the Dawson City region to protect, maintain and restore salmon stocks and habitats. We concentrate on Chinook salmon due to the presence of the juvenile life stage, the priority that we afford this species (and share with the Panel), and the ability for the Stewards to carry out meaningful activities in non-hazardous waters. Our strategy has been to hire two local high school students from early July to early/mid-August. As Student Stewards, they work under the field supervision of an experienced elder and the guidance of a Technical Advisor. The Student Stewards are provided with a wide range of hands-on training through participation in a variety of salmon and salmon habitat management and research activities. The proposed activities vary depending on the expected and actual juvenile salmon supply. In-project environmental conditions or unique experiential opportunities may result in modifications to the planned project. The context of all activities undertaken is explained to the students: they learn both *how* and *why* the activity is undertaken. At the end of the funded field work component of the project, the youth demonstrate their acquired skills and knowledge to children and community members in a Public Involvement Day. The existing "Record of Activities" is updated. Juvenile Chinook sampling for monitoring and assessment purposes of select project activities takes place in mid September and late May of the following year and is provided as an in-kind contribution.

RELEVANCE AND SIGNIFICANCE

This project is both relevant and significant to the maintenance of the constituency for salmon and salmon habitat in the Dawson area. In the Dawson community, "maintain" is a critical concept: although the cultural value of salmon is widely recognized, the community realizes little economic benefit from the salmon fishery. The community does receive

significant economic benefit from mining and related activities. Salmon are seen by many in the mining industry as an impediment to development and an added expense as they seek to support their families. Children in Dawson are raised in this environment. Many or most will enter the mining or associated industries either as a career or as seasonal workers to fund their educations. Our annual projects continue the work of ourselves and others in raising public awareness as a critical component in building and maintaining a constituency for salmon in the Dawson region. We are continuing a process that started in the early 1990s and has continued through community projects funded by a wide range of programs, agencies and entities. They have included the Yukon River Panel under the both the Interim and Final agreements; those sponsored or supported by DFO under the Yukon-Canada Economic Development Agreement; and those funded by DFO under the Habitat Conservation and Stewardship Program (HCSP) and the Habitat Restoration and Salmon Enhancement Program (HRSEP). Notably, the high school students we now hire had not been born when the Dawson community first sought funding to invest in the future of our salmon.

In our 2006 Pilot Project we selected the local community of Dawson City as our target group. We chose local high school students as the most effective form of reaching the larger community. The Student Stewards inform their peers and parents of their activities during the course of the project and the following winter. They also explain their activities, and the value of the Klondike River to salmon, at the Public Involvement Day. This is of particular importance to the younger children who attend the event. Children tend to look up teenagers and accept them as role models. Having youth as the educators at the Public Involvement Day is a powerful means of transferring information to, and wakening interest in, the young children. Of importance, our goal is not only the present community of Dawson, but the future community.

The Student Stewards' exposure to salmon, salmon habitat management and related research activities may influence the educational and career paths they follow. We recognize that most will leave Dawson and travel to Whitehorse or much further for their education or to experience the larger world. This is expected of young people. However, we anticipate that many or most will return. They will then contribute and perhaps provide leadership to our community in the management of our lands, waters, and the salmon that depend upon them. They will become the constituency of the future for salmon.

PLANNING

Most project planning took place during the Detailed Proposal phase of the application process. The planning included a meeting between the DDRRC and the Technical Advisor to discuss opportunities and considerations for the 2012 project. The "Yukon River North Mainstem: 2011 Record of Activities" was reviewed, and the recommendations considered in the planning process. The details of the project were discussed with Fisheries and Oceans Canada Resource Restoration Biologist Sean Collins, and a common understanding was achieved.

A primary consideration was the scheduled implementation of the Yukon Government's Code of Practice for Young and New Workers. We were fortunate in having anticipated most of the new requirements and were able to meet them at little incremental cost.

A number of Field activities were planned for the Student Stewards in 2012. These included:

- Juvenile Chinook Salmon salvage from isolated pools in the Germaine Creek avulsion;
- Monitoring performance of the bio-engineering conducted under YR R&E 87N-03 project in the Germaine Creek avulsion;
- Juvenile Chinook overwintering habitat characterization and mapping of the Viceroy Ground Water Channel, tributary to the North Klondike River;
- Implied juvenile Chinook Salmon abundance and growth monitoring in the Klondike River;
- Juvenile Chinook Salmon habitat utilization and assessment of different types of habitat;
- Ground truthing of Yukon Placer Fish Habitat Suitability Maps of the lower Klondike River Valley;
- Learning about mitigation to reduce impacts to salmon habitat during road and stream crossing reconstruction of the Dawson Road through an on-site with with Yukon Government Engineering staff;
- Restoration of juvenile Chinook Salmon to productive habitats located upstream of non-persistent organic barriers;
- Acquisition of tissue from juvenile Chinook Salmon for DNA analysis;
- Having the Student Stewards demonstrate their skills and knowledge at the Public Involvement Day.

Outcomes for most of the planned activities were identified in our Detailed Proposal. They are reported below in the "Summary" section of each activity.

IMPLEMENTATION

Funding was confirmed on March 29, 2012. A draft Work Plan was prepared and submitted to DFO Resource Restoration Biologist Sean Collins for review. The review was completed on April 5.

The contract with the PSC was signed May 1, 2012.

The Key Personnel identified in our Conceptual and Detailed Proposals were available. Hans Algotsson returned as the Field Supervisor, Al von Finster as the Technical Advisor and Andrea Oppen as the Public Involvement Co-ordinator. Project coordination and communication was provided by the author in her role of Dawson District Renewable Resource Council Executive Secretariat.

A three passenger 4 x 4 vehicle was provided by Hans Algotsson to transport the crew.

Equipment was taken out of storage, checked and made serviceable.

On April 17 an application was made to DFO for a Scientific Collection License to authorize fish sampling. A License was granted on May 3, and a summary report was submitted to DFO Licensing on November 26, 2012.

On May 22 and 23 the annual spring assessment sampling to investigate success of overwintering was conducted. Due to imminent washouts on the Clinton Creek Road sampling was limited to the Viceroy Channel.

On May 9 the hiring process began.

The Field Work component of the project commenced on July 9, 2012. The Student Stewards were briefed in accordance with the Orientation requirements of the Yukon Government's Code of Practice for Employers of Young and New Workers. This included identification of the Field Supervisor, location of First Aid facilities, procedures for the reporting of illnesses and injuries, emergency procedures and rights and responsibilities of both workers and employers to maintain a safe workplace. The Training requirements of the Code took place throughout the project. It included instruction and demonstration of tasks and work processes, and observation of the Student Stewards performance. Hazards were indentified to the Stewards, and personal protective equipment was provided.

The Schedule was generally followed, although some modification was required due to environmental factors. With the exception of a significant precipitation event on July 11, when 28 mm of rain fell, environmental factors were generally favourable. The weather was cool, and stream flows were usually moderate. This allowed almost all of the proposed activities to be conducted.

Each of our proposed activities is listed below. The title is followed by the metrics we proposed to report our "outcomes". The Summary section provides quantitative data. Where the activity was scientific or technical in nature a short report follows the Summary section. The Public Involvement Day report is provided as Appendix A.

Student Stewards – outcomes reported as days worked.

The Student Stewards worked a total of 27 days.

Public Involvement Day – outcomes reported as numbers of participants.

A total of 20 persons participated in the Public Involvement Day.

Salvage of salmon from isolated pools – outcomes reported as the total number of fish, by species.

Summary: A total of 299 0+ juvenile Chinook Salmon and 47 Slimy Sculpin were salvaged.

Introduction: Salvage occurred in the Germaine Creek avulsion. This is a section of Klondike River channel that carries surface flow during the spring freshet or summer high water events. Surface flows generally cease in late May or early June. Shallow pools remain and are isolated from surface flows. Large numbers of 0+ juvenile Chinook tend to be trapped in the pools: in 2007, for example, 1297 were salvaged (Smart, 2007). The pools heat up during the long days of early summer.

Methods: The salvage commenced on July 9. All available minnow traps were set. The traps were baited as per the Fisheries and Oceans Canada "Protocol for the baiting of Gee-type minnow traps for the capture of juvenile Chinook Salmon in the Yukon River Drainage Basin" (the DFO protocol). All fish captured were enumerated and placed in buckets. The buckets were carried by hand to the Klondike River or into waters that will have surface flow into the Klondike River throughout the summer.
On July 10, 32 juvenile Chinook salmon were weighed to the nearest 0.1 gram using an Ohaus HH120D electronic balance, and a smolt board was used to measure fork lengths to the nearest mm .

Results: A total of 299 juvenile Chinook salmon were salvaged, including 123 on July 10 and 112 on July 11. A sudden and severe rainstorm occurred on July 11 and the river rose quickly. Traps were removed on the afternoon of July 11. Salvage resumed later in July, with 44 salvaged on July 24, 6 on July 25, 13 on July 26 and 1 on July 27. Weights ranged between 1.1 and 2.3 grams, with a mean of 1.59 gram. Fork lengths ranged between 44 – 61 mm, with a mean of 54.91 mm.

Discussion: The 299 juvenile Chinook salmon salvaged in 2012 was 110 below the 2006 – 2011 average. This is attributed to the interruption in salvage activities on July 11. However, as the Klondike flooded the area the same objectives were realized. When salvage resumed after the flood had abated numbers of juvenile Chinook were much lower. This was the first year that length and weight data was collected during the salvage, which limits comparison with past years.

Conclusion: This activity was successfully conducted.

Riparian bio-engineering assessment – outcomes reported as number of stems counted and determination of the live/dead ratio

Summary: A total of 80 stems were counted, with a live:dead ratio of 66:14.

Introduction: The Klondike River at Germaine Creek Restoration Demonstration Project was conducted in 2004 (Miles & Polster, 2004) and monitored in 2005 (Miles & Polster, 2005) and 2006(Miles & Polster, 2006). Two bio-engineering techniques were used: palisades, where large diameter (>8 cm) stem segments were buried in closely spaced rows along the river bank; and gravel bar staking, where smaller (<6 cm diameter) stem segments were buried in loosely spaced rows on top of one gravel bar on the left side (looking downstream) and one on the right side of the channel. All stakes were greater than 1 meter in length. A tracked excavator was used for both techniques.
The palisades were largely composed of cottonwood cuttings. After apparent initial success, the cottonwood were afflicted in mid-summer 2005 by an unidentified fungus. By 2006 only the willows remained alive. The area is now densely covered with young alder. We did not assess the palisades.
The right limit gravel bar staking has been subjected to annual ice scour. This results from the avulsion channel acting as a high water overflow channel during breakup. It is not possible to determine which of the willows that sparsely cover this section

resulted from gravel bar staking and which did not. We therefore did not assess the success of the staking on the right gravel bar.
The left limit gravel bar is not scoured by ice, and sufficient stems remained to allow us to conduct an assessment. Most or all of the willows were vigorous and had been heavily grazed by moose. Height determination appeared to be meaningless and was not conducted.

Methods: We established three points. Each point was the centre of a 6 metre circle, which we termed a "Site". We then counted live and dead stems at each Site.

Results: The Downstream Site had 27 alive and 5 dead, for a total of 32; the Middle Site had 20 alive and 1 dead for a total of 21; and the Upstream Site had 19 alive and 8 dead for a total of 27.

Discussion: As the density of stems planted was roughly the same across the gravel bar, the differences in numbers of stems at each site indicate the likelihood that some dead stakes have either rotted away or been covered by sand etc deposited by the river. This is supported by the results of past monitoring: in 2006 success was only 69% (Miles & Polster, 2006) while our sampling indicated 82.5%. Regardless, the vigorous growth from the remaining stakes provides sufficient evidence of the success of the bio-engineering conducted.

Conclusions: Willow stakes are preferable to cottonwood as donor stock for live staking. Live staking is best conducted where mechanical (ie ice scour) is not likely to occur. No further monitoring of this bio-engineering is justified.

Overwintering habitat characterization and mapping - outcomes reported as the number of sites mapped and the total area of each site

Summary: The Viceroy Channel was mapped. The channel has an effective wetted area of 5854.1 square meters.

Introduction: This channel is between 2 and 3 km in length. It does not flood during summer. Habitat inventory activities in the channel are therefore not sensitive to environmental conditions. The channel was identified as valuable overwintering habitat during construction of the Viceroy Road in 1995. In late October of 1995 a total of 196 0+ juvenile Chinook salmon were salvaged from the footprint of the road immediately prior to construction. This area was approximately 30 square meters, giving a calculated density of 6.5 juvenile Chinook salmon per square meter. This is high: densities estimated elsewhere in the Yukon River drainage did not exceed 1 juvenile per square meter (Bradford, 2001). Monitoring of the Viceroy Channel by DFO and DDRRC has indicated that intensity of utilization by juvenile Chinook salmon varies. It has reflected both the apparent strength of the brood year and the accessibility of the channel to juveniles. A beaver dam was constructed near the mouth of the channel in late 2006. No 0+ Chinook were captured in 2007, 2008 or 2009. The dam was abandoned by the beaver in the winter of 2008-09, and was breached by the DDRRC in 2009. In 2010, captures of juvenile Chinook salmon approached pre-dam levels at the monitoring site. Water temperature monitoring in the channel was conducted from July 2005 until June 2010, and has since resumed.

The channel becomes ice covered, but does not freeze. Temperatures of ground water supplying the channel are currently being monitored by the Tr'ondëk Hwëch'in. Preliminary results indicate strongly that the water feeding the channel are hyporheic flows from the North Klondike River (von Finster, 2011). Chinook salmon have been captured in the channel in the spring, confirming successful overwintering.

Methods: Assessment and mapping of the channel took place on July 12 and 13. A data entry form was developed for the crew and printed on waterproof paper. The Technical Advisor explained the value of overwintering habitat and provided on-site training in data collection and recording. Channel assessment methodology described by Newbury and Gaboury (1993) was modified to determine the wetted area. A 0+00 station was established at the point where the Viceroy Channel entered the North Klondike flood plain. The channel was measured at right angles to flow from the left water's edge to the right water's edge with a cloth engineers tape to determine *wetted width*. The wetted width was multiplied by 5 to determine the distance to the next station upstream, which became 0+ the distance. The process was repeated to the upstream end of continuous surface flow. The *wetted area* was calculated from the mean value of measured widths of up- and downstream stations multiplied by the distance between them. Maximum water depths were measured at each station with a survey rod. Substrate was estimated using the Wentworth classification as modified by Bain and Stephenson (1999). In this classification, sand is < 2 mm; pebble is 2 – 64 mm; cobble is 64-265 mm, and boulder is >265 mm. Stream gradient was not measured as it is low and could not be measured accurately by hand-held clinometers. Minnow trapping for monitoring/evaluation was conducted on July 14 and September 16.

Results: The channel was clear of obstructions on July 12. The measured length of the channel was 1359.5 meters. The wetted width and maximum depth of the channel was measured at 79 stations. The total wetted area was 5854.1 square meters. The thalweg (deepest part of channel varied between 0.1 m and 0.9 m in depth, with a mean depth of 0.302 meters. Boulder was the most dominant substrate particle size and covered an estimated 43% of the channel bottom. Cobble, at 18%, pebble at 20% and sand at 17% were roughly equal. No juvenile Chinook salmon were captured. The channel was not frozen at the data logger site during the winter of 2011/12.

Discussion. The Viceroy Channel is ground water fed and has stable flows. The wetted area calculated will not change unless the water is impounded at some point along it. The majority of the wetted area will be available as rearing habitat for juvenile Chinook salmon. A portion of the channel will have winter flows and support overwintering. The amount of overwintering habitat is likely related to the composition of the stream bottom. Juveniles have been captured in both the autumn and spring in an area of the channel with 100% boulder stream bottom. The channel bottom between Stations 0+505 and 0+787 is comprised entirely of boulder or very nearly so. It comprises about 1645 square meters. If the 6.5 juveniles/meter number is accepted, this section of the channel could provide overwintering habitat for as many as 10,692 juvenile Chinook salmon. This potential was definitely not

realized in 2012, as no juveniles were captured in the channel. The reasons for this are unclear. It is probably related in part to a low escapement to the Klondike River in 2011. The 2011 spawning escapement was estimated to be 1181 Chinook. This compared to 5147 in 2009 and 803 in 2010 (Mercer 2012). Escapements are not monitored on the North Klondike. It is possible that little or no spawning occurred there in 2011. Regardless of the reasons, few juvenile Chinook salmon were captured during any of the sampling on the North Klondike in 2012.

Conclusion: the Viceroy Channel was mapped. The lack of juvenile Chinook salmon captured in the channel in 2012 was anomalous. Monitoring of the channel should continue

Klondike River juvenile Chinook implied abundance and growth monitoring - outcomes reported as numbers of salmon captured, numbers sampled, basic statistical analysis and provision of raw data to interested agencies

Summary: Sampling took place on July 27, when 65 juvenile Chinook were captured and 30 were sampled, and on September 16 when 49 were captured and then sampled. The mean fork length on July 27 was 62.63 mm and on September 16 it was 72.45. Assuming that this is typical of juvenile Chinook in the Klondike River in 2012, the average daily increase in length was 0.19 mm. The data has been submitted to DFO.

Introduction: Our objective was to establish three stations along the Klondike River between Hunker and Allgold Creeks to monitor annual wild juvenile Chinook salmon implied abundance and growth. This would provide data against which sampling in other years and areas could be compared, or be used to plan future studies by ourselves or others.

Methods: Selection criteria for the Stations included ease of access by the samplers, and their safety under most flow conditions. The Stations were to be representative of the river channel habitats. They would not be located in back- and/or ground water channels due to differences in thermal regimes (back channels will be warmer, and ground water channels cooler). The Stations were to be located in relatively stable areas to allow sampling to be repeated in other seasons or years. Minnow traps baited and set as per the DFO protocol were used to capture juvenile Chinook. All fish captured were enumerated by species. At each station either all 0+ juvenile Chinook salmon captured were sampled, or were placed in a container and 30 were randomly dipped out for sampling. Data collected included measuring each fish to the nearest 1 mm on a smolt board. Fork Lengths of Chinook salmon and Total Lengths of Burbot and Slimy Sculpin were measured. Fish were weighed on an Ohaus HH120D digital scale in July but not in September due to equipment malfunction.

Results: Only one Station was found that met the criteria. Generally, sites that were safe were inaccessible, and sites that were accessible were unsafe. Two candidate sites were on unstable channels. The site that did meet the criteria was the Boat Landing. This is located upstream of the Dempster Bridge. The channels are somewhat unstable but can be accessed safely from the Dawson Road. Sampling

took place on July 27, when 65 juvenile Chinook were captured and 30 were sampled and on September 16 when 49 juvenile Chinook were captured and all were sampled. The mean fork length on July 27 was 62.63 mm and on September 16 it was 72.45. Assuming that this was typical of juvenile Chinook in the Klondike River in 2012, the average daily increase in length was 0.19 mm.

Discussion The Boat Landing is located immediately downstream of one of the primary Chinook spawning sites on the Klondike River. Adequate numbers of juvenile Chinook were captured and sampled to meet target numbers for statistical analysis. This was despite the relatively low numbers of Chinook salvaged at the Germaine Creek Avulsion and the very low numbers captured at any place in the North Klondike River. As this is the first year of collection for this purpose, the fork length and weight data provide a baseline to build on.

Conclusion: This component is meaningful and should be continued. The search should continue for additional sampling sites.

Yukon Placer Fish Habitat Suitability (YPFHS) Map - Klondike River ground truthing - outcomes reported as locations and numbers of sites investigated and the results reported to DFO.

Summary: Nine water courses were identified from the YPFHS map as having potentially questionable Classifications. Eight of the 9 were located in the field. A report was prepared and was submitted to DFO. Text of the report follows.

Introduction: The YPFHS classifications were computer-generated and were based on existing 1:50,000 maps (Yukon Placer Secretariat, 2007). Many or most of the 1:50,000 base maps were drawn from aerial photographs taken in the 1940s and 1950s. The YPFHS classifications used stream gradient and distance from a Chinook salmon spawning or migration route as primary determinants of habitat suitability. The classifications were not ground-truthed in the lower Klondike valley. Many are inaccurate. As an example, the first series of maps showed the North Klondike River as flowing down the Klondike ditch instead of in it's real location.
The inaccurate classifications are most apparent in small streams with limited watershed area. Contour lines and drainage courses on all original 1:50,000 maps were hand drawn from the aerial photos by technicians. Channels were drawn onto the maps where none existed or currently exist. The computer-generated placer classification maps show small tributaries as being valuable Chinook rearing streams. These are considered as: "Moderate-high suitability habitats are defined as watercourses that are highly suitable for rearing juvenile Chinook salmon". However, many streams with this classification have ephemeral or intermittent flows. Others drain to ground or to flow overland (ie no defined stream channels) through wetlands before entering the Klondike River. The high values attributed to dry or non-existent streams erode confidence in agency capabilities. Restrictive conditions may be needlessly placed on placer miners. The miners may be faced with added expense and delay in preparation of applications etc, or denied access to gold to which they have the right to mine. Although the Fish Habitat Suitability maps were

only to be applied to the Placer industry, they are used much more widely. They may affect the activities of other users, such as Highways, forestry, etc.

Methods: We identified 9 candidate creeks between Too Much Gold Creek and the north end of Henderson Corners from the Placer Fish Habitat Suitability Maps. We then interpreted Googlearth images to find likely locations where they crossed the Dawson Road. We attended these locations and looked for surface flows through drainage structures at the Dawson Road. Where streams were found we sampled for fish using minnow traps baited and set as per the DFO protocol. This method is effective for the capture of juvenile Chinook salmon and slimy sculpin. These are two of the three most likely species to be present in smaller streams. Minnow trapping is ineffective for the capture of arctic grayling, which is the third species. Two traps were set at each creek for 48 hours per trap, or a total of 96 trap/hours. The traps were checked daily.

Results: We located 8 of the 9 creeks. Due to problems with our GPS, only approximate co-ordinates can be given. These are:

Un-named Cr. #1 (north of Alki Creek)	64 03.38/139 02.37
Alki Cr.	64 03.68/138 59.4
Un-named Cr. #2 (between Alki & Germaine Cr – not found	
Germaine Cr.	64 03.07/138 54.71
Goring Cr.	64 02.57/138 52.0
Leroy Cr.	64 01.98/138 47.54
Un-named Cr. #3 (at Dempster turnoff)	63 59.70/138 45.28
Leotta Cr.	63 58.46/138 44.2
Too Much Gold Cr.	63 57.49/138 42.6

No fish were captured.

Discussion: Permafrost underlies the majority of the watersheds of all these streams. With the exception of Leotta Creek, Two Much Gold Creek and possibly Goring Creek all streams flow across extensive areas of valley bottom permafrost prior to entering the Klondike River. During the July 11 rainstorm 28 mm of rain fell at the Dawson Airport. It is likely that the rainfall in the Klondike Valley upstream of Rock Creek was higher than this. The intensity of rainfall between Flat Creek and Henderson Corner was far greater than in the lower Klondike valley. Except where ditched for drainage the Klondike valley between Un-named Creek and the Dempster Highway bridge became a wetland. The Klondike valley bottom drains slowly and remained very wet throughout the project period. The lack of fish captures at the stream crossings north of the Dempster Corner is inconclusive. Individual fish, if present, could have dispersed across the valley floor. Leotta Creek flows directly to the Klondike River and the lack of fish captures is surprising. Too Much Gold Creek flows into an old side channel of the Klondike. The side channel flows through a series of beaver dams prior to entering the Klondike. The crossing at the Dawson Road was recently reconstructed. The July 10 rainstorm weakened the new structure and the Government of Yukon spent most of the project period rebuilding it. We sampled at the road crossing in 2008 and 2011 but did not capture

any fish. De Graff (2011) observed high numbers of 0+ Arctic Grayling in one or more of the beaver ponds. He expressed the opinion that juvenile Chinook salmon would not use the beaver ponds and that an absence of sculpin in his catches indicated a lack of overwintering habitat for any fish.

Conclusions: The Yukon Placer Fish Habitat Suitability Map should be amended to remove Un-named Creek #2, as it does not exist. Further investigation is warranted for the remainder of the creeks.

On-site with Yukon Government engineers to raise awareness of the application of fish and fish habitat information in infrastructure renewal planning - outcomes reported as whether it occurred

This did not occur. Due to delays in regulatory processes the projects proposed for the 2012 open water period did not proceed and the YG engineers were not on site.

Restoration of Chinook salmon to productive habitats upstream of non-permanent obstructions – outcomes reported as numbers of Chinook Salmon restored to productive habitat, numbers sampled, basic statistical analysis and provision of raw data to interested agencies.

Summary: A total of 702 juvenile Chinook Salmon were restored to productive habitat upstream of beaver dams on Clinton Creek.

Introduction: We anticipated that there would be a large number of 0+ juvenile Chinook salmon migrating up the Fortymile River in 2012 due to the healthy 2011 border escapement. We speculated that this would be reflected in reasonable migrating into Clinton Creek and into the much colder Mickey Creek.

Clinton Creek is the site of the abandoned Clinton Creek Asbestos Mine. The creek is unique in draining unglaciated terrain while supporting a number of beaver colonies. On August 10, 2006, seventeen beaver dams were observed between the mouth of Clinton Creek and the minesite during an over flight (von Finster, 2006). Beaver are usually not able to maintain colonies on creeks draining the "V" shaped valleys in the non-glaciated portion of the Yukon. This is due to the violent spring freshets and summer responses to rainfall events that are characteristic of these streams. Beaver are able to dam Clinton Creek due to buffered stream flows resulting from an artificial lake in the upper watershed. This feature, Hudgeon Lake, formed when approximately 60 million tonnes of waste rock piled on the ridge top failed and slid across the valley. Hudgeon Lake is 2100 metres long, has a surface area of 64 hectares, and a volume of approximately 10 million cubic metres (AECOM, 2011). It provides temporary storage for water flowing from the upper valley and reduces the intensity of flows downstream. The lake provides a thermal subsidy to the creek downstream of the outlet during the open water period. Water temperatures may be very high, with a maximum hourly temperature at the lake outlet of 26.75 recorded in July 2007. The high temperatures may be sustained: in 2007, for example, temperatures over 20 degrees were measured on every day between July 11 and 30, and on 11 days in August (von Finster, 2007). Aquifers have formed in the waste rock deposits and in redistributed material washed downstream. This material is forming an alluvial cone that is currently about 700 meters long. Ground water discharges from the aquifers at a cooler temperature and both

mediates high stream temperatures and provides a wide range of thermal habitats that small fish such as juvenile Chinook salmon can use as refuges. The result has been a highly productive habitat complex extending from the lake outlet downstream for about 1.5 km. Young-of year juvenile Chinook salmon were first restored to the creek in this area in 2006 (Smart, 2006). The activity has been conducted annually since. Mid September sampling has taken place each year to monitor and evaluate the growth of juvenile salmon at the minesite. In some years the growth of juvenile Chinook salmon has been remarkable. The summer of 2007 had near perfect conditions: the creek had, and maintained, low/moderate flows. The creek was warm, increasing invertebrate productivity. The large numbers of ground water discharges appear to have provided adequate thermal refuges. A total of 2070 juvenile Chinook salmon were restored to the creek at the mine site in July and early August (Smart, 2007). Some juveniles migrated upstream: in mid-September 2007, 13 were captured at Station 1, which is the upstream limit of migration below the lake outlet. The mean fork length of this group was 99.77 mm, and the maximum length was 111 mm (von Finster, 2007). This shattered the old record for a 0+ Chinook of 100 mm fork length. The past record fish had been captured in the Fortymile River in late August, 1987 (Jaromovic & von Finster, 1988).

The lake and several smaller water bodies formed by tailings- and other waste rock failures in tributary valleys now provide reservoirs for surface waters and recharge areas for ground water. Some groundwater discharges continue throughout the winter. Yearling Chinook have been captured at the minesite in May (Mackenzie-Grieve, 2011) confirming successful overwintering.

Mickey Creek is crossed by a culvert on the Clinton Creek road. The culvert was poorly placed and the outlet is generally perched above the downstream plung pool. The creek is unregulated. In 2004 approximately 85% of the watershed area was burned by wildfire. A significant number of slope failures soon followed (Lipovsky et al, 2005). The upper watershed further destabilized during the catastrophic precipitation events of early August, 2010. One or more sediment wedges is moving down the creek. In 2012 a wedge was passing through the culvert and the outlet was backwatered. Juvenile Chinook had unobstructed upstream passage, and restoration undertakings were not warranted.

Methods: Restoration activities commenced on July 30 and were completed on August 9. All available minnow traps were set on Clinton Creek, initially near the mouth and later further upstream due to bear interference. Both areas are within Station 4. The minnow traps were baited and set as per the DFO protocol. All fish captured were enumerated by species. All 0+ juvenile Chinook salmon captured were placed in a container and moved to the restoration site at Station 2A, at the mouth of Wolverine Creek. An air pump was used to maintain oxygen levels during transit. A total of 30 juveniles were randomly sampled on July 31 and August 1. On August 7 and 8, 99 and 101 juveniles were sampled in conjunction with the collection of tissue samples. The anal fin of each of these 200 juvenile Chinook was clipped. Sampling included measuring fork lengths to the nearest millimetre using a smolt board and weights to the nearest 0.1 gram using an Ohaus HH120D digital balance. Monitoring/evaluation sampling occurred on September 16. Weights were not measured due to equipment failure.

Results: A total of 702 juvenile Chinook salmon were restored to productive habitat. Daily counts were: 274 on July 31; 52 on August 1; 4 on August 2; 173 on August 7; 181 on August 8; and 18 on August 9. Fork length and weight data are shown below.

Juvenile Chinook Salmon captured in Clinton Creek
Fork Length and Weights at date during 2912 sampling

Date	Location	Number	Fork Length (mm)		Weight (gram)	
			Mean	Range	Mean	Range
July 31 2012	Sta 4	30	63.4	58 - 70	2.53	1.8 - 3.3
Aug 1 2012	Sta 4	30	64.37	67 - 73	2.8	1.8 - 4.1
Aug 7 2012	Sta 4	99	65.97	55 - 83	2.87	1.7 - 5.7
Aug 8 2012	Sta 4	101	64.22	52 - 76	2.67	1.4 - 5.4
Sept 16 2012	Sta 4	39	70.03	61 - 83	n/a	n/a
Sept 16 2012	Sta 2A	50	76.82	68 - 93	n/a	n/a
Sept 16 2012	Sta 1	3	83	78 - 88	n/a	n/a

Station 4 is at the mouth, Station 2A is at the downstream end of the minesite and Station 1 is at the upstream limit of upstream migration. Juveniles captured at Station 1 had to migrate upstream through a canyon with gradients in excess of 5% for short pitches.

The mean fork length of juveniles captured at Station 4 on September 16 was 6.63 mm greater than those captured on July 31. The mean length of juveniles captured at Station 2A on September 16 was 13.42 mm greater than those captured at Station 4 on July 31. The mean fork length of the small number captured at Station 1was 19.6 mm greater than those captured at Station 4 on July 31.

Discussion: The 702 of juveniles restored to productive habitats in 2012 fell slightly below the mean annual number of 732. Collection of juveniles at Station 4 was hampered due to a black bear sow disturbing the traps: as an example, on August 9 she opened 17 out of 19 minnow traps. We could have probably doubled the number of juvenile salmon captured had it not been for this bear.

Mean fork lengths at Station 4 and Station 2A during both the summer and fall were comparable to those of years of similar abundance. The mean length of juvenile Chinook captured at Station 2A during the September sampling has been consistently greater than those captured at Station 4. This is believed to reflect the productivity of the habitats at the minesite. Of interest, the 3 large juvenile Chinook captured at Station 1 were the first captured there since 2007. As in 2007, fewer juveniles were captured than at Station 2A and the mean length of the juveniles was significantly greater. However, the mean fork length of the 13 juveniles captured in 2007 was 99.8 mm, or 16.8 mm longer than those captured in 2012.

Conclusion: Although this component of the project was negatively affected by bears, it was successful and should continue.

Acquisition of genetic samples from juvenile Chinook salmon - outcomes reported as the number of samples collected, and any other information requested from the agency interested and within our capacity to provide.

Summary: A total of 200 samples were collected from Clinton Creek, with 99 collected on August 7 and 101 on August 8.

Introduction: The use of genetic analysis for a wide range of salmon- and salmon habitat management and research purposes is expected to continue to expand. We first proposed this component of our project to introduce the Student Stewards to the method and some of the uses of the data. We first carried out this activity in 2009 in partnership with DFO and ADF&G. We found that the Student Stewards were very interested: so much so that one of them brought a friend along as it was considered to be "so cool". The samples were analysed by DFO and the data reported in Mackenzie-Grieve (2010).

Methods: Resource Restoration Biologist Sean Collins provided collection vials and preservative. We used the same numbering system as in 2009, where YR- identified the site as in the Yukon River drainage, CN- for Chinook Salmon, 12- for the year and 1 through 200 for the individual sample. The first sample we collected was YR-CN-12-1 and the last was YR-CN-12-200. Prior to clipping each fish, fork length was measured to the nearest millimeter on a smolt board. Each fish was then blotted to remove surface water and weighed to 0.1 gram on an Ohaus HH120 digital scale. Stainless steel scissors were used to clip tissue from the anal fin. Each tissue sample was placed in an individual vial that had been pre-filled with preservative. Each vial was pre-labelled with the sample number written in indelible ink. Length and weight data was meticulously recorded on specially prepared data sheets. The sample vials and supporting data were submitted to DFO Federal Contaminated Sites Biologist Jody Mackenzie-Grieve, who is arranging, and funding analysis.

Results: We met our target number of 200 samples, with 99 samples collected on August 7 and 101 on August 8. This was 30% of the juveniles restored to productive habitat at the minesite. Sixteen of the 200 juveniles that had been fin clipped were recaptured on September 16 at or upstream of the point where they were restored to the creek. This was 28% of the number of the juvenile salmon captured there. Fifteen of the 16 were captured at Station 2A and 1 at Station 1.

All clipped juveniles captured appeared healthy. The fin clips had healed and in some appeared to have substantially regenerated. The mean fork length of the 16 clipped juveniles was 74.87 mm, while the mean fork length of the unclipped juveniles was 77.94 mm. The results of the DNA sampling have not been received.

Discussion: Assuming that proportional mortality in clipped and unclipped juveniles was similar, the percentage of clipped juveniles in August and September was concordant. This implies that the contribution of juvenile Chinook that migrated upstream from the mouth to the minesite was minor or absent. If true, essentially all

salmon utilizing the productive rearing habitat at the mine site in 2012 were those that we had restored to the creek.
The mean fork lengths of the clipped fish captured in September was 3.07 mm less than those that had not been clipped. This implies that the clipping did affect the growth rates.

Conclusion: The 2012 tissue sampling went well. The Student Stewards enjoyed it, and responded well to the need for discipline in sample collection and record keeping. This activity should be conducted annually if partnerships with agencies can be maintained.

Juvenile Chinook Salmon habitat utilization and assessment of different types of habitat - no outcomes were proposed.

Introduction: Our strategy was to introduce the students to the field of habitat assessment by sampling in three types of habitats: ground water fed channels; still water back channels ("back" channels do not have water flowing through them except during flood conditions) with little or no ground water in put, and off-channel beaver ponds that drain to the Klondike River. We assumed that captures of juvenile Chinook salmon would be very low or absent in the latter two types. We considered that learning where salmon are not present is as important as learning where they are present.

Methods: The Viceroy Channel and the Germaine Creek Ground Water Channel served as a ground water fed channels. Sampling also took place at the Dredge Pond Beaver Dam site located upstream of the Klondike River Bridge near Dawson (64 02.954/139 23.46); at the Beaver Dam Channel above Rock Creek (64 03.554/139 03.673), and at the Side Channel Beaver Dam (63 57.14/138 40.407). Minnow traps baited in accordance with the DFO Protocol were set downstream and upstream of the beaver dams. The traps were deployed for 2 – 24 hour periods. Differences in the types of habitat were pointed out to the Stewards by the Field Supervisor and Technical Advisor and the findings were discussed.

Results: Two juvenile Chinook were captured downstream of the Dredge Pond Beaver Dam and none were captured upstream of it. No juvenile Chinook were captured either below or above the Rock Creek Beaver Dam. Thirty five juvenile Chinook salmon were captured below the Side Channel Beaver Dam and none were captured upstream.

Discussion: This was the first year for this activity, and it must therefore be seen as a pilot. The channel between the Dredge Pond Beaver Dam and the Kondike River was backwatered, resulting in a body of still water. Juvenile Chinook are generally not found in this type of habitat (Hunka & Schuyler, 1988). The lack of juveniles in the Rock Creek Ground Water Channel was surprising. The Side Channel Beaver Dam demonstrated the potential for organic obstructions to negatively affect juvenile Chinook salmon upstream migration. Overall the Stewards were exposed to a number of different types of habitats and had the opportunity to see the use the juveniles made of them

Conclusion: The objectives of this activity were largely met and the activity should be repeated in the future.

In-season opportunities – Acquisition of eggs from Chinook Salmon for use in the Salmon in the Classroom program in Dawson.

The local person who was to conduct this project approached our Field Supervisor and offered to have the Stewards participate in this activity. As this would have been of interest to the Stewards and would have materially increased their understanding of the field of fish husbandry, the Field Supervisor agreed. However funding for the local egg take was not in place when the adult salmon were in the river. DFO carried out the egg take and were not aware of the offer made by their local contractors. The egg take took place outside of working hours in any case.

CONCLUSIONS AND RECOMMENDATIONS:

The 2012 North Mainstem Stewardship Program was successful. The project planning and implementation and administration went smoothly. We were able to conduct all the proposed activities that we had control over. This included activities that had not occurred in the past. The Student Stewards performed well and assimilated information provided to them easily. High standards of safety were maintained and there were no injuries. Each of the Student Stewards wrote a report. They may be found in Appendix E.

We hope to be able to conduct another project in 2013. If so, we will:

- Continue our strategy of hiring local high school level Student Stewards, supervised by an experienced Field Supervisor and Technical Advisor;
- Continue to investigate additional opportunities to monitor salmon, restore access to habitats or perform salvage activities;
- Seek to connect the project with other types of salmon-related projects or other work being done in the field in the Dawson Area.

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APPENDIX A

PUBLIC DAY

Rearing & Over-Wintering Access Restoration Project

Public Open House Summary

Prepared by: Andria Oppen

Dear Dawson District Renewable Resource Council,

The public day was a success. We did however have a decline in attendance from the previous year. We had 20 community members attend this year again mostly between the ages of 5-10. The children were a captive audience and were full of questions for the field workers. The field workers did an excellent job of explaining the importance of the project and provided hands on experience for the children. The visitors had an opportunity to watch the measuring process of the fish as well as help to transfer the fish between buckets. This was thrilling for the kids and certainly will provide lasting memories.

The event spread over 3 hours and included a lovely lunch provided by Bonanza Market. My preparation of the event consisted of contacting the Elders Coordinator at Tr'ondek Hwech'in with an invitation once the date for the event had been determined. I then contacted both Tr'inke Zho Daycare and the Dawson Daycare to invite their summer camp kids to the event. Preparing a poster and posting it in various locations around town. I confirmed transportation for the Dawson daycare as the other daycare was not able to attend this year.

On the day of the event I picked up the food and went to Germaine Creek to set up the food tables and establish a plan with the project staff. I remained through the event and participated in the lesson, then cleaned up the site.

My recommendation for next year is to contact the director of Tr'inke Zho daycare in early July as she tends to be away the first two weeks in August. This would allow time for her to arrange with her staff the outing specifics. As for the public perhaps an ad on the rolling ads leading up to the event may encourage more adult participation. Again, wonderful feedback form those who attended, some of the children who had attended in previous years remembered the types of fish and shared the details with the other children about how the traps worked.

Thank you again for the wonderful opportunity. It was a pleasure to work with the project team.

Please contact me with any questions,

Andria Oppen
andriaoppen@gmail.com

APPENDIX B

Protocol for the Baiting Of G-Type Minnow Traps for the Capture of Juvenile Chinook salmon In the Yukon River Drainage Basin

Fisheries and Oceans Canada
Habitat and Enhancement Branch

Baited G-type minnow traps have proven to be an effective means of capture for juvenile Chinook salmon in the Yukon River drainage basin. Trapping has been conducted by consultants, public interest groups, and government agencies. Salmon roe was the main bait that was used to trap the juveniles.
DFO Habitat developed the following Protocol in 1985 to provide a consistent methodology for G-type minnow trapping in the Yukon River Drainage basin in Canada:

Traps are baited with either Yukon River Chinook or Chum salmon roe. The roe is not salted or otherwise chemically preserved. A "walnut" sized" piece of roe is placed in a perforated thin plastic sandwich or similar bag, and the bag tied off.

(Note: roe is most easily handled when it is frozen: freeze the skeins flat, and chip off appropriate sized pieces. Thin, flexible plastic bags will remain flexible even in cold water. Zip closure bags tend to be stiff and are not recommended. Even very slight current will "pump" thin plastic bags and expel attractant from the bait. Perforations are most easily made with an "Exacto" or similar hobby knife blade: up to 15 bags may be stacked and 0.5 to 1.5 cm long cuts made through them).

The bags of roe are kept frozen for as long as possible before using, as they are most easy to handle when in this state. The potential of the odour of the roe attracting bears is also decreased.

The traps are prepared by having a tether of string or line attached to either of the halves. The trap is baited, closed, and a twist tie (paper coated wire) is used to tie the two halves together. **The minnow trap clip is not used**, as traps are often lost due to high water, etc: if the halves of the trap remain joined together, the trap will continue to capture and destroy fish. When closed by a twist-tie, the trap will quickly open and cease to capture and destroy fish.

When setting the traps in a new area, it is advisable to place the traps in all available types of habitat. Habitat utilisation by juvenile Chinook tends to vary from location to location: pre-judgement is not advisable. The traps should also be marked with survey flagging. A 24 hour set is recommended.

APPENDIX C

FISH CAPTURES DDRRC 2012

Juvenile Chinook catches DDRRC 2012
Fortymile River drainage

Date		Juvenile Chinook Salmon
Lower Clinton Creek		
July	31	274
Aug	1	52
Aug	2	4
Aug	7	173
Aug	8	181
Aug	9	18
Sept	16	39
Clinton Creek at the minesite		
Sept	16	57
Mickey Creek		
July	31	0
Aug	1	0
Sept	16	0
Total		**798**

Juvenile Chinook sampling DDRRC 2012
North Klondike River Watershed

Date		Juvenile Chinook Salmon
		Viceroy Channel trib N. Klondike
May	23	0
July	24	0
Sept	15	0
		North Fork Intake
July	24	0
July	25	0
July	27	5
		Side channel above North Fork Bridge
July	24	1
July	25	0
		6

Juvenile Chinook sampling DDRRC 2012

Klondike River Watershed

Date		Juvenile Chinook Salmon
LogJam channel upstream of Dempster Bridge		
July	24	4
July	25	8
Dredge Pond beaverdam - above dam		
July	18	0
July	19	0
Dredge Pond beaver dam - below dam		
July	24	1
July	25	1
Side channel below Beaver Dam		
July	24	20
July	25	15
Side channel above Beaver Dam		
July	26	0
July	27	0
Beaverdam channel upstream Rock Creek		
July	26	0
July	27	0
Germaine Avulsion salvage		
July	10	123
July	11	112
July	24	44
July	25	6
July	26	13
July	27	1
Germaine Creek Avulsion		
Aug	14	113
Klondike River at boat landing		
July	27	65
Sept	16	49
Total		**575**

Incidental catches DDRRC 2012
Fortymile River drainage

Date		SS	BB	AG	LNS
Lower Clinton Creek					
July 31 - Aug 9	31	14	0	0	254
Sept	16	3	1	0	0
Clinton Creek at the minesite					
Sept	16	7	0		0
Mickey Creek					
July	31	0	0	2	0
Aug	1	0	0	0	0
Total		**24**	**1**	**2**	**254**

Incidental captures DDRRC 2012
North Klondike River Watershed

Date		SS	BB	AG	LNS
Viceroy Channel trib N. Klondike					
May	23	0	0	0	0
July	24	1	0	0	0
Sept	15	2	0	0	0
North Fork Intake					
July	24	1	0	0	0
July	25	2	0	0	0
July	27	11	0	0	0
Side channel above North Fork Bridge					
July	24	0	0	0	0
July	25	0	0	0	0
Total		17	0	0	0

Incidental captures DDRRC 2012

Klondike River Watershed

Date		SS	BB	AG	LNS
LogJam channel upstream of Dempster Bridge					
July	24	0	0	0	0
July	25	0	0	0	0
Dredge pond beaver dam - downstream of dam					
July	18	0	0	0	0
July	19	0	0	0	0
Dredge pond beaver dam - downstream of dam					
July	24	1	0	0	0
July	25	0	0	0	0
Side channel below Beaver Dam					
July	24	3	2	0	0
July	25	3	0	0	0
Side channel above Beaver Dam					
July	26	0	0	0	0
July	27	0	0	0	0
Beaverdam channel upstream Rock Creek					
July	26	1	1	0	0
July	27	0	0	0	0
Germaine Avulsion salvage					
July	10	30	0	0	0
July	11	3	0	0	0
July	24	9	0	0	0
July	25	3	0	0	0
July	26	2	0	0	0
July	27	0	0	0	0
Germaine Creek Avulsion					
Aug	14	3	11	0	0
Klondike River at Boat Landing					
July	27	5	1	0	0
Sept	16	0	5	0	0
Total		**63**	**20**	**0**	**0**

APPENDIX D

Yukon River North Mainstem Salmon Restoration and Enhancement – Record of Activities

Fortymile River Drainage

Clinton Creek

Drainage Area: 206 sq. km

Clinton Creek is the first west bank tributary upstream of the mouth of the Fortymile River. The watershed has been much affected by the abandoned Clinton Creek asbestos mine. Failures of waste rock dumps have resulted in the creation of Hudgeon Lake and in significant contributions of sediment to the lower creek. Storage of water in the upper drainage may be buffering flows sufficiently that beaver are able to maintain dams across the creek. Beaver dams were identified as a probable obstruction in 2005

Activities in 2006

DDRRC Stewardship crew relocated 782 juvenile Chinook salmon from the lower creek to the Wolverine Creek area. Salmon appeared in large numbers in the lower creek, between July 7 – July 12. DFO reported 17 beaver dams between the mouth and the mine site in August.

Activities in 2007

DDRRC Stewardship crew relocated 2070 juvenile Chinook salmon from the lower creek to the Wolverine Creek area. Salmon appeared in large numbers in the lower creek when trapping was initiated on July 18.

Activities in 2008

58 Juvenile Chinook were captured and restored to productive habitat. Very high flows affected trapping success and resulted in the breach of most upstream beaver dams.

Activities in 2009

901 Juvenile Chinook were captured and restored to productive habitat. 200 juvenile Chinook DNA samples were acquired.

Activities in 2010

587 Juvenile Chinook were captured and restored to productive habitat. Fork lengths were measured of a target of 30 jcs/day.

Activities in 2011

15 Juvenile Chinook were captured and restored to productive habitat.

Activities in 2012

702 Juvenile Chinook salmon were captured and restored. Fork lengths and weights were measured of a target of 30 jcs/day. 200 juvenile Chinook DNA samples were acquired.

Recommendations for 2013

Continue to capture juveniles in lower Clinton Creek and restore them to productive habitat near the minesite. Continue with fork length and weight measurements if numbers warrant. Collect tissue samples for DNA analysis.

Mickey Creek

Drainage area: 63 sq. km

Mickey Creek is the first east bank tributary of size of the Fortymile River. Wildfires burned the majority of the drainage basin in 2004. A perched culvert at the Clinton Creek Road crossing was identified as a partial obstruction in 2005.

Activities in 2006

DDRRC Stewardship crew relocated 34 Chinook salmon, but the project ended before large numbers entered the stream.

Activities in 2007

DDRRC Stewardship crew relocated 1273 Chinook salmon. Salmon appeared in large numbers in early August, and probably continued on past the project end.

Activities in 2008

32 juvenile Chinook salmon were relocated over the culvert.

Activities in 2009

9 Juvenile Chinook salmon were captured and relocated.

Activities in 2010

247 Juvenile Chinook salmon were captured and relocated.

Activities in 2011

No Juvenile Chinook salmon were captured.

Activities in 2012

The culvert was backwatered due to a sediment wedge moving downstream. No Juvenile Chinook salmon were captured.

Recommendations for 2013

Monitor and capture/restore to creek above culvert as required.

Klondike River Drainage

Louse town Pond

This pond is a mining cut in the centre of Lousetown. It floods from the Klondike River during high water.

Activities in 2009

No salmon were caught in the 19 traps that were set for two days.

Recommendations:

As the pond is on TH land, only work there at TH's request.

Bonanza Creek

Area: not determined

Bonanza Creek flows north and enters the Klondike River downstream of the main Bridge. The drainage basin has been intensively placer mined.

Activities in 2008

47 juvenile Chinook salmon and 11 sculpin were captured in 15 trap-nights with the traps set between 5 and 8 kilometres up from the mouth.

Recommendations

No further actions are recommended.

Un-named Creek #1 – at north end of Henderson Corner

Classified as a Moderate-High Fish Habitat Suitability stream.

Activities in 2012

Sampled as part of Placer Fish Habitat Suitability Map investigations

Recommendations for 2013.

Sample as part of Placer Fish Habitat Suitability Map investigations – Year 2

Alki Creek

Classified as a Moderate-High Fish Habitat Suitability stream.

Activities in 2012

Sampled as part of Placer Fish Habitat Suitability Map investigations

Recommendations for 2013.

Sample as part of Placer Fish Habitat Suitability Map investigations – Year 2

Germaine Creek

Classified as a Moderate-High Fish Habitat Suitability stream.

Activities in 2012

Sampled as part of Placer Fish Habitat Suitability Map investigations

Recommendations for 2013.

Sample as part of Placer Fish Habitat Suitability Map investigations – Year 2

Germaine Creek area salvage

The Klondike River has developed a new channel in this area. The old channel carries water in the spring. As water levels fall, the Klondike River no longer enters the channel. A series of isolated pools remain and extend downstream to the mouth of Germaine Creek.

Activities in 2007

Salvage resulted in the return of 1297 Chinook fry to the Klondike River.

Activities in 2008

Salvage resulted in the return of 8Chinook fry to the Klondike River. Flows in the Klondike rose in July and the isolated pools were re-connected to the river.

Activities in 2009

Salvage resulted in the return of 419 Chinook fry to the Klondike River.

Activities in 2010

Salvage resulted in the return of 248 Chinook fry to the Klondike River.

Activities in 2011

Salvage resulted in the return of 51 Chinook fry to the Klondike River.

Activities in 2012

Salvage resulted in the return of 299 Chinook fry to the Klondike River. Fork lengths and weights were measured of 30 jcs.

Recommendations for 2013

Continue to salvage juveniles from the isolated pools and release them into open waters.

Goring Creek

Area: not determined
Goring Creek flows north from a defined valley into a series of wetlands and then to the Klondike River
Activities in 2008
No juvenile Chinook salmon or other fish were captured in 5 trap-nights at the Klondike Highway crossing.
Activities in 2009
No sampling occurred.
Activities in 2012
Sampled as part of Placer Fish Habitat Suitability Map investigations
Recommendations for 2013.
Sample as part of Placer Fish Habitat Suitability Map investigations – Year 2

Leroy Creek

Classified as a Moderate-High Fish Habitat Suitability stream.
Activities in 2012
Sampled as part of Placer Fish Habitat Suitability Map investigations
Recommendations for 2013.
Sample as part of Placer Fish Habitat Suitability Map investigations – Year 2

Un-named Creek #3

Classified as a Moderate-High Fish Habitat Suitability stream.
Activities in 2012
Sampled as part of Placer Fish Habitat Suitability Map investigations
Recommendations for 2013.
Sample as part of Placer Fish Habitat Suitability Map investigations – Year 2

Dempster Bridge area salvage

A series of pools extend down the right (north) side of the river.
Connection with the river depends on ground water inflows
Activities in 2007
Salvage took place, resulting in the return of 101 fry to the Klondike River.
Activities in 2008
The crew checked this area but the pools were not isolated due to the high flows.
Activities in 2009
No isolated pools in this area.
Activities in 2010
No isolated pools in this area.
Activities in 2011
No isolated pools in this area.
Activities in 2012
No isolated pools in this area.
Recommendations for 2013
Monitor and salvage juveniles if necessary.

Logjam on left side Klondike River upstream of Dempster Bridge

This is a large and persistent log jam, and is a candidate for a "Klondike River juvenile Chinook abundance and growth station.

Activities in 2012

Limited sampling took place. No juvenile Chinook were captured.

Recommendation for 2013

Resample with greater effort

Boat Landing on Klondike River

This is an accessible and relatively stable area. It is the first "Klondike River juvenile Chinook abundance and growth program" station.

Activities in 2012

Sampling was successfully conducted in July and September.

Recommendation for 2013

Sample in July and September.

Too Much Gold Creek

Area: not determined

Too Much Gold Creek flows from a narrow valley into a series of wetlands extending to the Klondike River.

Activities in 2008

No juvenile Chinook salmon or other fish were captured in 6 trap-nights at the Klondike Highway crossing.

Activities in 2011.

Sampling took place in September, and no fish were captured.

Activities in 2012

Sampled as part of Placer Fish Habitat Suitability Map investigations

Recommendations for 2013.

Sample as part of Placer Fish Habitat Suitability Map investigations – Year 2

Leotta Creek

Leotta Creek is 2 km east of Dempster junction and west of Flat Creek. The water flows narrowly from the hills and flows into the Klondike River.

Activities in 2008

No juvenile Chinook salmon or other fish were captured in 2 trap-nights at the Klondike Highway crossing.

Activities in 2012

Sampled as part of Placer Fish Habitat Suitability Map investigations

Recommendations for 2013.

Sample as part of Placer Fish Habitat Suitability Map investigations – Year 2

All Gold Creek

All Gold Creek enters the South Klondike River immediately west of the mouth of Flat Creek. The drainage basin has been intensively placer mined, and the creek is unstable.

Activities in 2008

No Juvenile Chinook salmon were captured 4 slimy sculpin were captured in 8 trap-nights at the Klondike Highway crossing.

Recommendations

Maintain as a candidate for periods when the Klondike River is too high to work in

Flat Creek

Area: not determined

Flat Creek enters the South Klondike River from the south. The Klondike Highway crosses the creek near the mouth.

Activities in 2008

No juvenile Chinook salmon were captured in 6 trap-nights. 3 burbot were captured at the Klondike Highway crossing

Recommendations

Maintain as a candidate for periods when the Klondike River is too high to work in

North Klondike River Drainage

North Klondike River - salvage

Activities in 2008

There was no work done due to high water levels

Activities in 2009

One isolated pool with juvenile salmon was located at the North Fork intake

Activities in 2010

No pools were observed

Activities in 2011

No pools were observed

Activities in 2012

No pools were observed

Recommendations for 2013

Monitor area and salvage juveniles as necessary

Viceroy Channel

Drainage area: Not applicable

Viceroy Channel is a small, ground water fed channel. It is crossed by the Viceroy Mine Road about 800 meters upstream from it's mouth. A beaver dam was established about 300 meters upstream from the mouth in the summer of 2005.

Activities in 2006

A total of 13 Chinook were restored to the channel above the beaver dam.

Activities in 2007

A total of 13 Chinook were restored to the channel above the beaver dam.

Activities in 2008

The North Klondike River was high. No salmon were trapped.

Activities in 2009

The abandoned beaver dam was breached.

Activities in 2010

The channel was monitored and was not obstructed. Sampling at the Viceroy Road crossing resulted in the capture of 80 juvenile Chinook salmon.

Activities in 2011

The channel was monitored and was not obstructed. Sampling at the Viceroy Road crossing resulted in the capture of 10 juvenile Chinook salmon.

Activities in 2012

The channel was monitored and was not obstructed. Sampling at the Viceroy Road crossing did not result in the capture of juvenile Chinook salmon. The channel was mapped.

Recommendations for 2012

Monitor channel at road crossing to determine whether juveniles have migrated into the creek. Walk downstream to the confluence with the Klondike to ensure that the channel is not obstructed.

Upstream of North Fork Bridge

Off-channel habitat on the left side of the North Fork Bridge.

Activities in 2011

Sampling took place and low numbers of juvenile Chinook were captured

Activities in 2012

Sampling took place and a single juvenile Chinook was captured

Recommendation

Maintain as an index of juvenile Chinook salmon implied abundance and growth in the North Klondike River and as a candidate for periods when the Klondike River is too high to work in.

At North Fork Intake

Complex channel resulting from past river engineering.

Activites in 2011

Sampling took place and low numbers of juvenile Chinook were captured

Activities in 2011

Sampling took place and low numbers of juvenile Chinook were captured

Recommendation

Maintain as an index of juvenile Chinook salmon implied abundance and growth in the North Klondike River and as a candidate for periods when the Klondike River is too high to work in.

Abandoned Hatchery site at Km 10 Dempster

Complex, ground water fed channel resulting from past river engineering

Activities in 2011

Sampling took place. No juvenile Chinook were captured

Recommendations

Maintain as a candidate for periods when the Klondike River is too high to work in.

North Klondike River at Benson Creek

Access to North Klondike River – salmon have been documented spawning in the locality.

Activities in 2011

Sampling took place. No juvenile Chinook were captured

Recommendation

Maintain as a candidate for periods when the Klondike River is too high to work in.

North Klondike at Highway Camp at 42 Mile.

This is the upstream limit of local reports of spawning Chinook salmon

Activities in 2011

Sampling took place. No juvenile Chinook were captured

Recommendation

Maintain as a candidate for periods when the Klondike River is too high to work in.

APPENDIX E

STUDENT STEWARD REPORTS

Dear Dawson District Renewable Recourse Council:

I would like to thank you for giving me the wonderful opportunity this summer to work within your organization. I had so much fun working in this position. Hans Algotsson and Galen Clarke were incredible to work with, I couldn't imagine it with anyone else. It was also a pleasure to work and learn from Al Von-Finster.

I learned so much about the salmon fry and salmon altogether that I didn't know before. I learned about their habitat, their life cycles, and many other interesting facts. We kept a detailed log of all the areas we visited, the number of fish we trapped, and we documented the weight and length of 30 fish each time. We recorded more juvenile salmon in the first week than they did all of last year! I learned many other things from Hans as he talked a lot about the Yukon and Dawson area and he even took us to the old Forty Mile town site. We helped save, count, and tag many salmon fry this summer, from all over the Dawson region, from North Fork to as far away as the Forty-Mile. Counting fish is not all we did - we got to do some GPS work and we even got to do some Habitat Mapping. We located and observed the water flow in culverts along the highway. We even had an interesting encounter with a bear that got into our bait.

I learned so much from the many experiences this summer and have only one complaint. I feel there was a lot of wasted time and that we could have been more efficient and effective if there was a more precise plan. My favourite part was being able to spend most of our time outside, seeing the beautiful scenery, experiencing the Yukon, and doing the hands-on work. Thank you again for this wonderful opportunity. I would do it all again in a heartbeat!

Sincerely,

Christina McIntyre

Sept 26, 2012

DDRRC Fisheries project

This summer was a fun and enjoyable working experience for me. I enjoyed this job because it gave me lots of hands on experience. I enjoyed most of it like collecting the traps, examining the fish, and I loved the scenery. The thing that I didn't like about the job was there was way too much time that we weren't doing anything. This summer we measured a creeks depth and distance, set traps to catch fish, took GPS reading of where creeks crossed the highway, counted and euthanized juvenile salmon, took samples of the anal fin with Al Von-Finster, and released juvenile salmon in a safe place for the winter. During this time we worked in many different locations and creeks including mickey creek, Germaine creek avulsion, viceroy creek, northfork, Klondike river, Clinton creak and many many more. My favorite part of the job was learning new things from Al Von-Finster, and Hans Algotson about salmon and Yukon history.

-Galen Clarke