

Decheeka Falls Salmon Passage  
Investigation 2019  
Tahltan River, tributary to Stikine River  
British Columbia

Prepared for: The Pacific Salmon Commission

Northern Endowment Fund

March 2020

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Yukon and Transboundary Rivers Area

Fisheries and Oceans Canada

## Introduction

The site in question is referred to as Decheeka Falls in this report. Upon investigation of past remedial salmon passage work at the site in the 1960's and 1970's, the spelling Descheeka has been used and local knowledge has referred to the site as Tutesheta Falls possibly in relation to a nearby tributary creek on the south side of Tahltan River.

Decheeka Falls is located in the Tahltan River watershed in a location that both Chinook and sockeye salmon migrate enroute to the upper Tahltan River and to Tahltan Lake. This natural site has been a known site of concern for salmon passage having attention from Alaska State fisheries staff and Canadian fisheries staff in the 1960's and 1970's. It is not completely evident in the record but its clear remedial work was attempted during this time including both salvage transport of salmon and remedial passage efforts. In recent years the site has become more of a concern again with expected sockeye salmon numbers not completely materializing at the Tahltan Lake weir upstream operated by Fisheries and Oceans Canada and Tahltan Fisheries. While not enumerated elsewhere the expected sockeye salmon abundance was a result of forecasting based on downstream sampling in commercial fisheries. It was suggested that the absence of expected sockeye salmon may be due to below average Tahltan River flow levels recorded in recent years. Observations of an undetermined number of salmon present and salmon leaping at the Falls and pooling below the area have been recorded from helicopter surveys in 2017 and 2018. It has been suggested that passage at these falls is limited at particular flows with low flow conditions being the suggested limiting condition however this is not for certain due to the absence of surveys during a range of flows. These conditions would impact the most significant stock to migrate the specific area, Tahltan Lake sockeye salmon. If lower flows are limiting then it would particularly affect those annual sockeye salmon runs that are late in migrating overall or more consistently the salmon at the latter end of the run period when water levels decline in August near the latter portion of the run.

The salmon passage issue at Decheeka Falls has been known for some time however it has not received particular attention until weir operations in recent years resulted in less than expected abundance in 2017 and 2018 when compared to stock assessment information on run strength and forecasted escapement. In addition, the weir operation results were erratic at times with numerous or consistent fish migration through the weir site followed by periods where numbers dwindled or ceased indicating the possibility of migration challenges to the overall run. An assessment of past years to determine how prevalent a combination of late run sockeye, low water levels has resulted in less than expected weir escapement has proved difficult. The Tahltan River Chinook that migrate Decheeka Falls are potentially impacted by migration challenges however proportionally this is a very small amount of total Tahltan River Chinook population. Tahltan sockeye which make up the majority of all Stikine sockeye production, entirely depend on lake spawning grounds upstream of Decheeka Falls within Tahltan Lake.

Of relevance to overall salmon migration success in the Tahltan River drainage is the large Tahltan River rockslide that occurred in a narrow canyon section of the river in May 2014 approximately 800 meters upstream of the Stikine River confluence. Work has been completed annually at this rockslide to monitor and improve passage conditions. The effect of this passage challenge to salmon subsequently migrating through Decheeka Falls should also be considered. A related 2019 Northern Endowment Fund project, the 2019 Tahltan River Salmon Passage Telemetry Project, will further inform salmon migration

conditions at Decheeka Falls. Forthcoming results of the 2019 Telemetry assessment project may provide additional insight.

Concerns regarding the migration of salmon, in particular the sockeye salmon enroute to Tahltan Lake, prompted this focused survey and investigation of Decheeka Falls to determine the challenge to salmon it may cause, the extent to this site limiting salmon passage and to identify remedial activities to pursue to improve passage in relation to results of the project investigation.

The purpose of this project was to collect the required information to develop a design plan for salmon passage improvement.

The objectives of the project were as follows:

- Record salmon migration attempts and success at the site of Decheeka Falls through regular onsite surveys over a range of migration timing and flows;
- Document the site conditions including water temperature, water level, discharge and salmon migration with installation of logging equipment and the use of pictures and video records for subsequent evaluation;
- Contract a professional fish passage expert to conduct an evaluation of the conditions onsite and through site records, pictures and video recorded over the course of the project to develop options for salmon passage improvement;
- Using information collected over the course of this project develop a project design plan to guide future salmon passage improvement work that will ensure passage through the Decheeka Falls site.

## Methods

Access to Decheeka Falls is by helicopter only as it is a remote location in the upper Tahltan watershed creating challenges to frequent site visits due to transport costs. Helicopter services in Dease Lake were used.

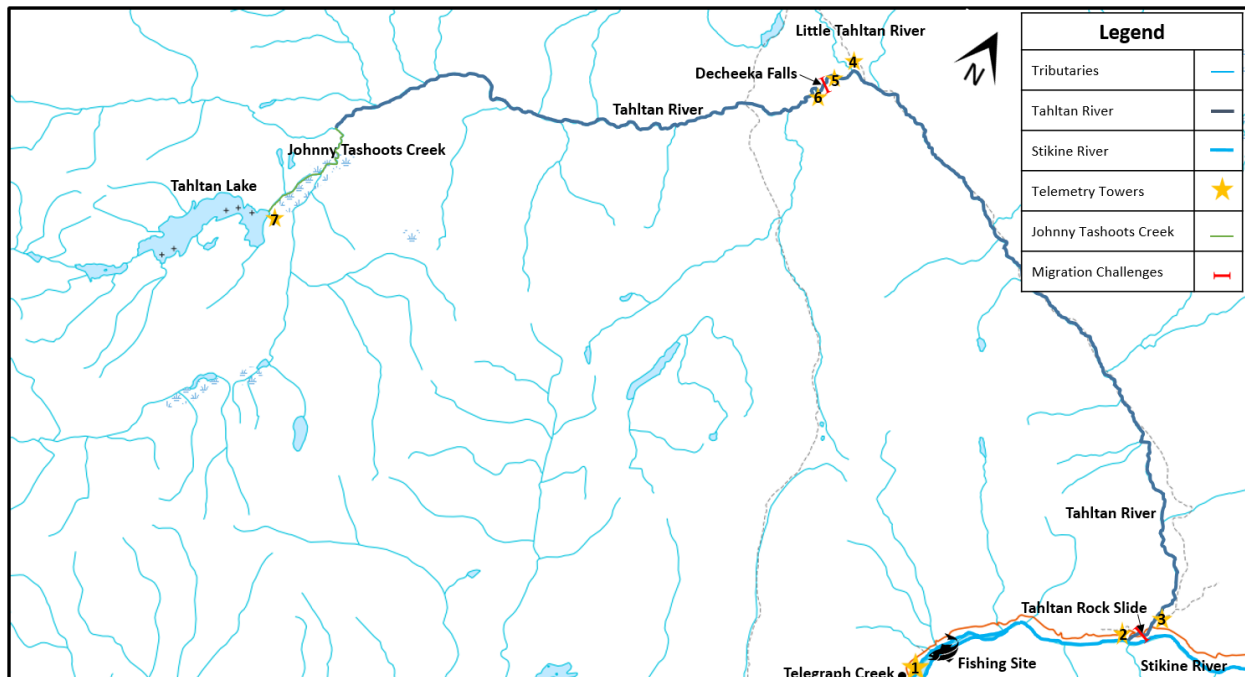


Figure 1. Location of Decheeka Falls. 2019 Tahltan River watershed project map.

A summary of information related to salmon passage at Decheeka and recent apparent migration effects was completed to inform background information of the site being a potential challenge to salmon migration. Archival information was searched to determine additional information on historic work completed in the 1960's to 70's.

Additionally DFO will retain an appropriately qualified engineering expert with experience in salmon passage remediation in order to provide site survey, remedial recommendations and design. Site surveys will be completed to develop information on specific challenges to salmon migration and plans based on challenges observed and the extent of the problem observed.

Prior to this project beginning DFO Whitehorse Salmonid Enhancement Program staff made a trip to Decheeka Falls in October 2018 during seasonal low water conditions to land and conduct a preliminary assessment of the site. This is the first time anyone has been on the ground here since approximately the 1960's or 1970's. During this site visit a small preliminary landing pad was established for consistent direct helicopter access to allow further surveys and custom measurement reference gauges were affixed near the most significant challenge observed for future reference and photo records. This site visit served to both prepare for future work at the remote site, understand what previous work may have been completed many years ago and assess the possibility of intervention to improve salmon passage at the site if pursued.

Site visits will be frequent as possible to span the sockeye salmon migration and will be assisted by another Northern Fund project funded for 2019 that radio tagged Chinook and sockeye salmon in the Stikine River near Telegraph Creek for evaluation of barrier conditions at the Tahltan River rockslide and at Decheeka Falls. This radio tagging project, the 2019 Tahltan River Salmon Migration Telemetry Project, will assist the evaluation of passage.

Water level station loggers (Hobo Onset U20 model) and temperature loggers (Hobo Tidbit v2 UTBI-001 model) were deployed to record information on streamflow and condition during the 2019 salmon migration. It was expected that the most significant impact to salmon migration at Decheeka Falls is to sockeye and the cause related to flow levels becoming naturally lower over the course of their summer migration, resulting in a more significant challenge or barrier at some level of declining streamflow. This latter summer period, in the month of August, is the period that received additional focus of site visit trips to observe conditions and salmon present. Overall project site visits were completed directly through this project and also opportunistically through related NEF projects and regular DFO programs being completed nearby including the 2019 Tahltan River Radio Telemetry project, stock assessment salmon aerial surveys and stock assessment camp service flights.

## Results

### Archival Information

Archival information searching at the DFO office provided some insight into activities completed by the Canadian Government in the 1960s and 1970's. Brief reports were found with very limited picture copies of limited resolution. In general activities included large helicopters that were used to position rocks and debris in position and also blasting being completed on canyon walls in the area (possibly) were completed however project design records were not found to date. It is surmised that using the installations of rock and possibly other structural materials were being employed to establish backwatering approaches to improve salmon passage.

## Decheeka Falls Description

Decheeka Falls is located approximately 34 kilometers downstream of Tahltan Lake in the upper half of the Tahltan River watershed (Coordinates 58.1058 ° N, -131.3359 ° W, Figure 1) The area referred to as Decheeka Falls is a incised section of the Tahltan River where it leaves an upstream meandering profile to enter an incised canyon reach extending until the confluence with the Little Tahltan River. The site itself is made up of four separated hydraulics (Figure 2) in the upper 500 meters of the incised canyon reach. Stream flow in this higher elevation area is driven seasonally by spring snowmelt followed by precipitation and annual snow melt in upper extents of the watershed. Groundwater is prevalent in the watershed however unclear its contribution to upper elevation watershed sections compared to middle and lower sections of the Tahltan River watershed. Generally the watershed is an arid climate with little precipitation however significant localized rain storms have been noted and result in significant water level changes in the Tahltan River, that can result in elevated flows for days after such an event. Water levels typically decrease through June and in recent years where records began to be collected (2014-2019) water levels have declined further in July and August before September precipitation provides for increased flows prior to freeze up. In recent years the spring freshet appears to occur at variable times and trending to earlier in middle May.

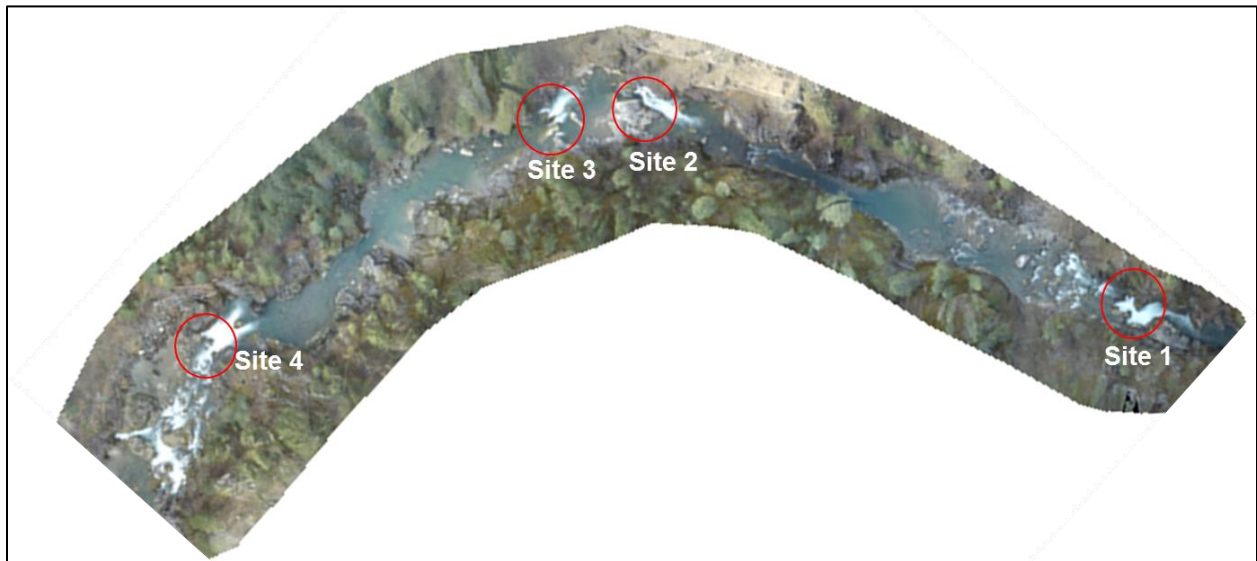


Figure 2. Decheeka Falls is made up of four hydraulic sites.

## 2019 Snow and Streamflow Conditions

Snowpack conditions in spring 2019 were the second lowest recorded as reported by the BC Government at their Kiniskan snow pillow site. It should be noted this snow pillow site is located far to the East of the Tahltan River and is an index to the area for this project reference, however it is in an area of a greater snow accumulation character than the Tahltan River area. Telegraph Creek and Dease Lake have manual snow measurement sites however after a devastating wildfire in the Telegraph Creek area in the summer of 2018 the resulting conditions have led to the benchmark sites being abandoned in the Telegraph Creek area at this time. Snow level results in comparison to recent years when potential challenges to salmon passage were suspected are presented in Figure 3 from the British Columbia government website.

### Snow Basin Index Graphs - March 1, 2019

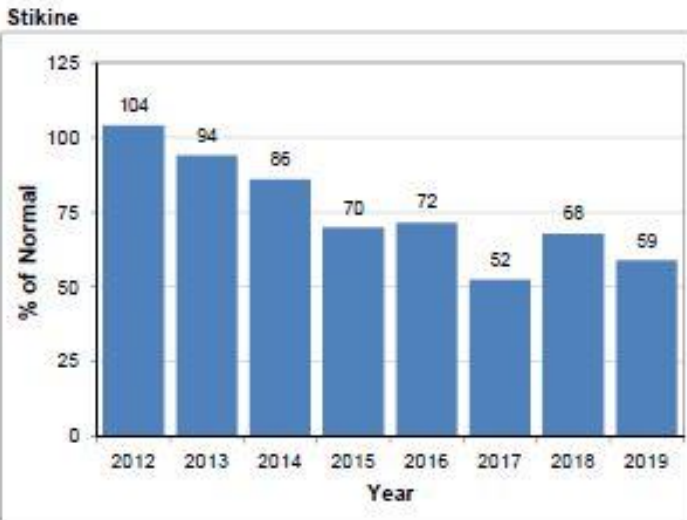


Figure 3. BC Government website. Annual Snow Level Conditions. Stikine Area.

Tahltan River watershed streamflow was measured at the Tahltan River Bridge using a metric staff gauge affixed to the highway bridge abutments beginning in 2014 when the rockslide occurred. The Tahltan River Bridge is located approximately 400 meters upstream of the confluence with the Stikine River so represents Tahltan River total water level and discharge well. At times, rising water levels in the Stikine River can “back up” Tahltan River, raising its level however this influence does not reach as far up the Tahltan River as the measurement location at the bridge in normal circumstance and has not been observed in years of record presented.

Tahltan River water levels in 2019 were below the average recorded in recent years (2014-2018) and the lowest of those recorded years as presented in Figure 4. An additional extension to the staff gauge needed to be installed to record sub-zero measurements.

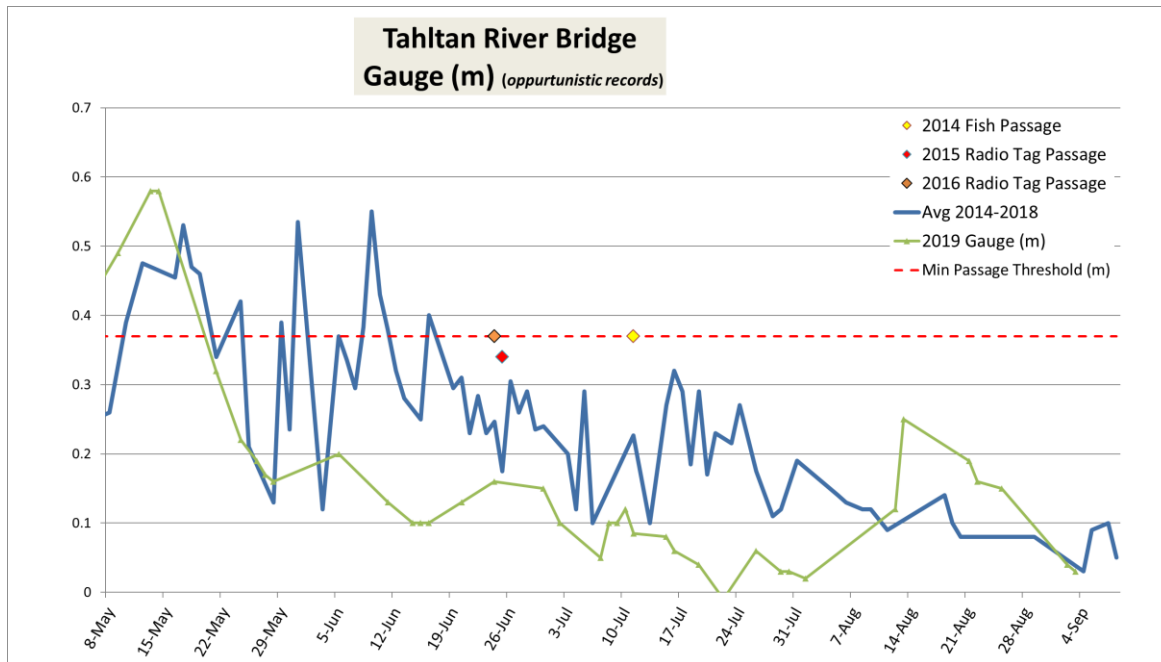


Figure 4. Total Tahltan River water level records recorded during site visits and opportunities by project partners at the Tahltan River bridge near confluence with the Stikine River.

On June 20, 2019 Tundra Helicopters provided transport to the site with materials to establish stream level stations, benchmarks and loggers to record stream temperature conditions. The helipad was expanded to increase accessibility and safety as directed by the pilot. Additionally through cooperation of NEF projects to take advantage of the flight to the remote site the two radio receiver stations were established both upstream and downstream of Decheeka falls to record salmon migration through the site for the Tahltan River Telemetry project.

For streamflow and temperature recording a site was chosen approximately 200 meters upstream of the upper Decheeka Falls hydraulic (Site 4) that would be wadeable in low water conditions to record benchmark flow information for long term record reference. Loggers were deployed to record conditions over the duration of the salmon migration. Water levels were expected to decline further to allow wading across the channel for a discharge estimate however in a subsequent trip equipped to complete the measurement water levels had increased. In its place for 2019 a benchmark was created near the site of the water level logger deployment into bedrock on stream left of the channel to reference 2019 measurements in the future. On August 28, 2019 a staff gauge was installed on stream left at the logger deployment location and an initial reading of 2.42 meters was recorded.

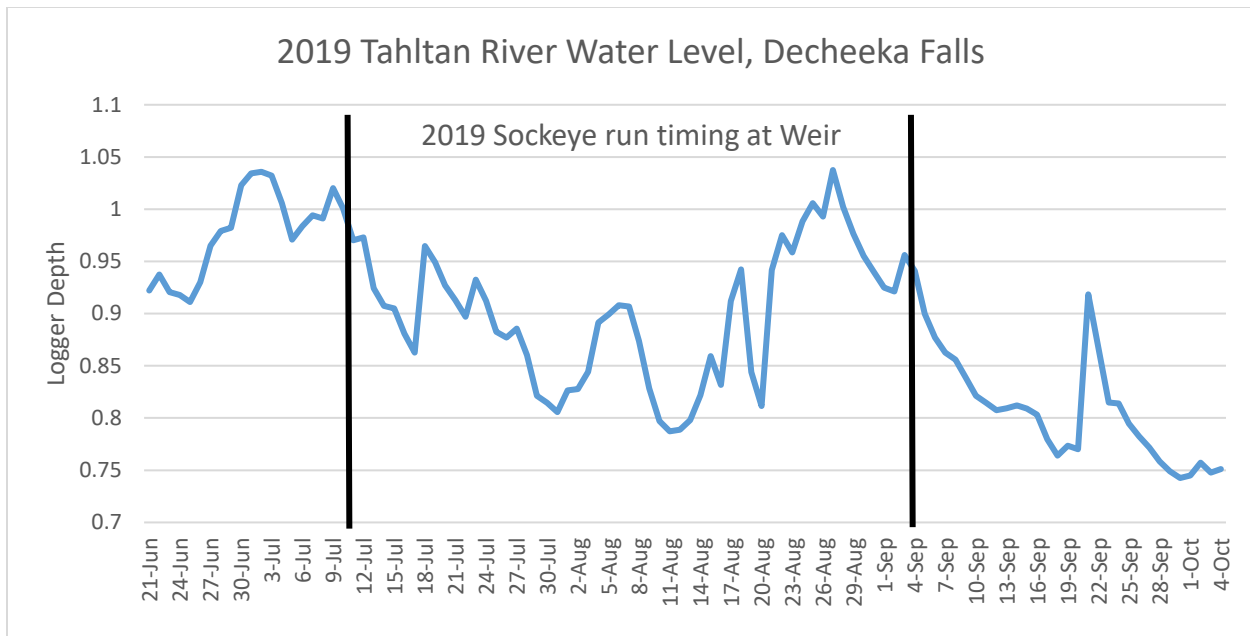


Figure 5. Continuous 2019 summer water level record with reference to sockeye run timing.

Variable water levels were recorded in 2019 and as opposed to a declining trend over the summer a notable significant rise in water level was recorded beginning in mid-August due to rainfall events. Water levels recorded by data logger deployed are presented in Figure 5 including reference to lagged dates sockeye salmon migration through the Tahltan Lake weir began, July 13, and ended, September 5, in 2019. Telemetry information will confirm the migration time from Decheeka Falls to the weir however it can be speculated this is approximately 2-3 days not counting migration challenges that have been noted in Johnny Tashoots Creek related to regular beaver activity.

Where locate monitoring results?

#### Temp

After some delay due to significant involvement in the 2019 Big Bar Landslide on the Fraser River, on August 28, 2019 a site survey was conducted by Northwest Hydraulic Consultants (NHC) accompanied by DFO Whitehorse SEP staff. Ground level measurements were completed on all four hydraulics with particular focus on the upstream (Site 4) where salmon were observed leaping at the challenge. Success and failure was noted as well as the hydraulic conditions effecting various attempts. Water levels during the survey were elevated due to a recent significant rain event as evidenced by the water level record. Details on the results of the survey are forthcoming from the contractor and will be included in this report once complete.

Overall sockeye salmon run migration information is included in Figure 6. Salmon passage is represented as daily enumeration through the Tahltan Lake weir as recorded by DFO Stock Assessment and Tahltan Fisheries staff in 2019.



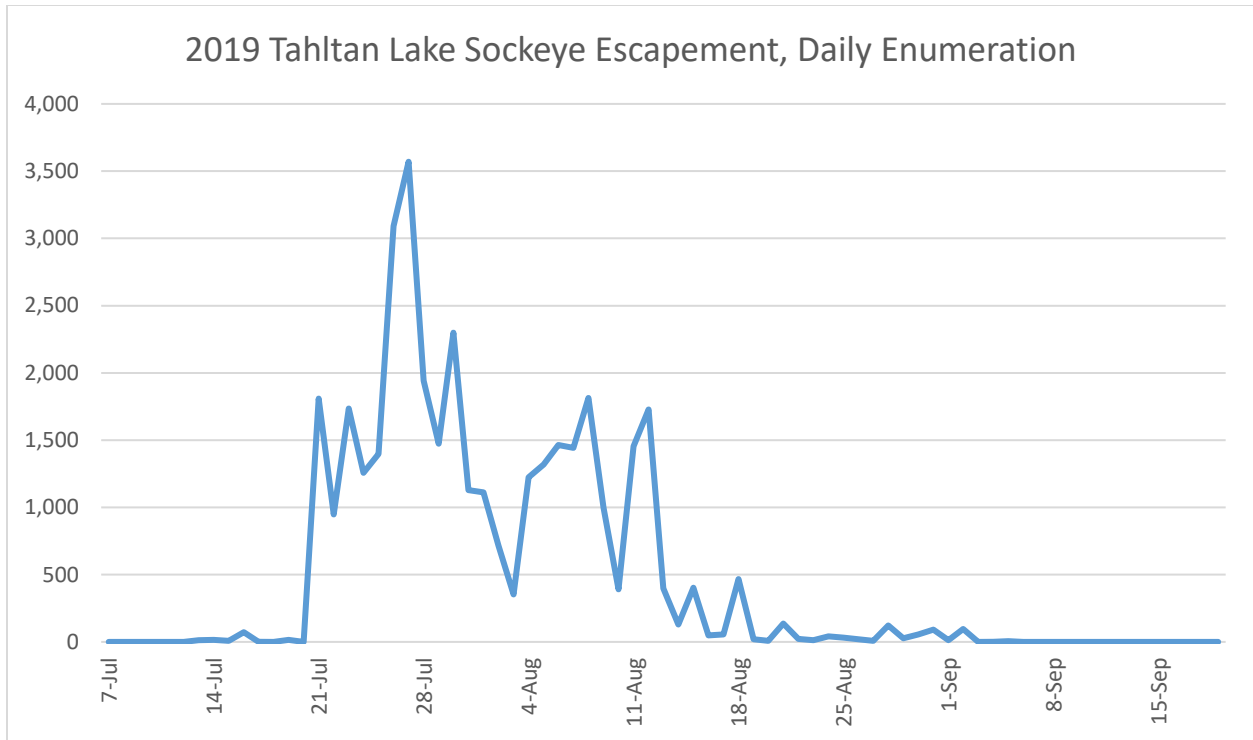


Figure 6. 2019 Tahltan Lake sockeye weir daily enumeration record.

### Discussion

Tahltan River water levels changed over the course of the salmon runs and due to a significant rainstorm in late August saw an increase from very low levels while salmon were still migrating upriver. This change presented an opportunity to observe changes in passage results at the weir and was coincidentally one of the site visits when the NHC survey was completed.

Significant passage problems in the form of delayed or impeded sockeye salmon were not observed through visual surveys by helicopter or ground inspections. Sockeye salmon passage through Decheeka Falls and successfully entering Tahltan Lake resulted in numbers expected for the year and was an over escapement (Tahltan Lake target 18,000 - 30,000. 2019 escapement 36,999) showing abundant sockeye salmon migrating the Tahltan River in 2019. However determining whether a great number of sockeye salmon were present in the downstream pools of challenges at Site 4 and Site 1 of Decheeka Falls was difficult to assess due to the clarity of the water and depth of the large pool at Site 4 and with Site 1 the turbulence and vantage to adequately see downstream of it in the severely incised and narrowing canyon. Fish presence was only observed at Site 4 and appeared that consistent leaps were occurring however not to an unusually high frequency that would suggest large numbers present during the last site visit during the run on August 28. Additionally, sockeye salmon were not observed rising to breach the water in the pool downstream of Site 4 during observations suggesting there was not distressed or abundant competing salmon present in the deep pool.

As described below further information is yet to be produced regarding fish passage at Decheeka Falls. The Telemetry project requires completion of data analysis to determine what the results of salmon

passage conditions 2019 were. These results will be included in the respective project report once complete.

Northwest Hydraulic Consultants completed a site visit later than preferred related to commitments being contracted as lead fish passage professionals to the Big Bar slide on the Fraser River in 2019 with salvage operations and remedial fish passage work underway in an emergency bid to assist salmon passage upstream of the Fraser River salmon passage barrier. Had the survey been completed in early August more sockeye salmon would have been observed due to the run being well underway. However the survey originally intended to be late in the run when suspected challenges to passage may increase was completed August 28 coinciding with an escapement run timing when 99% had passed into Tahltan Lake according to post season information. The intent was to investigate salmon passage and evaluate if variable flows, particularly low flows, were limiting salmon passage success. As suspected by past observations of salmon present at the Decheeka site late in the run season. Salmon were observed in recent years as late as September 12 when the annual sockeye aerial survey of the Stikine River is conducted and Decheeka was flown over to observe salmon presence. Results of these flights over the site resulted in discussion concerning salmon observed however the abundance of salmon present was unclear from the air leading to this project to verify the concern for salmon passage.

Northwest Hydraulics Consulting completed a site survey of all four challenges to salmon passage at Decheeka Falls and will develop a brief report outlining information collected and options moving forward.

While not directly related to this project another concern for salmon passage to Tahltan Lake should be addressed. This obstacle is Johnny Tashoots Creek which leads from Tahltan Lake to the Tahltan River. This small creek is challenged to process widespread beaver effects on salmon passage that are consistently present and partially managed as possible by Tahltan Lake enumeration weir operation staff. Beaver dams are frequently breached and pulled to allow salmon passage during the Chinook and sockeye runs. Variable daily sockeye weir counts observed in recent years could be a result of effects of passage within this creek either, or in addition to, potential delays that may occur at Decheeka Falls.

### Conclusion/Recommendations

Monitoring of the fish passage conditions in 2019 was successfully achieved through the work of this project to improve access to the remote helicopter accessible site and allow frequent observations during the 2019 salmon run periods. It is recommended that site access and site monitoring established as a result of this project be maintained in years to come to further the knowledge of salmon passage at Decheeka Falls.

In 2019 Stikine watershed snowpack levels were 52% of normal according to regional Stikine snow pillow data collected by the British Columbia government. The 2019 summer season saw unusually low water levels and the lowest as recorded from the Tahltan River bridge on the Telegraph Creek road beginning in 2014 to assist with Tahltan River rockslide information. However two major rain events occurred during the sockeye run timing that rose levels in the Tahltan River. This range of flows observed during the sockeye run in 2019 was advantageous to assisting in determining if certain levels cause delays or prevent passage of migrating salmon. However a long term record of Tahltan River specific water levels does not exist and needs to be approximated from nearby watersheds such as Tuya River that has a

Water Survey of Canada station on it since the 1960's. Further water level information should be recorded to improve the current record of water levels that occur during salmon migration at Decheeka Falls. This will assist in understanding salmon passage observed in 2019 in context of water levels and potential changes in future years.

As a result of monitoring over the course of the salmon runs, particularly the sockeye run, in 2019 it can be verified that there was not a significant limiting fish passage feature in the conditions observed in 2019. This is confirmed with two measures in 2019. First that no significant number of salmon were observed at the Decheeka Falls site indicating significant challenges to passage causing delays or preventing passage. Secondly that the weir count did not have significant periods of limited salmon passage that could indicate changes in passage success somewhere downstream. Tagged salmon migration success will provide further information on passage through the site.

A complimentary NEF funded Tahltan River Telemetry project was completed in 2019 to evaluate salmon passage through both the Tahltan River rockslide that occurred in 2014 and migration at Decheeka Falls. Analysis of this large dataset is currently underway and being finalized. Results should be consulted in the project report. Assessment of passage at Decheeka included visual observations and surveying of site challenges however a measure of salmon delay or failure through the Decheeka Falls site is expected to be determined from the radio tagged salmon passing the radio receiver towers positioned immediately downstream of the Decheeka site and upstream of it.

Northwest Hydraulics Consultants will prepare a brief report on their findings through a survey of the site conditions at Decheeka to inform the parameters of the barriers, salmon behavior observed and information on potential approaches to improve salmon passage.

A passage design is not requested as significant delays and impediments to salmon passage were not observe in 2019 making the development of a solution less informed without observing a problem in action. Remaining funding for this aspect of the project will be returned to the PSC. Annual monitoring of Decheeka Falls will continue with reference to flow and compiled site information in hand now to inform differences in conditions should significant challenges be observed in the future.