Haggart Creek Watershed

2024 Fisheries Monitoring Program

Prepared by Fish and Wildlife Branch, Fisheries Section,
in collaboration with the First Nation of Nacho Nyak Dun

Haggart Creek Watershed: 2024 Fisheries Monitoring Program

Government of Yukon, Fish and Wildlife Branch in collaboration with the First Nation of Nacho Nyak Dun

Authors
Myles Brown and Cameron Sinclair

Acknowledgement
Planning and delivery of the monitoring program was a significant collaborative effort between staff from various sections of the Yukon Government, the First Nation of Nacho Nyak Dun, and several external partners. Mark O'Donoghue, Lisa Rear, Joël Potié, Kenji Tatsumi, Tristan Sparks, Mairi Hanna, Pascale Savage, Jaylene Goorts, Treharne Drury, Kenji Tatsumi, Robert Perry, Marc Cattet, Caitlin January, Mark O'Donoghue, Lisa Rear, Marshal Buyck, Rasheeda Slater, and other members of the First Nation of Nacho Nyak Dun, the staff at Fireweed Helicopters and other community partners who have worked with fisheries staff to deliver the monitoring program.

Copies Available From:
Government of Yukon
Fish and Wildlife Branch, V-5
Box 2703, Whitehorse, Yukon, Y1A C6
Phone 867-667-5721
Email: fisheries@yukon.ca
Online: Yukon.ca and open.yukon.ca

Suggested Citation
Brown, M. R., & C. L. Sinclair (2025). Haggart Creek Watershed: 2024 Fisheries Monitoring Program. Government of Yukon, Whitehorse, Yukon, Canada.

Executive summary

On June 24, 2024, the heap leach pad at Victoria Gold Corporation's Eagle Gold Project failed. In response, the Government of Yukon and the First Nation of Nacho Nyak Dun commenced a multi-year Fisheries Monitoring Program to detect acute (short-term) and chronic (long-term) changes to the freshwater populations within the Haggart Creek watershed. This includes monitoring population dynamics, abundance, movement and heavy-metal concentrations in fish tissue.

In 2024, the joint program completed the first year of assessment. Standardized fisheries sampling techniques, including backpack electrofishing, sample angling and minnow trapping were used to assess the whole watershed, including sites directly upstream and downstream from the mine. Sampling locations were a combination of randomly selected locations following standard river assessment methodologies and sites previously assessed in the baseline assessment prior to the mine's construction. Of 52 proposed sites, 44 were sampled using single-pass backpack electrofishing, providing a current perspective on species presence, relative abundance, population structure, and habitat conditions. The key findings from year one include:

- **Species composition and abundance:** Seven fish species were documented in the survey: Arctic grayling (*Thymallus arcticus*), round whitefish (*Prosopium cylindraceum*), slimy sculpin (*Cottus cognatus*), Arctic lamprey (*Lethenteron camtschaticum*), burbot (*Lota lota*), chinook salmon (*Oncorhynchus tshawytscha*), and northern pike (*Esox lucius*).
    - Four of the seven species were present in the Haggart Creek watershed: Arctic grayling (*Thymallus arcticus*), round whitefish (*Prosopium cylindraceum*), slimy sculpin (*Cottus cognatus*), and burbot (*Lota lota*).
    - Arctic grayling and slimy sculpin were the most abundant species. Arctic grayling catch rates were consistent with historical data, suggesting moderate abundance despite potential impacts from the mine failure.
- **Spatial variability:** Significant differences in fish size and abundance were observed across sub-drainages, with lower abundance and altered size distributions in the mainstem of Haggart Creek near the impact zone compared to upstream tributaries.

- **Habitat fragmentation:** Partial barriers, such as culverts and beaver dams, were identified as potential contributors to localized differences in fish distribution, compounding the effects of sedimentation and water quality changes from the mine incident.
- **Mark-recapture studies**: Over 200 Arctic grayling were tagged to establish baseline population metrics for long-term monitoring using a Jolly-Seber open-system model.

Preliminary results indicate the watershed supports a diverse fish assemblage, and the mainstem of Haggart Creek shows reduced Arctic grayling abundance, potentially linked to human activities. The findings underscore the need for continued monitoring to distinguish between natural variability and human impacts, thereby informing mitigation strategies. The 2024 assessment provides critical baseline data for understanding the ecological consequences of the Eagle Mine incident, supporting evidence-based decision-making for fish conservation and management.

Table of Contents

Table of Figures

Table of Tables

Introduction

Background

Project location

The Haggart Creek Watershed is located 85 km north of the town of Mayo, Yukon, within the traditional territory of the First Nation of Nacho-Nyak Dun. Haggart Creek flows southward towards the South McQuesten River within the Stewart River drainage of the Yukon (**Figure 1**). The Victoria Gold Corporation's Eagle Gold Project is located within the Dublin Gulch drainage area of the Haggart Watershed, 27 km upstream of the South McQuesten. Since 2011, Victoria Gold Corporation has developed and operated an open-pit gold mine employing a heap-leach process for extracting gold (Harvey et al., 2022).

Environmental baseline assessment

The Dublin Gulch sub-watershed supported historical placer mining activity. Between 2007 and 2009, the Victoria Gold Corporation conducted an environmental baseline assessment led by Stantec Consulting to provide an aquatic baseline prior to the open-pit mine development (Stantec, 2010). Stantec assessed 69 sites within a local study area using backpack electrofishing and gill nets, completing habitat assessments at the sampling locations. Of the 69 sites, 38 were found to be fish-bearing, with detections of Arctic grayling (*Thymallus arcticus*), chinook salmon (*Oncorhynchus tshawytscha*) and slimy sculpin (*Cottus cognatus*). The baseline study remains critical for understanding pre-mine aquatic conditions, providing a valuable reference point for comparative analysis of the region's ecosystems, both historically impacted and during the current monitoring efforts.

Heap leach failure

On June 24, 2024, Victoria Gold Corporation's Eagle Gold Project experienced a catastrophic failure of the heap leach pad. In response, the Government of Yukon (YG) and the First Nation of Nacho Nyak Dun (FNNND) collaborated to conduct environmental monitoring programs, including water quality and fisheries assessments, in the downstream environment of the Eagle Gold mine, to assess the impacts and inform potential risks associated with the heap leach failure.

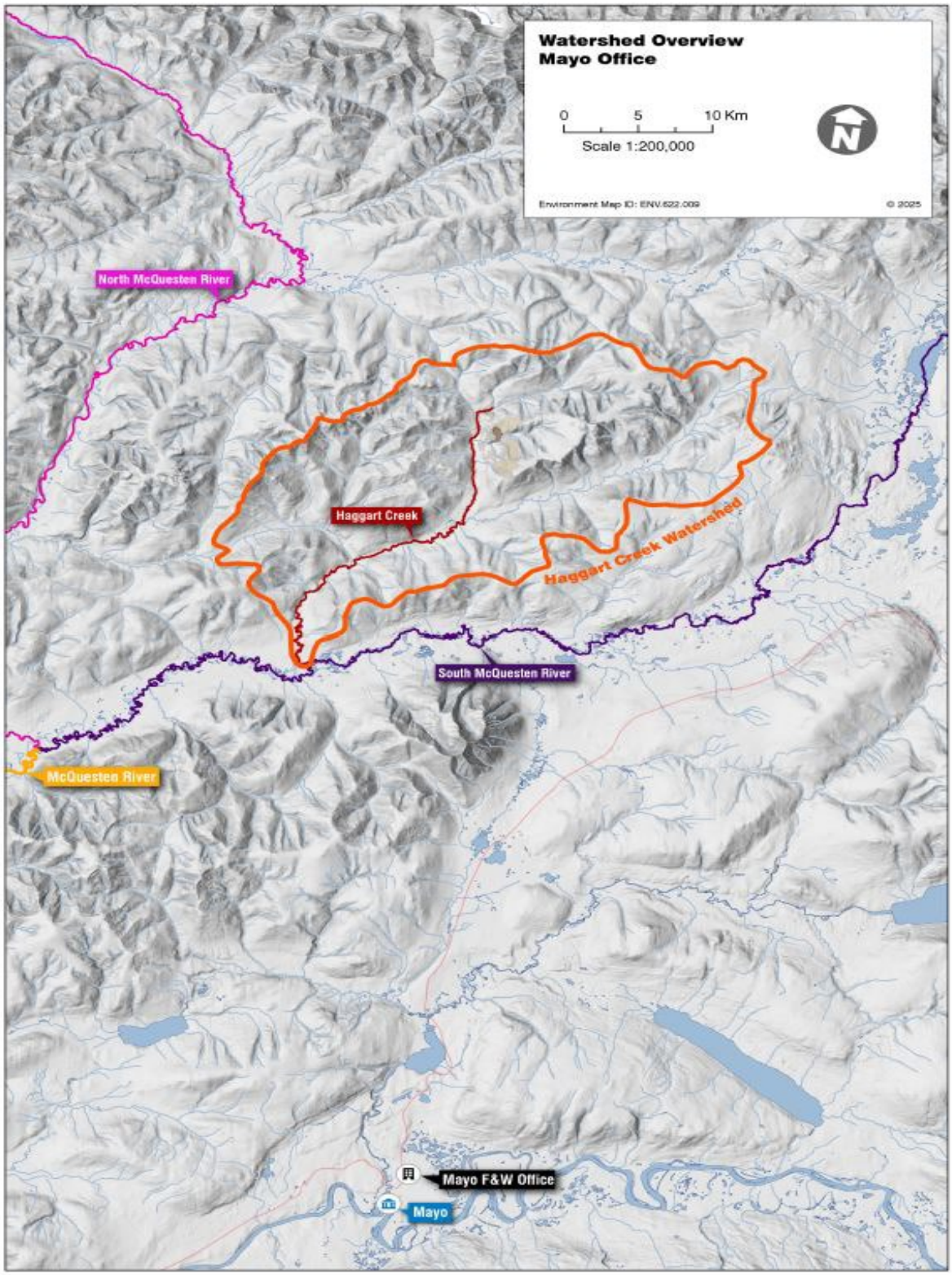


Figure 1 Location of the Haggart Creek watershed.

Fisheries monitoring program goals and objectives

Goals

In July 2024, YG and FNNND created a joint Fisheries Monitoring Program to monitor the freshwater fisheries populations within the Haggart Creek watershed. The program aimed to achieve the following goals.

- Evaluate the acute (short-term) and chronic (long-term) effects of the heap leach failure and the operation of the mine on freshwater fish population dynamics, growth, cyanide contamination, heavy-metal contamination and habitat characteristics.
- Detect and monitor changes over time by distinguishing natural variability from human-caused impacts. The program will establish baseline data to monitor trends over the short term (2–5 years) and long term (20 years).
- Develop an aquatic cumulative effects model to better understand how multiple stressors influence fish abundance and fish habitat integrity
- Inform mitigation and restoration efforts by identifying priority areas for aquatic habitat restoration and support recovery efforts for impacted species.

2024 objectives

To achieve these goals, the 2024 program focused on the following objectives:

- Assess freshwater fish species presence, abundance, structure, and distribution.
- Assess the current availability, structure and condition of fish habitats.
- Provide a comparative analysis of the prior environmental baseline information to identify and quantify any biologically significant differences.
- Initiate a multi-year, open-system, mark-recapture survey using a Jolly-Seber model for Arctic grayling.
- Conduct a lethal fish sampling to test for heavy-metal contamination in tissue.

This report summarizes the joint YG/FNNND 2024 Fisheries Monitoring Program, excluding the results of the tissue analysis. Tissue sampling findings may be presented by the Department of Health and Social Services.

Methods

Survey scale

The program focuses on conducting fisheries assessments at a watershed scale to monitor how freshwater populations respond to potential contamination resulting from the heap leach failure. Standardized methodologies were applied to assess the species diversity, relative abundance, population structure, distribution and sustainability of fish stocks and their habitats.

The fisheries assessment focuses on monitoring two types of sampling sites:

State sites – These provide information on the relative abundance, distribution and structure of fish populations within the watershed in areas not expected to be influenced by mining activity.

Impact sites – These provide information on the relative abundance, distribution, and structure of fish populations at locations within the pathway of effects from the mine.

Standards

The understanding of the risks, duration and consequences associated with the heap leach failure at the Eagle Mine site is evolving as multidisciplinary agencies continue their assessments. The Fisheries Monitoring Program is expected to be a multi-year project to assess inter-annual and annual effects and variation. Standardized methods align with established fisheries and habitat monitoring guidelines to ensure consistency and comparability over time and across watersheds. Key references include:

- The detailed sampling standards supporting this assessment include those described in Coldwater Fish in Wadable Streams (Dunham et al., 2009),
- Standard Operating Procedure for Small Stream Backpack Electrofishing (Government of Alberta, 2017),
- Fish Survey Methods for Rivers (Schiek & Sullivan, 2014),
- GRTS: User-friendly method for Busy Biologists (Reilly et al, 2023),
- Reconnaissance (1: 20,000) Fish and Fish Habitat Inventory (Vavenby et.al., 2001)
- Fish and Fish Habitat Baseline (Stantec, 2010).

Sample timing, location, and size

Timing

Fish were sampled during July to September under stable flow conditions (between the lower 25th and upper 75th percentiles for water flow) when they are widely distributed throughout the watershed. This timing minimizes variability caused by spawning or migration and maximizes capture efficiency.

Water flow measurements throughout the watershed from 2007 to 2009 revealed that the pooled mean flow between June and September was 1.789 m^3/s. The pooled mean lower 25^{th} and upper 75^{th} percentile for the same period were calculated as 1.610 m^3/s and 1.963 m^3/s, respectively (Gardener et al., 2010). This time window is expected to increase visibility and optimize fish capture efficiency, mitigating some of the environmental factors that affect catchability (proportion of the population available to be captured with a standard unit of effort and timing window). These conditions increase the chances of detection and capture and reduce variability among sites.

Sample locations

Traditional random selection tools can lead to site clustering. To avoid clumping, sites were chosen using a Generalized Random Tessellation Stratification (GRTS) method. GRTS is a spatially balanced sampling design, which allows biologists to add additional or replacement sites as needed while retaining overall spatial balance. GRTS also allows for weighting site selection based on strata of interest (e.g. if you want more survey points on Order 3 streams) (Reilly et.al., 2023).

State sample sites were selected randomly using GRTS. Exact locations may vary in the field based on site conditions and discrepancies from the GIS watershed layer. Impact sites are not randomized; they are all located in Dublin Gulch and the mainstem of Haggart Creek. Impact sites were selected from the Stantec (2010) report at locations downstream of the mine in the expected pathway of effect. Stantec (2010) details the site selection criteria, with the initial sites selected from a systematic random sampling design.

Sample size

The number of watershed sampling sites was determined using a power analysis to ensure that trends in population size, distribution, and structure can be detected with a desired level of power and precision (Stevens and Olsen, 2004). The initial sample size was estimated using an alpha of 0.05, with the goal of detecting a 50% change in the population with an 80% power over a minimum of five years of sampling. To complete the power analysis, the standard deviation of the catch was estimated from the Stantec (2010) capture data at 1.88 units on a log scale, and the process error was set at 0.2 on a log scale.

The results of the power analysis indicated that the sampling design for year one should include a total of 52 sites, 200 m in length. Of these 52 sites, 49 sites are located in the Haggart Creek watershed, with 3 sites located along the South McQuesten Road (**Figure 2**). The survey was divided into ground-based sampling sites (n=26) and helicopter access sites (n=26). Of the 52 sites, 23 were impact sites (44%), and 29 were state sites.

Future surveys may add additional sites if site conditions degrade due to natural or human-caused impacts (Schiek & Sullivan, 2014; MacPherson et al., 2024). New sites can reflect importance to First Nations, local resource users and other interests. Data from these sites can be plotted with GRTS data but may need to be isolated for trend analysis and reporting.

Fish capture and analysis

Capture

Fish are sampled using single-pass backpack electrofishing in open 200 m transects and angling in 2000 m open transects (Bonar et al., 2009; Meador et al., 2003, Dunham et al., 2009; Honkanen, et al., 2018; MacPherson et al., 2024). Angling sites are limited to Lynx Creek and one pool on the mainstem of Haggart Creek. Angling was not used in other areas due to changes in water clarity that affected catchability across the watershed. Sampling points represent the start of each sampling reach (**Figure 2**).

At electrofishing sites, each site was broken up into four 50m sampling reaches labelled A to D (e.g. 0-50 m = reach A, 51-100 m = reach B, 101-150 m = reach C, 151-200 m = reach D). At angling sites, each site was broken up into four 500m intervals.

Open transects are selected, rather than employing block nets, to expedite sampling while maintaining accuracy in order to complete sampling prior to potential contaminant release from the heap leach failure. Post et al. (2022) and MacPherson et al. (2023) demonstrated the ability to assess and formulate recovery actions for very low-abundance salmonid species at risk using single-pass electrofishing and, in many instances, without block nets. Meador et al. (2003) demonstrated that single-pass electrofishing captured 80-100% of total species richness. They also showed that the open transect method that does not use block-nets did not differ significantly from surveys which used them.

In future survey years, we may use block-netted multi-pass electrofishing to improve our population estimates. Hedger et al. (2013) and Honkanen et al., (2018) found this method to be accurate, as long as at least three passes are completed, the nets are set up properly, and there are enough marked fish in the system. As this method is more intensive, it will be used as time and effort allow.

Biological data and analysis

Biological data is collected from all fish species captured within each reach, combined and reported at the site level. The data collected is used to report on fish community structure and biodiversity indices. Observed fish by species are recorded for each reach within a site. Catch rates are the combined total of captured and observed fish. Data collected from each fish included fork length (mm) and total length (mm) for all fish being live-released. Any injuries or abnormalities were reported. Fish were marked with Passive Integrated Transponders (PIT) tag numbers and fin clips. Clips retained for DNA analysis include each fish's DNA sample number and fork length. For fish lethally sampled, weight (g), sex, maturity and otoliths for an aging structure were retained. Otolith vials are marked with the sample number, species, fork length and data.

Analysis of length, age, weight, growth and Fulton condition factors may occur annually or once sufficient sample sizes are acquired to be informative. Data will be displayed using histogram distributions with bin ranges compared against the percent of the sample. Size structure will be

evaluated based on Relative Stock Density (RSD) as a standardized length-categorization system to assess stock composition (Gabelhouse, 1984). RSD provides defined size thresholds tied to five standardized categories identifying fish as: stock, quality, preferred, memorable and trophy fish. RSD allows for comparisons within and between waterbodies by species because the sizes are standardized, and it is a valuable tool to investigate how a fish stock has responded to changes impacting structure and abundance (Gabelhouse, 1984).

Given the above, our annual comparisons of trend data shall largely be based on single-pass data, validated utilizing population estimates from multi-pass depletion methods. The analysis of trends will follow the approach reported in Neufeld, K. and MacPherson, L. (2018), Post et al. (2022) and MacPherson et al. (2023), including the Shiny App for Bayesian CPUE Analysis.

Relative abundance and catch rates

Relative abundance is an index of the true abundance within the watershed, measured through catch rate (catch per unit effort-CPUE) (Dunham et al., 2009; Honkanen, et al., 2018). The assumption is that CPUE indexes density and that fluctuations in density measured over time that fall outside a range of natural variability correspond to shifts in the population (Dunham et al., 2009; Honkanen et al., 2018). Validating this assumption through a mark-recapture experiment helps assess the precision and accuracy of catch per unit effort (CPUE) in detecting changes in population abundance and structure. Repeated annual monitoring further describes the inter-annual variability in the data and highlights uncertainty in key parameters.

CPUE can be expressed in many forms based on reach length or reach area and standardized for effort (e.g. electrofishing seconds or fishing time). For Yukon rotational watershed surveys on small, wadable streams, CPUE is standardized as fish/200m/1200sec. The equation for standardizing catch rate data is:

Equation 1 *Electrofishing Catch Rate Standardization:* $$\frac{Catch}{\left(\left(\frac{seconds}{1200\ sec}\right) * \left(\frac{Distance}{200m}\right)\right)}$$

Catch rates are the sum of measured and observed fish for each reach by site. They can be adjusted by species for catchability (q) and capture efficiency (CE) to improve the accuracy of population trend assessments and density estimates (Dunham et al., 2009; Neufeld et al., 2018;

MacPherson et al., 2023). Haggart Creek catch rates will be adjusted following future sampling events.

Fish tagging and mark-recapture

To complement the single-pass electrofishing and sample angling, Arctic Grayling over 155mm fork length were injected with PIT tags in the sub-dorsal space as the primary mark for a multi-year, open-system mark-recapture experiment using the Jolly-Seber method (Seber, 1965). A secondary mark of a left pelvic fin clip will be used to identify tagged fish and used as a genetic sample. Tags are injected into the fish's dorsal musculature, providing reliable long-term identification with minimal interference with fish behaviour and physiology (Bonar et al., 2009). Each fish was measured and released at the capture site immediately after tagging to reduce handling stress. The Jolly-Seber model is a tool to estimate total population size by recapturing tagged fish and relies on several assumptions, as outlined by Pine et. al (2012):

- *Equal capture probability among all individuals:* all individuals, tagged or untagged, within the population have an equal probability of being captured during each sampling event.
- *Accurate identification upon recapture*: to meet this assumption, all fish will be scanned with a PIT tag reader and visually inspected for a secondary mark.
- *Minimal handling effects on fish behaviour and decision-making:* to meet this assumption, all individuals will have a short handling time and quick releases near the marking site.
- *No effect on fish survival:* to meet this assumption, fish marking will be conducted by skilled staff.

Capture-recapture model

The Jolly-Seber model is suited for open populations where immigration, emigration, births, and deaths influence population structure (Jolly, 1965; Seber, 1965). This study design accounts for natural population fluxes, using annual tagging efforts and recapture events to estimate population size, survival probability, and recruitment. The Jolly-Seber model is a tool to estimate total population size by recapturing tagged fish and relies on several assumptions, as outlined by Pine et. al (2012):

- *Equal capture probability among all individuals:* all individuals, tagged or untagged, within the population have an equal probability of being captured during each sampling event.
- *Accurate identification upon recapture*: to meet this assumption, all fish will be scanned with a PIT tag reader and visually inspected for a secondary mark.
- *Minimal handling effects on fish behaviour and decision-making:* to meet this assumption, all individuals will have a short handling time and quick releases near the marking site.
- *No effect on fish survival:* to meet this assumption, fish marking will be conducted by skilled staff.

Annual recapture events will occur at each electrofishing and angling site. These subsequent surveys will duplicate previous sampling events, generating recaptures using the standardized single-pass or multi-pass depletion removals described earlier. During these sampling events, unmarked fish larger than 150mm will have PIT tags inserted. A minimum target of 200 PIT tags per year will be inserted. Following the second year of sampling, estimates of the total population size will be calculated, and the tagging effort will be adjusted.

As stated, the Jolly-Seber model was selected to accommodate the open population structure, estimating total population size (N_t), survival probability (ϕ), and recruitment (B_t) across the sampling time periods (Pollock et al., 1990). The equations are:

Equation 2 *Population size (N_t):*

$$\hat{N}_t = \frac{M_t + 1}{\hat{p}_t} - 1$$

Where M_t is the number of marked individuals in the population at time (t), *P*t is the estimated capture probability derived from the proportion of tagged fish recaptured to untagged fish within each year.

Equation 3. Survival probability (ϕ):

$$\frac{Mt + 1}{Mt} x \frac{Rt}{mt}$$

Where M_{t+1} and M_t are the marked individuals in consecutive sampling years (i.e. 2024/2025), R_t is the total number of marked fish released at time t, and m_t is the number of marked fish recaptured at time t, *and* x represents multiplying. Survival is calculated annually.

$$B_t = N_{t+1} - \phi \, x N_t$$

Equation 4. Recruitment (Bt):

Where N_{t+1} is the population size in a sampling year, ϕ is the survival probability multiplied by N_t, the population size of the previous sampling year. Recruitment accounts for changes in the population size due to natural births and fish immigration and is adjusted to account for the survival rates from the previous season's estimate.

Fish tissue and contaminant sampling

In collaboration with the Government of Yukon's Animal Health Unit and the Office of the Chief Medical Officer of Health, YG fisheries staff will collect whole fish samples for heavy metal analysis. Samples will be submitted to ALS Laboratories and Gambert Consulting for testing. A Chain of Custody form will be filled out for each sample collected for heavy-metal analysis to ensure sample integrity.

Whole fish will be collected from designated sites, individually placed in plastic bags with a sample ID card and stored in a cooler on ice. At the end of each sampling day, they will be transferred to a locked freezer at the Mayo Fish and Wildlife Office. Samples will then be transported to Whitehorse under a secure chain of custody for distribution to the contractors. Tissue sampling protocols will be determined by the contractors.

In total, the Fisheries Monitoring Program will aim to sample 30 fish (Arctic Grayling and Slimy Sculpin) from each of the sub-drainages within the watershed: 1) Upper Haggart Creek, 2) Ironrust Creek, 3) Swede Creek, 4) Lynx Creek, and 5) Haggart Creek Mainstem.

Data uncertainties

The analysis of survey results can evolve over time as our understanding of lotic systems and fish populations deepens (Dunham et al., 2009; Neufeld et al., 2018). Watersheds are dynamic, with natural variability in flow levels, flow rate, precipitation, turbidity, land use and riparian stability (Neufeld et al., 2018; MacPherson et al., 2024). Environmental or human-caused factors such as active and historical placer and quartz mining, wildfires, hillside slumping, erosion, heavy metal inputs and cyanide contaminants can influence data collection in the Haggart Creek watershed.

Population estimates and monitoring are also subject to uncertainty. Recruitment, growth, mortality and migration can impact survey results, vary annually and influence trends. Additional survey errors such as interannual variation not explained by population growth can hinder detecting changes in fish abundance (Honkanen et al., 2018).

In 2024-25, Haggart Creek faced significant challenges. In particular, the high risk of mortality due to the heap leach failure, which has increased the likelihood of fish kills in the mainstem. This threat has the potential to affect both migrating and resident fish. In response, Department of Fisheries and Oceans staff issued a directive for the company to install fish barriers and salvage fish, moving them to the South McQuesten River. While it was hoped this would mimic the seasonal migration of species like Arctic grayling, the movement of an unknown number of PIT tagged fish from Haggart may have confounded the initial year of sampling. As a result, our survey efforts will require additional years of data collection beyond the proposed five years of data to separate out trends in population change from the effects of environmental variability, survey uncertainty, methods bias and fish removal (Neufeld et al., 2018; Honkanen et al., 2018; MacPherson et al., 2023).

Results

Sampling overview

A total of 52, 200 m sites were planned for sampling between July 11 and August 30, 2024. Of these, 49 sites were within the Haggart River watershed, and 3 were sites along the South McQuesten Road (**Figure 2**). Not all 52 sites could be sampled due to site safety considerations at the Eagle Gold Mine, which prevented Yukon government Fisheries staff from sampling on the mine property in Haggart Creek within a 2 km upstream or downstream buffer of Dublin Gulch. Additionally, rainfall, combined with the degradation of bare east-facing slopes began transporting significant volumes of sediment downslope into the mainstem of Haggart Creek. The turbid water persisted from July 18 until August 30. Consequently, 3 lower mainstem sites were not surveyed. The total number of sites surveyed in 2024 was 44. An additional 9, 2 km angling sites were also sampled. Seven species, totalling 2397 fish, were captured from backpack electrofishing, and one species, totaling 152 fish, was captured using sample angling (Table 1).

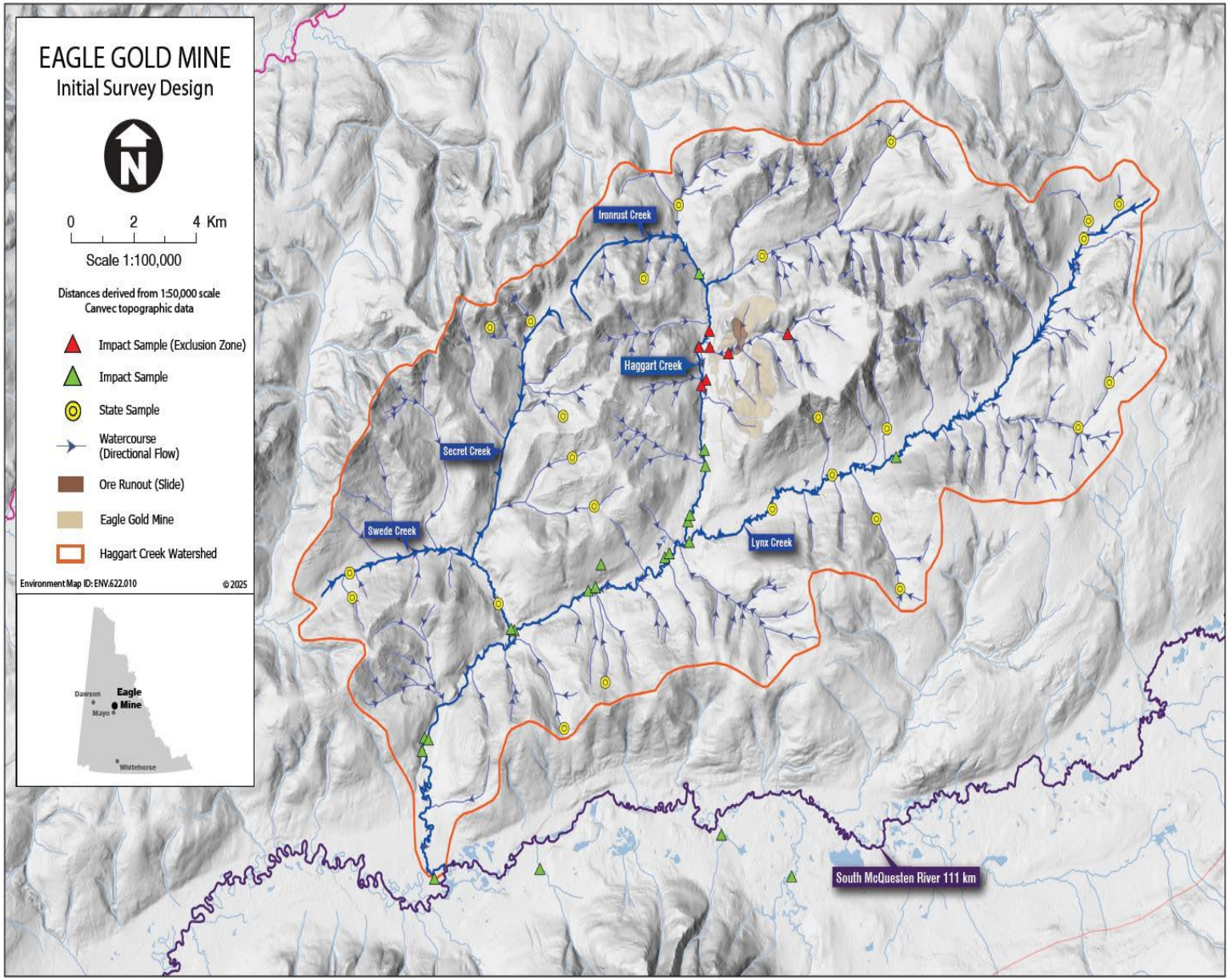

EAGLE GOLD MINE
Initial Survey Design
N
0 2 4 Km
Scale 1:100,000
Distances derived from 1:50,000 scale
Canvec topographic data
Impact Sample (Exclusion Zone)
Impact Sample
State Sample
Watercourse
(Directional Flow)
Ore Runout (Slide)
Eagle Gold Mine
Haggart Creek Watershed
Environment Map ID: ENV.622.010
© 2025
Dawson
Mayo
Eagle
Mine
Whitehorse
Ironrust Creek
Haggart Creek
Secret Creek
Swede Creek
Lynx Creek
South McQuesten River 111 km

Figure 2. Initial sample locations by backpack electrofishing (n=52) and angling (n=9) within the Haggart Creek Watershed, 2024. Green (n=44) are completed sites. Black triangles are incomplete sites (n=3). Red triangles are inaccessible sites on the mine property (n=5). The yellow outline is the perimeter of the Haggart Creek watershed.

Table 1. Total number of fish captured and observed by species during the Haggart Creek Watershed assessment in 2024.

Common name	TOTAL Number of fish	Electrofishing	Angling
Arctic grayling	484(+1158yoy)	332(+1158yoy)	152
Arctic lamprey*	3	3	0
Burbot	27	27	0
Chinook salmon*	6	6	0
Northern pike*	3	3	0
Round whitefish	2	2	0
Slimy sculpin	883	883	0

Note: * Not detected in Haggart Creek, they were found in Haldane Creek

Arctic grayling

Captures

In total, 1625 juvenile and adult Arctic grayling were observed (i.e. seen not measured) and/or captured (i.e netted and measured) through backpack electrofishing and angling (Table 1). Of these, an estimated 1158 Young-of-year (YOY) Arctic grayling were observed at two sites, and 484 Arctic grayling were caught in 39 of 44 sites. Of those, 332 Arctic grayling were captured and measured (n = 180 electrofished, n = 152 angled) (Figure 3). YOY Arctic grayling estimates were based on the count of individuals forming schools and extrapolating to the number of schools observed within the sampling reach. These counts are not reflected in the CPUE analysis. While valuable, these observations may introduce bias when comparing catch rates between sites and increase variability from year to year. Therefore, YOY observations were removed from CPUE calculations as outliers. Captured YOY are included in the total only when measured.

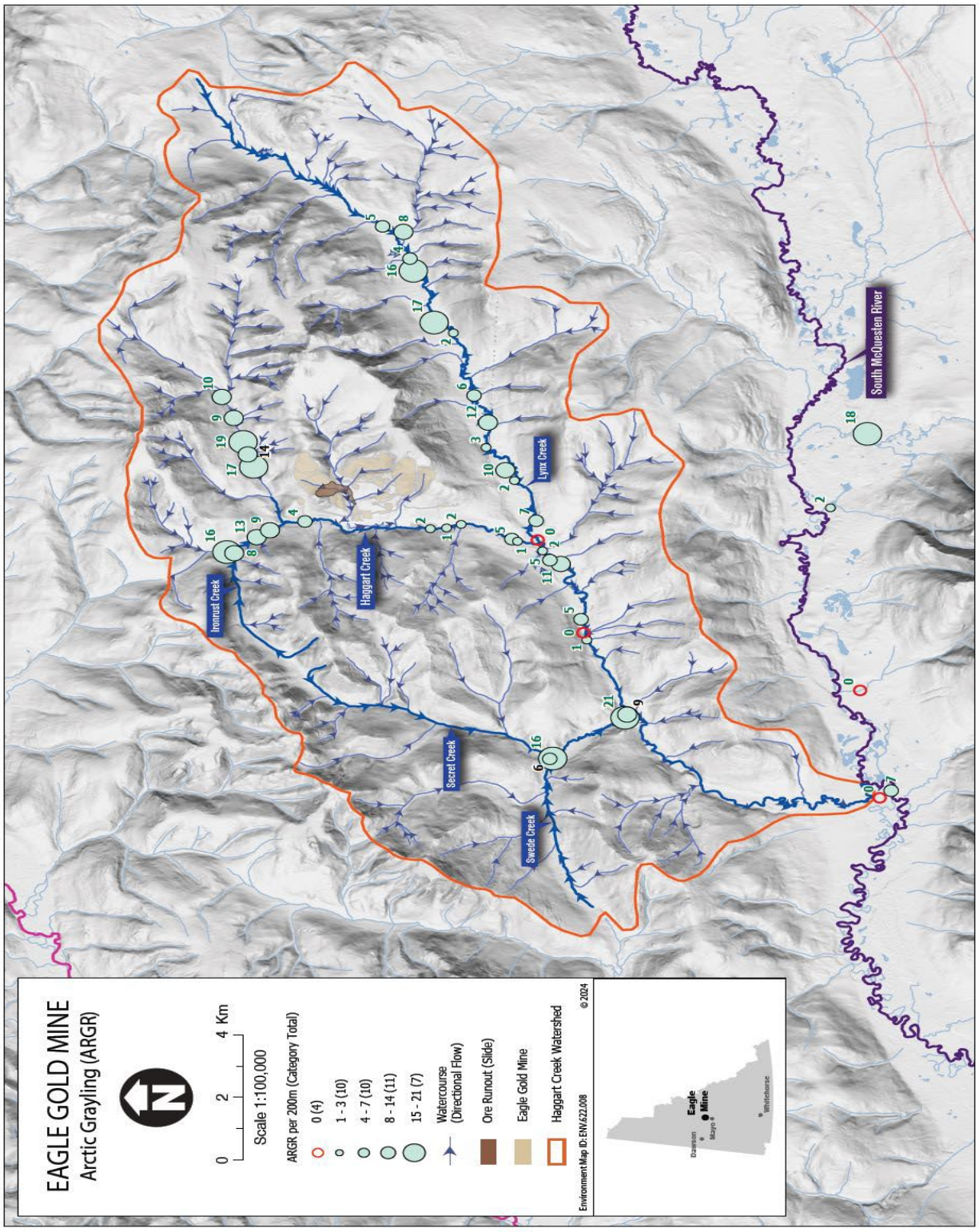


Figure 3. Sites sampled by backpack electrofishing (n= 44) and angling (n=9) within the Haggart Creek Watershed, 2024. The diameter of the sampling point and the number indicate the catch per site. Five locations marked with a 0 but no circle indicate sites where no Arctic grayling were captured.

Size distribution

The average fork length for Arctic grayling sampled by electrofishing (n=180) was 207 mm, ranging from 26 mm to 385 mm (Figure 2). In contrast, the average fork length for Arctic grayling captured by angling (n = 152) was 292 mm, ranging from 105 mm to 380 mm (Figure 4).

The Relative Stock Density (RSD) suggests a broad and stable size structure. Among the electrofished samples, 36% were in the stock size category (up to 200mm), compared to only 1% of the angled fish. Additionally, 40% of electrofished and 28% of angled fish were classified as quality (300mm – 399mm long), 21% and 53% were preferred (400mm – 499mm long), and 5% and 17% were of memorable size (>500mm), respectively.

The differences in the size distributions conform to the literature expectations that electrofishing is more effective at sampling smaller and younger Arctic grayling while angling is more effective at capturing adults. The size bias by gear type demonstrates the need for different assessment tools within watershed surveys to capture a representative picture of the whole population. The map in Figure 3 identifies that Arctic grayling catch varies by site and is higher in certain sub-watersheds and lower in others.

The size structure of Arctic grayling was investigated by site and by sub-watershed to see if there was a similar pattern of fluctuation compared to spatial location in the watershed. Across the 39 sites where Arctic grayling were captured, counts ranged from 0 to 23 individuals per reach, with 33 sites yielding more than one fish. This allowed for spatial analysis of size distributions across sub-watersheds, revealing patterns of variation tied to specific locations within the watershed.

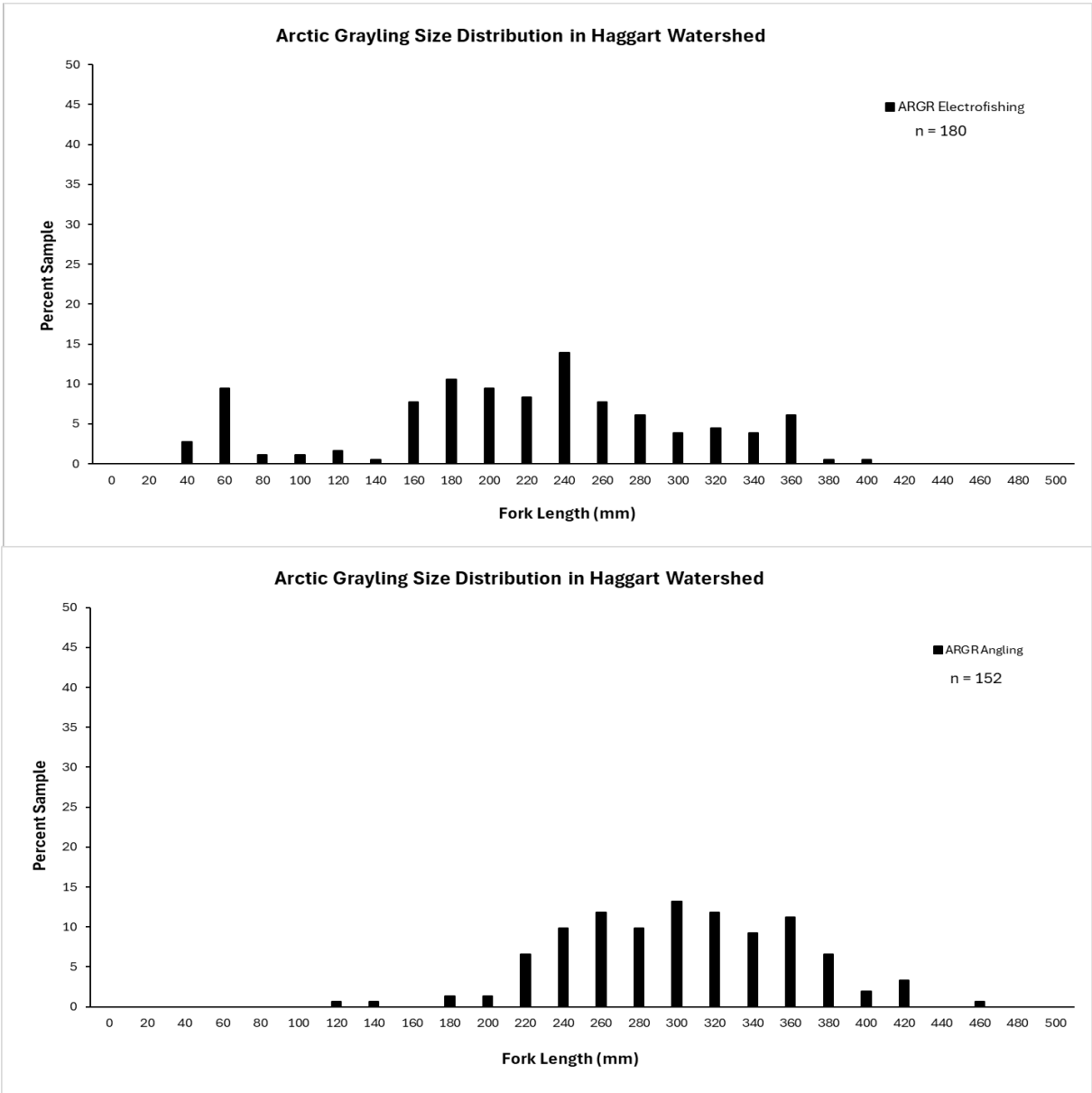


Figure 4. A summary of Arctic grayling (ARGR) fork lengths in 20 mm bins from the 2024 assessment. The black bars represent fish captured electrofishing (n=180, 44 sites). The grey bars represent fish captured angling (n=152, 9 sites).

Size distribution: Site comparison

The size distribution of Arctic grayling by site was analyzed for sites from Upper Haggart Creek to the furthest downstream location at the confluence with the South McQuesten River. Box and Whisker plots of catch by site were plotted for 27 of 33 sites where enough fish were caught to report a distribution of sizes. The Box and Whisker plots indicate overlap across sites in the interquartile range (25th to 75th percentile) for 20 of 26 sites (**Figure 5**). HCRC5 in

Haldane Creek is the strongest outlier with no shared overlap. Site HCRC5 is a natal stream supporting the rearing of YOY grayling and is significantly different from the other sites for this reason. Overlap in the distribution does not mean there are no differences by site. Sample size at the site level is variable and often poor (e.g ranging from 0 to 23). The Kruskal-Wallis test of the sites produced a Chi-square value of 82.09706 and a significant p-value of 0.0001, confirming the significant differences in size distribution.

Given the difference in sample size and the variation in means, site variance was also tested. The Levene test for equal variance produced an F Ratio of 3.2093 and a significant P-value of 0.0001, indicating that variance is not equal between sites. A Welch's ANOVA was performed to test the significance of size differences given unequal variance. The F Ratio was 4.3844, and a significant P-value of 0.0004 supports that there are significant differences in the mean fish sizes between sites showing unequal variance.

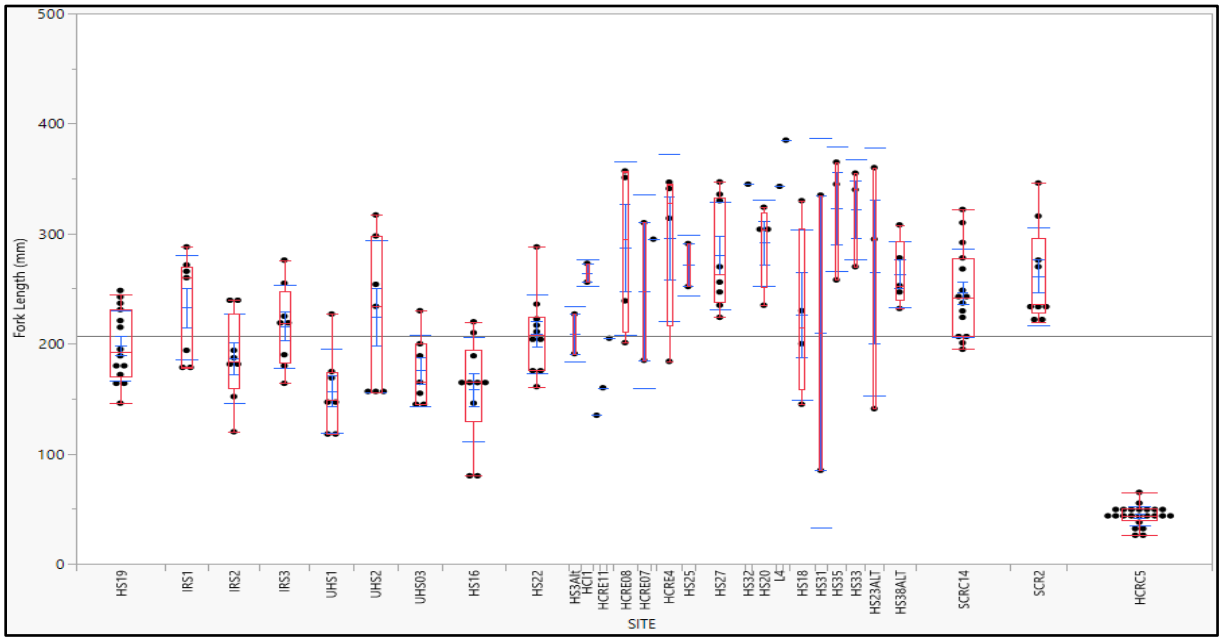


Figure 5. Box and whisker plot of the distribution of Arctic grayling predicted total lengths by sampling location (n=33) in the Haggart Creek watershed, 2024. The x-axis is the site names ordered from the headwater locations to the furthest downstream site. The y-axis is the predicted total length (mm). The red lines are the box plots. The median (Q2) is the line in the box, the lower edge of the box is the 25th percentile/first quartile (Q1), and the upper edge of the box is the 75th percentile/third quartile (Q3). The length of the box (interquartile range (IQR)) measures the spread of the middle 50% of the data. The upper and lower whiskers capture the largest to smallest numbers within 1.5x of Q1 or Q3, respectively. The blue lines are the mean and standard deviation for each distribution of sizes by site.

Size distribution: Sub-watershed comparison

To provide a more robust assessment of trends in size structure and to account for environmental site effects potentially influencing size and growth, the individual locations were grouped by sub-drainage to evaluate trends across the watershed. **Figure 6** displays stacked bar graphs of Arctic grayling fork length distributions grouped into sub-drainages: Upper Haggart Creek (above the Eagle Mine site), Ironrust Creek, Haggart Creek, Lynx Creek and Swede Creek. Similar to the site-level comparison, the size distributions remain overlapping when grouped by sub-drainage. However, a distinction in mean size becomes visible between the upper and lower watersheds, and pooling the sites did help to control for some site-level effects. All sub-watersheds contain juvenile and adult fish with means ranging from 186mm FL (95% CI 169-202) in Upper Haggart Creek to 283mm (95% CI 263 – 303) in Lynx Creek (**Figure 7**).

There are partial barriers to movement within the watershed. The culvert at the confluence of Swede Creek and the lower Haggart Creek mainstem presents a potential barrier. Additionally, there is a beaver dam approximately 180cm tall upstream of the confluence of Lynx Creek and the lower Haggart Creek mainstem. While Arctic grayling can move into the mainstem of Haggart Creek, movement upstream into other parts of the watershed remains uncertain under current conditions.

Discrepancies in size distributions by location could be influenced by partial watershed fragmentation. Investigating these differences is important as the potential impacts from the Eagle Mine incident may impact the mainstem in the pathway of effects to the confluence with the South McQuesten River. When the sites were pooled by sub-drainage, the assumption of equal variance was tested again using Levene's test, which is robust to small sample sizes and unequal variance. Levene's test yielded an F Ratio of 6.2910 and a significant P value of 0.0001, indicating that variance remained unequal and significantly different. Therefore, location in the watershed is, in part, influencing mean size. A one-way ANOVA with unequal variance further indicated statistically significant differences between size distributions with an R ratio of 18.87 and a P-value of 0.0001 (**Figure 7**).

Further investigation of the sub-drainage similarities was tested using a non-parametric test, the Dunn Method, for joint ranking to identify statistically similar size distributions. This is

visualized in **Figure 7** using the Each Pair Student T-test mean circles diagram. Although the T-test differs, using the mean circle's diagram and letter report as an output helps to visualize the similarities and discrepancies in a manner similar to the Dunn Method, with comparable matching letter reports, which is acceptable. The Dunn Method letter report (**Table** 2) shows sub-drainage pairings where the mean size and 95% confidence limits are significantly different or not. Matching letters indicate no difference. Mismatched letters, paired with a significant p-value, indicate statistically different pairings, although the quantiles for the distribution of each sample may overlap.

Table 2. Pairwise nonparametric comparisons of fish size among watershed sites using the Dunn Method for joint ranking. Score mean differences, standard error differences, Z-scores, and p-values are provided for each pair of comparisons. Each subdrainage is connected to a specific letter to assess the connectedness. Upper Haggart Creek – A, Ironrust – BA, Haggart Creek – BC, Lynx – C, Swede – c.

Watercourse 1	Watercourse 2	P-Value	Connecting Letters Report
Lynx	Upper Haggart	<.0001*	C - A
Swede	Upper Haggart	<.0001*	C – A
Lynx	Ironrust	<.0001*	C – A
Haggart	Upper Haggart	0.0007*	B C – A
Swede	Ironrust	0.0071*	C – A B
Haggart	Ironrust	0.0694	**B** C – **B** A
Ironrust	Upper Haggart	1.0000	**A** B - **A**
Lynx	Haggart	1.0000	**C** – B **C**
Swede	Haggart	1.0000	**C** – B **C**
Swede	Lynx	1.0000	**C** – **C**

*Note: *Significant differences are indicated by p-values < 0.05. The Connecting Letters Report shows groups that are not significantly different, with levels sharing the same letter, indicating similarity in fish size distribution.*

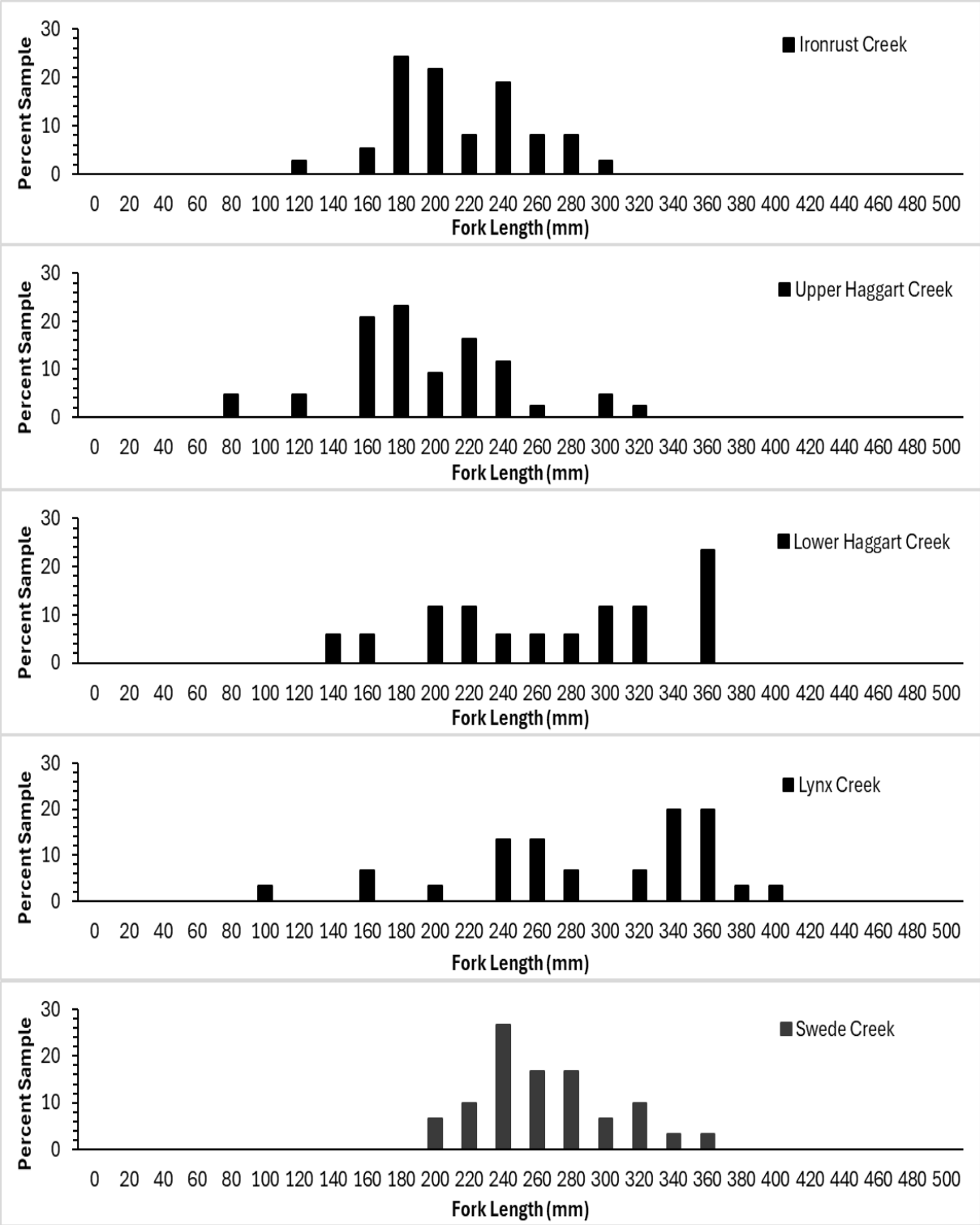


Figure 6. Stacked bar graph of the size distribution of Arctic Grayling in the five sub-drainages of the Haggart Creek watershed. The x-axis is the fork length measured in 20-millimetre bin ranges. The y-axis is the percent of the sample.

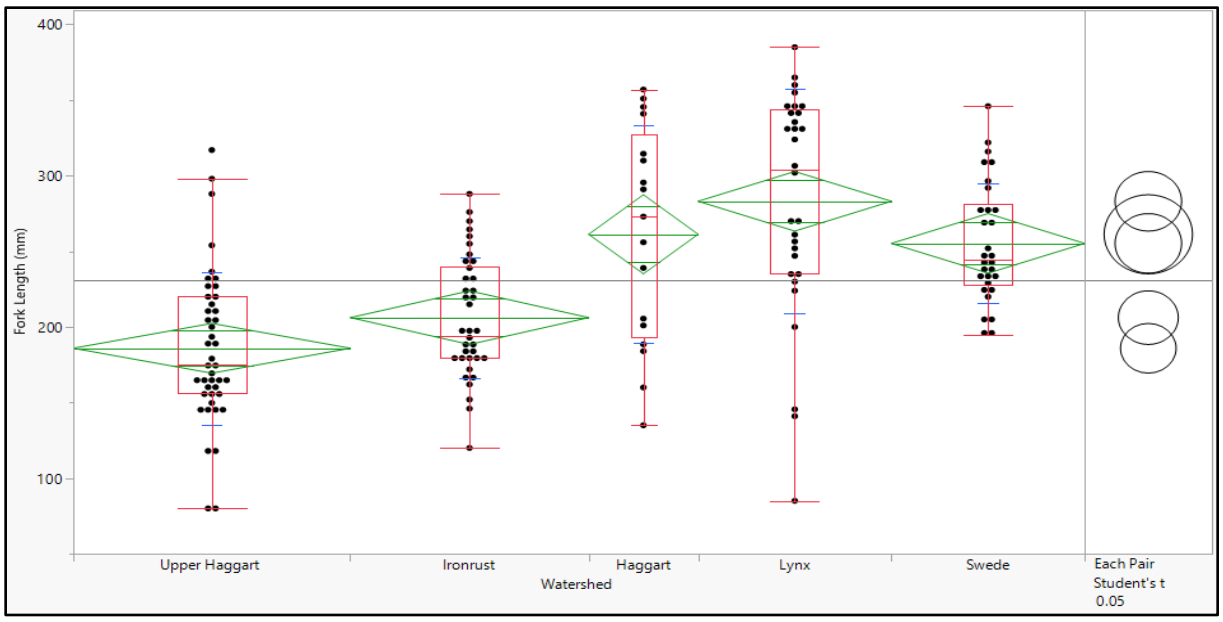


Figure 7. Distribution of Arctic grayling fork length (mm) across five sub-drainages in the Haggart Creek watershed. Measured fish are the black dots with box plots, mean diamonds, and mean circles. Each box plot represents the interquartile range (25th to 75th quartile), with the central line showing the median fork length. Mean diamonds illustrate 95% confidence intervals around the group means. Mean circles to the right of each site represent pairwise comparisons using the Dunn Method and visualized with the Student's T-test with unequal variance. Non-overlapping circles indicate significant differences between sites at the 0.05 significance level. Sites are arranged from left to right as Upper Haggart Creek, Ironrust Creek, Haggart Creek, Lynx Creek and Swede Creek.

Age distribution

Otoliths were collected from n=88 Arctic grayling (n=46 males, n=40 females, n=2 unknown) as aging structures during contaminant sampling. The age distribution had 11-year classes, ranging from age 2 to 14, with an average age of 5 years for fish collected during contaminant sampling (Figure 8). The age-class distribution was assessed for fish taken from each of the major contributing sub-drainages.

Sample size varies by drainage: Haggart Creek (n=22), Lynx Creek (n=24), Ironrust Creek (n=24) and Swede Creek (n=18). These sample sizes were too small to determine if spatial trends and statistical differences among age and size classes existed among sub-drainages. The Government of Alaska (2024) reports Arctic Graylings living up to 32 years in northern drainages with an age-at-maturity of 4 for males and 7 for females. Of the n=40 females, 65% (n=26) were mature and of the n=46 males, 59% (n=27) were mature. The average age at

maturity for males and females in Haggart Creek is similar to the data reported in Alaska at ages 5 and 6, however maturity was not assessed.

Stantec (2010) used scales to age Arctic grayling. Age comparisons between scales and otoliths can yield divergent estimates. *Table* 3 compares the average fork length at age between the two and provides the standard deviation for the mean size and sample size per age. Sample sizes were very small. Therefore, age-class comparisons are not robust. Nevertheless, it does provide some information on the sampled fish size at age structure and compared to the results reported in Alaska, which would share similar biophysical and environmental features, the Arctic grayling distribution is approximately 40-60% of a potentially undisturbed northern Arctic grayling population (Northcote, 1995; DiCicco, 2002a).

***Table 3**. Comparison of the mean fork length (mm), standard deviation and sample size by age-class for Arctic Grayling from the Haggart Creek Watershed. Samples were taken in 2007 by Stantec and 2024 by the Government of Yukon.*

Year	Metric	*Y*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
2007	Mean FL (mm)	76	123	155	259	337	352	379	-	-	358	-	-	-	-	-	-
	SD	14	18	18	100	24	34	23	-	-	-	-	-	-	-	-	-
	N	12	11	8	2	3	6	2	-	-	1	-	-	-	-	-	-
2024	Mean FL (mm)	-	-	159	210	219	250	289	304	326	352	362	393	-	-	403	-
	SD	-	-	25	28	30	17	44	26	20	0	25	32	-	-	0	-
	N	-	-	3	18	19	13	12	8	6	2	4	2	-	-	1	-

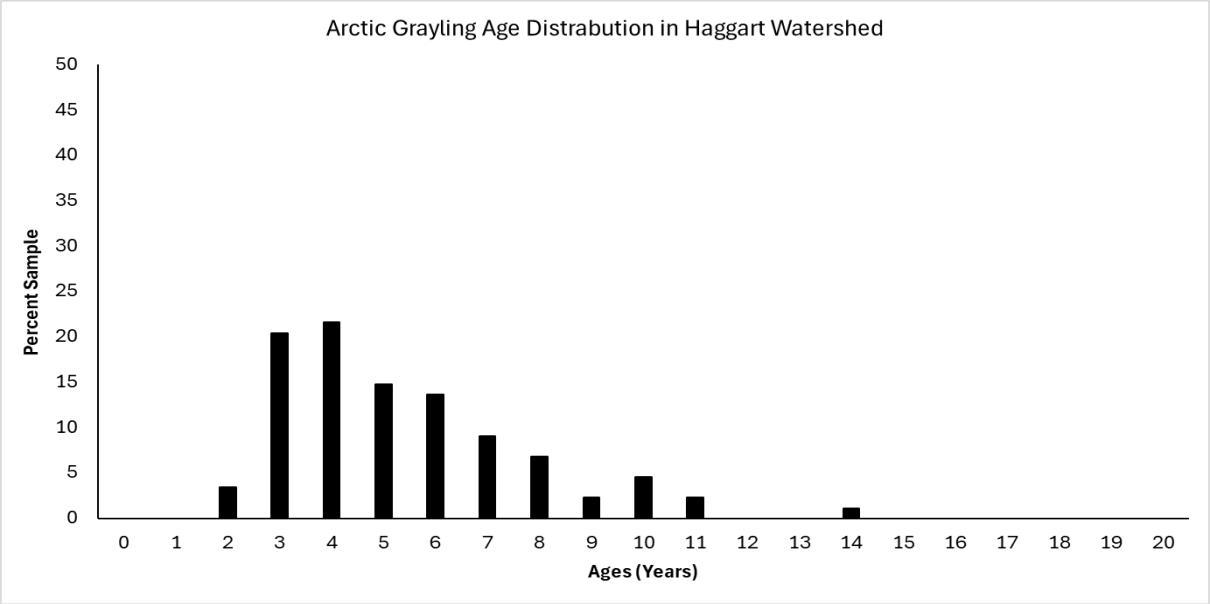


Figure 8. A summary of Arctic grayling age distribution from (n=88) fish collected for contaminant sampling during the 2024 assessment. Arctic grayling were collected in the Haggart Creek, Ironrust Creek, Swede Creek and Lynx Creek systems.

Abundance

Electrofishing catch rates (CPUE) serve as a metric of relative abundance. For this survey, CPUE is standardized as fish/200m/1200sec. The bootstrapped mean electrofishing CPUE for the Haggart Creek watershed was 7.62 fish/200m/1200sec (95% CI: 5.4-9.2) (**Figure 9**). The Stantec (2010) survey of the Haggart Creek Watershed reported CPUE as fish/100m^2. Additionally, Stantec's methodology varied, using multi-pass depletion removal at 13 sites across the watershed, within 100m sampling reaches, to calculate CPUE and derive density estimates. Therefore, any comparisons between the two surveys must be made with caution.

The 2010 CPUE reported was 1.5 fish/100m^2 (95%CI: 0.8 – 2.1). The 2024 CPUE is 1.0 fish/100m^2 (95%CI: 0.6 – 1.4), with F= 1.65, and the p = is 0.208 (> 0.05α). The low F and large p-values indicate no statistically significant difference. Paired Student's T-test for comparison of means between the 2010 and 2024 surveys showed no significant differences in the ordered difference report for these catch rates (**Figure 10**). The angling CPUE for Arctic

grayling is 3.2 fish/angler-hr (95%CI: 2.2-4.6). Angling data was collected from 4 sites in the Haggart Creek mainstem and 5 sites in Lynx Creek.

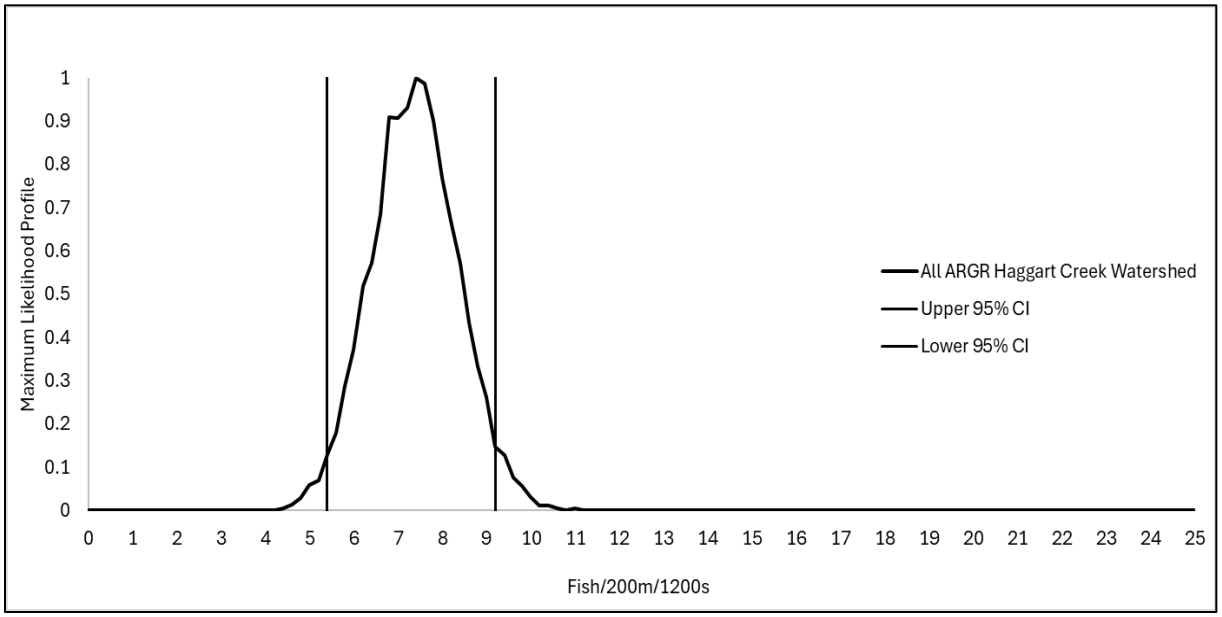


Figure 9. Arctic grayling total catch per unit effort (CPUE) is 7.62 fish/200m/1200sec (95%CI: 5.4-9.2) for backpack electrofishing in the Haggart Creek Watershed, 2024.

Abundance: Sub-watershed comparison

Evaluating CPUE trends within and between sub-watersheds may be important to understanding shifts at the watershed scale. CPUE varied significantly among the sub-watersheds. Differences in CPUE are apparent by separating the watershed into four contributing systems, the CPUE for Upper Haggart above Dublin Gulch including Ironrust Creek (HCMS upper), mainstem Haggart to the confluence with the South McQuesten River (HCMS impact), and Lynx Creek main stem (LCMS) (**Figure 11**). The sample size in the fourth system, Swede Creek and an unnamed tributary of Haggart Creek, was small, ranging from one site to three sites, and is not included in this analysis. There is no overlap in the confidence limits and limited overlap in the bootstrapped distribution of CPUE in these watershed sections, indicating a significant difference. The historical data from Stantec (2010) also reported variation in abundance between the sub-watersheds in the system; catch rates were highest in Haggart Creek and were lowest in Ironrust Creek. The 2024 data shows the CPUE in the mainstem Haggart Creek is 5.6x lower than the upper Haggart Creek and 3x lower than Lynx Creek.

The differences in CPUE by site and sub-watershed are apparent in the 2024 survey of locations from the Haggart Creek headwaters to the confluence with the South McQuesten River, supporting the conclusion that the 2024 results are inconsistent with the 2010 findings (**Figure 12**). No direct cause is currently implied. The difference may be an artifact of enhanced sampling or population changes within the watershed over the 15-year time frame or a combination of other cumulative factors. Comparisons of the Arctic grayling CPUE by sub-drainages within Haggart Creek were investigated (Figure 13). To do the comparison, we first tested for equal variance among the subgroups using Levene's test and found no significant differences ($p = 0.4767$). As such, an ANOVA was preformed to compare CPUE among the sub-drainages. The findings revealed significant differences ($R^2 = 0.51$, $F = 12.831$, $p = 0.0001$). We found that 51% of the variation in catch rate could be attributed to the sub-drainages. Results of the All-Pairs Tukey-HSD test found that only the Mainstem of Haggart Creek significantly differed from the other sub-drainages (Figure 13).

Detailed habitat assessments of the sub-watersheds were performed to investigate any linkages between observed catch rates and habitat characteristics. The assessments revealed habitat differences that may partially explain the observed differences in catch per unit effort (CPUE). For example, Lynx Creek features deep pools and runs, whereas the Upper Haggart is shallower compared to other areas further down the watershed. The Upper Haggart also had fewer pools and was composed mostly of rifle-and-runs. While the Mainstem Haggart was a relatively even mixture of pools, rifles and runs. The mean wetted stream width was also larger in the Mainstem Haggart (10.3m) compared to the other two areas (3.6m in upper Haggart Creek and 5m in Lynx Creek). Assessments had comparable sample sizes for each section, with 10 in Upper HCMS, 15 in the lower HCMS (Dublin Gulch to the confluence with the South McQuesten River), and 13 in the LCMS. That being said, we did find strong similarities in substrate and vegetation types among the three locations (Appendix A).

The influence of size structure on CPUE was investigated across sub-watersheds. Among the three sub-watersheds, the mean sizes for Arctic grayling were marginally different. The mean fork length for each sub-drainage approximated the size of a mature Arctic grayling. Nevertheless, adult and juvenile fish were present in all sub-drainages (**Figure 5**), suggesting that the observed abundance differences were not associated with life stages such as spawning, rearing and feeding.

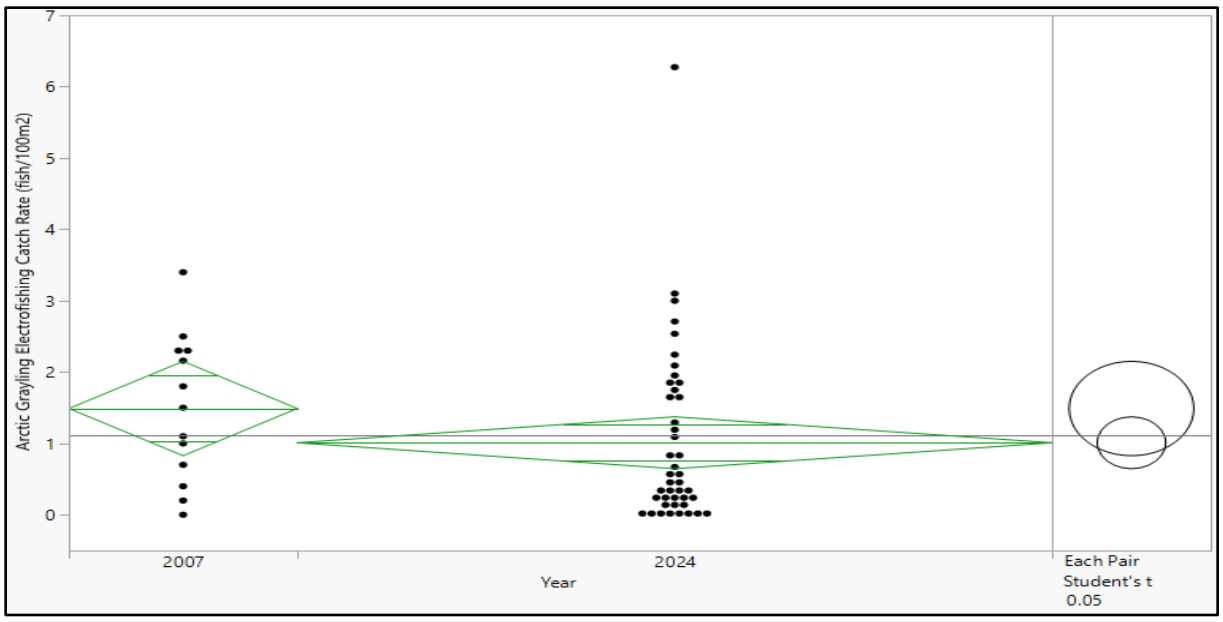


Figure 10. Arctic grayling electrofishing catch rate (fish per 100 m²) in 2007 and 2024. Each point represents an individual sampling event. Mean diamonds display the 95% confidence intervals around the mean catch rate for each year, with the horizontal line within the diamond showing the mean. Mean circles to the right indicate pairwise comparisons using the Student's t-test with unequal variance, where non-overlapping circles signify a statistically significant difference at the 0.05 significance level. Catch rates appear more variable in 2024 compared to 2007, with overlapping mean circles suggesting no statistically significant difference between years. The width of the mean diamonds is proportional to the sample size.

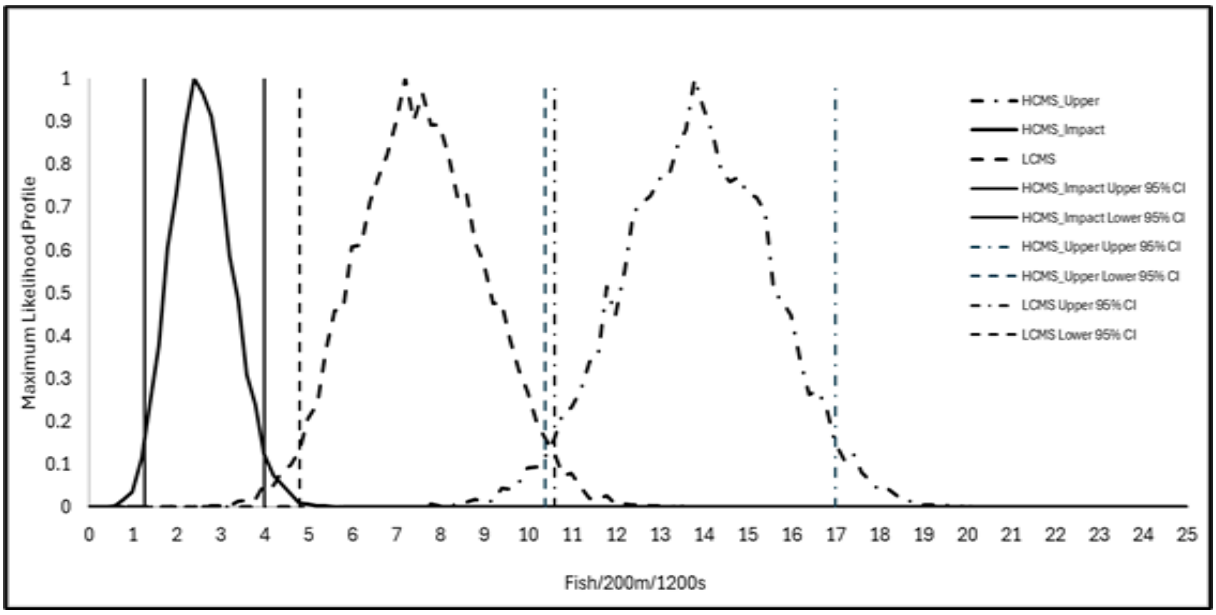


Figure 11. Arctic grayling bootstrap of the mean catch per unit effort (CPUE, observed and measured) and 95%CI for backpack electrofishing in three sections of the watershed: upper Haggart Creek (HCMS), Haggart Creek (HCMS impact) and Lynx Creek (LCMS). The CPUE for Upper Haggart Creek is 13.8 fish/200m/1200sec (95%CI 10.4 - 17), Haggart Creek Mainstem is 2.4 fish/200m/1200sec (95%CI 1.2 - 4) and Lynx Creek is 7.2 fish/200m/1200sec (95%CI 4.8 – 10.4).

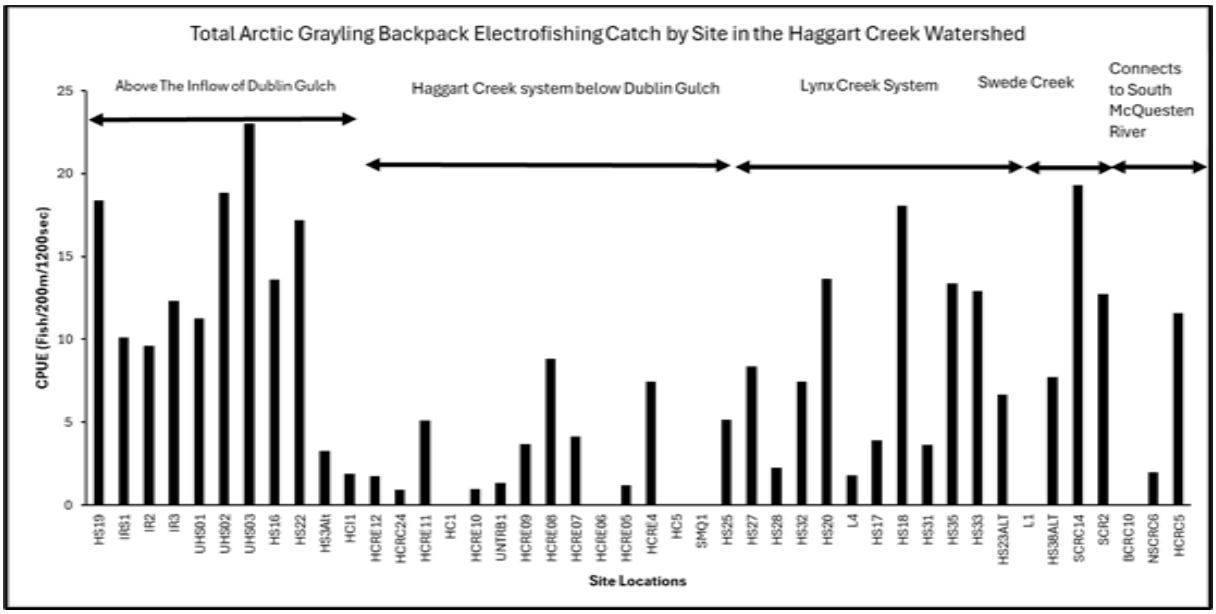


Figure 12. Arctic grayling catch per unit effort by site for backpack electrofishing in the Haggart Creek Watershed, 2024. Sites are arranged from the headwaters to the confluence with the South McQuesten River.

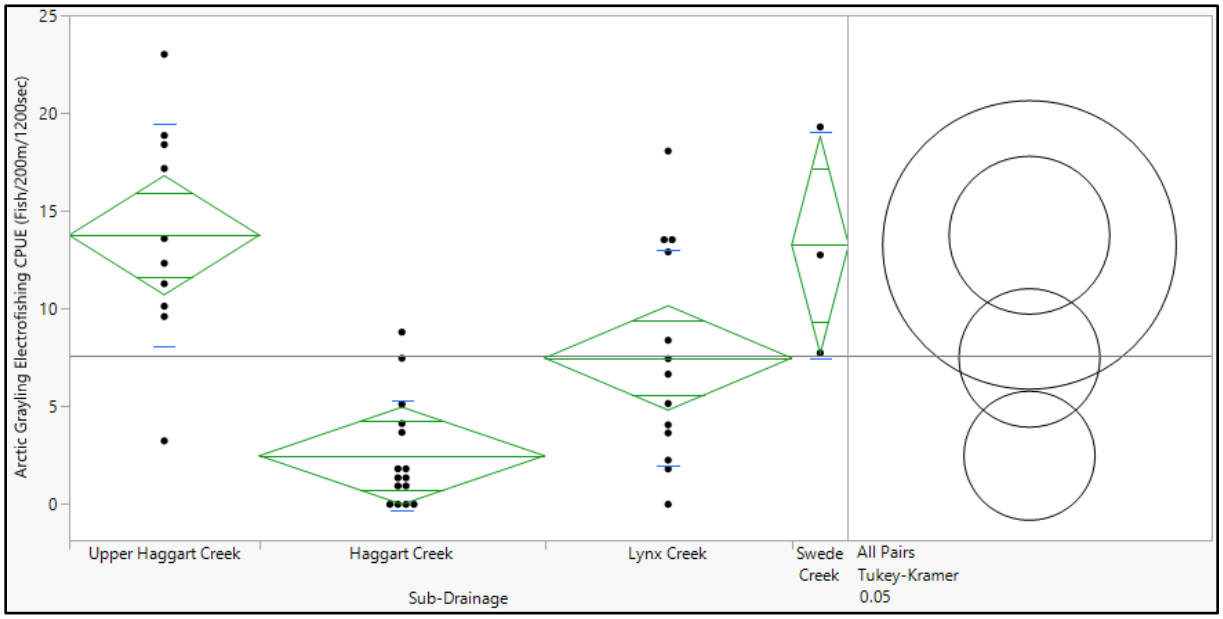


Figure 13. Catch per unit effort (CPUE) of Arctic grayling (fish per 200m/1200sec) across four sub-drainage sites: Upper Haggart Creek, Haggart Creek Mainstem, Lynx Creek and Swede Creek. Each dot represents an individual sampling event. Mean diamonds display the 95% confidence intervals around the mean CPUE for each site, with the horizontal line indicating the mean. Tukey-Kramer circles on the right represent pairwise comparisons among the sites; non-overlapping circles suggest significant differences at the 0.05 significance level. The plot indicates variability in CPUE across the sub-drainage sites, with Upper Haggart Creek and Lynx Creek showing higher CPUE values, though overlapping circles suggest limited significant difference.

Capture-recapture

Arctic grayling were marked (e.g PIT tag and fin clip) at 30 of the 44 sites sampled. In total 207 PIT tags were inserted dorsally in Arctic grayling, n=86 at electrofishing sites and n=121 at angling sites (Figure 14). The 2024 sampling constitutes the marking run for a multi-year, open-system Jolly-Seber mark recapture survey. The Jolly-Seber model relies on several assumptions. While all assumptions were met for the Haggart Creek marking event in 2024, no Jolly-Seber population estimate was generated. Key parameters, Phi (survival probability), p (capture probability), N (population estimate) and B (recruitment) for the model are still in development. Two variables, p (capture probability) and N (population estimate), can be derived from survey results. A preliminary population estimate can be derived from the relative abundance catch rate using Equation 2. Our catch rate for Arctic grayling was 7.62 fish/200m/1200sec (95%CI: 5.4-9.2)(Figure 9). This catch rate can be re-calculated to report fish per area, 1.08 fish/100m2 (95%CI: 0.6 – 1.5). Preliminary estimates of capture efficiency (CE) from electrofishing data indicate 0.54, and from the Haggart Creek salvage data provided by DFO, a modelled catchability (q) is 0.102. Following Equation 5, the density estimate is 19 Arctic Grayling/100 m² (95% CI: 12-27). The mark-recapture experiment will improve the accuracy of estimates of CE and q, refining the population estimate over time and providing context should any significant mortality events occur.

Slimy sculpin

Captures

In total, n = 883 juvenile and adult Slimy Sculpin (*Cottus cognatus*) were captured and observed in 26 of 44 backpack electrofishing sites (**Table 1**, **Figure 15**). Slimy Sculpins are benthic species with small home ranges that support all life cycle stages. Keeler (2006) found a median home range radius of 9m and reported a 100-250m range. Backpack electrofishing catch rates compared to PIT tag mark-recapture surveys identified backpack electrofishing as having a high capture probability and was a suitable surrogate for assessing abundance (Keeler et al., 2007).

Size distribution

The average total length of the slimy sculpin captured through electrofishing (n=384) was 60 mm, ranging from 22 mm to 125 mm (Figure 16). The size structure is broad, with Young-of-year sculpin absent and old-growth fish present (>110mm). The size structure exceeds what Gray et al. (2018) report as a reference population.

Abundance

The slimy sculpin bootstrapped mean CPUE for the Haggart Creek watershed from backpack electrofishing was 15 fish/200m/1200sec (95%CI: 9.5-22.5) (**Figure 17**). Like Arctic grayling, slimy sculpin abundance varies with location within the Haggart Creek watershed (**Figure 10**). Unlike Arctic grayling, the highest catch rate occurred in the mainstem Haggart Creek below Dublin Gulch. The small home ranges and migratory distances may have an autocorrelation impact on slimy sculpin detection and relative abundance. Gray et al. (2018) indicate that spawning slimy sculpin may only move 120m. Therefore, it may be natural that slimy sculpin are not present in the tributary systems if they have not colonized them previously. Barriers such as the culverts at the confluence of Swede Creek and Haggart Creek, the culvert on the mainstem Haggart Creek just below site HCRE12, and the robust beaver dam near the confluence of Lynx and Haggart Creek could be full barriers to the slimy sculpin's movement and therefore fewer sculpin are present in the tributaries that feed into Haggart.

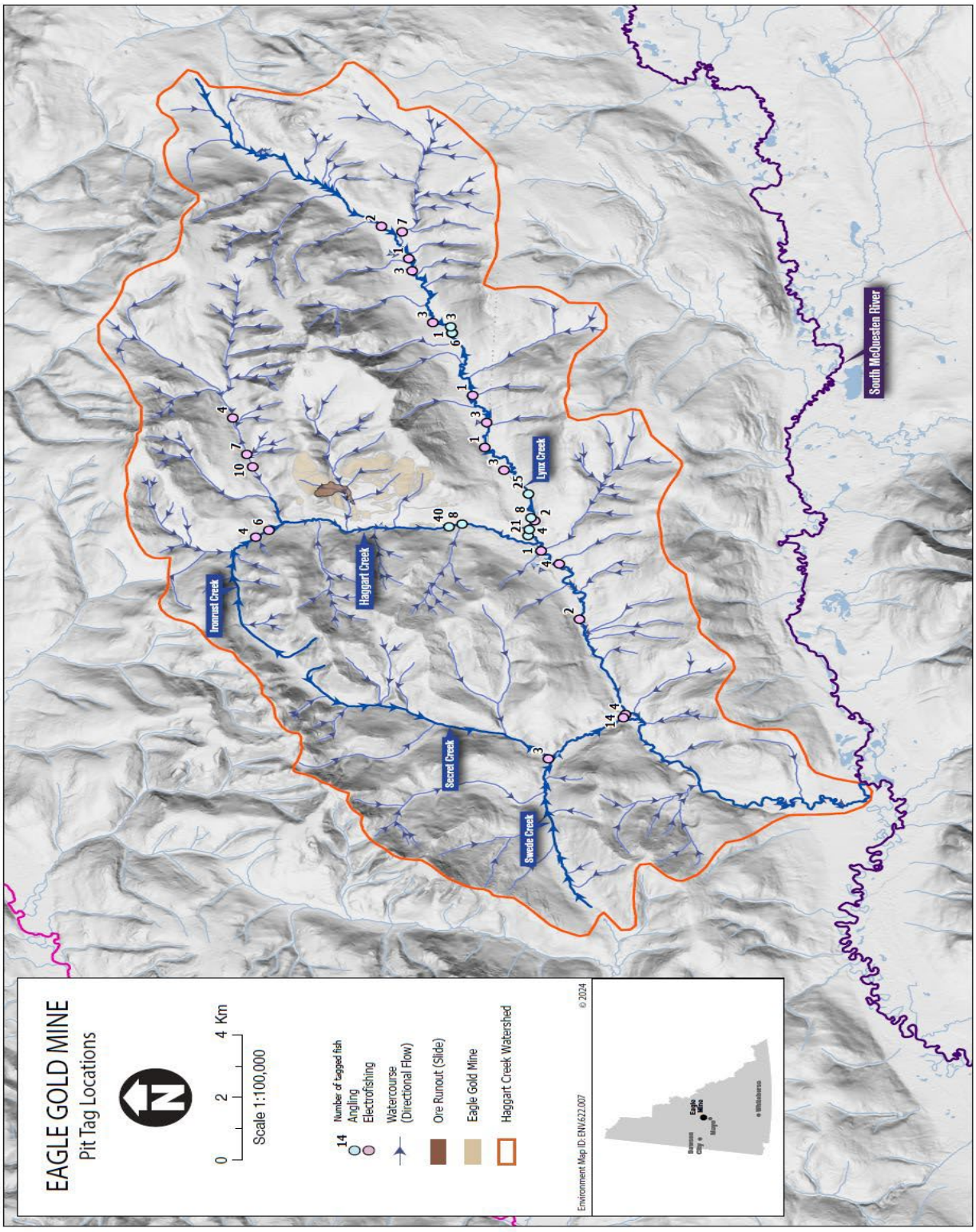


Figure 14. Sites sampled by backpack electrofishing (n= 44) and angling (n=9) where Arctic grayling were implanted with n=207 PIT tags within the Haggart Creek Watershed, 2024 .

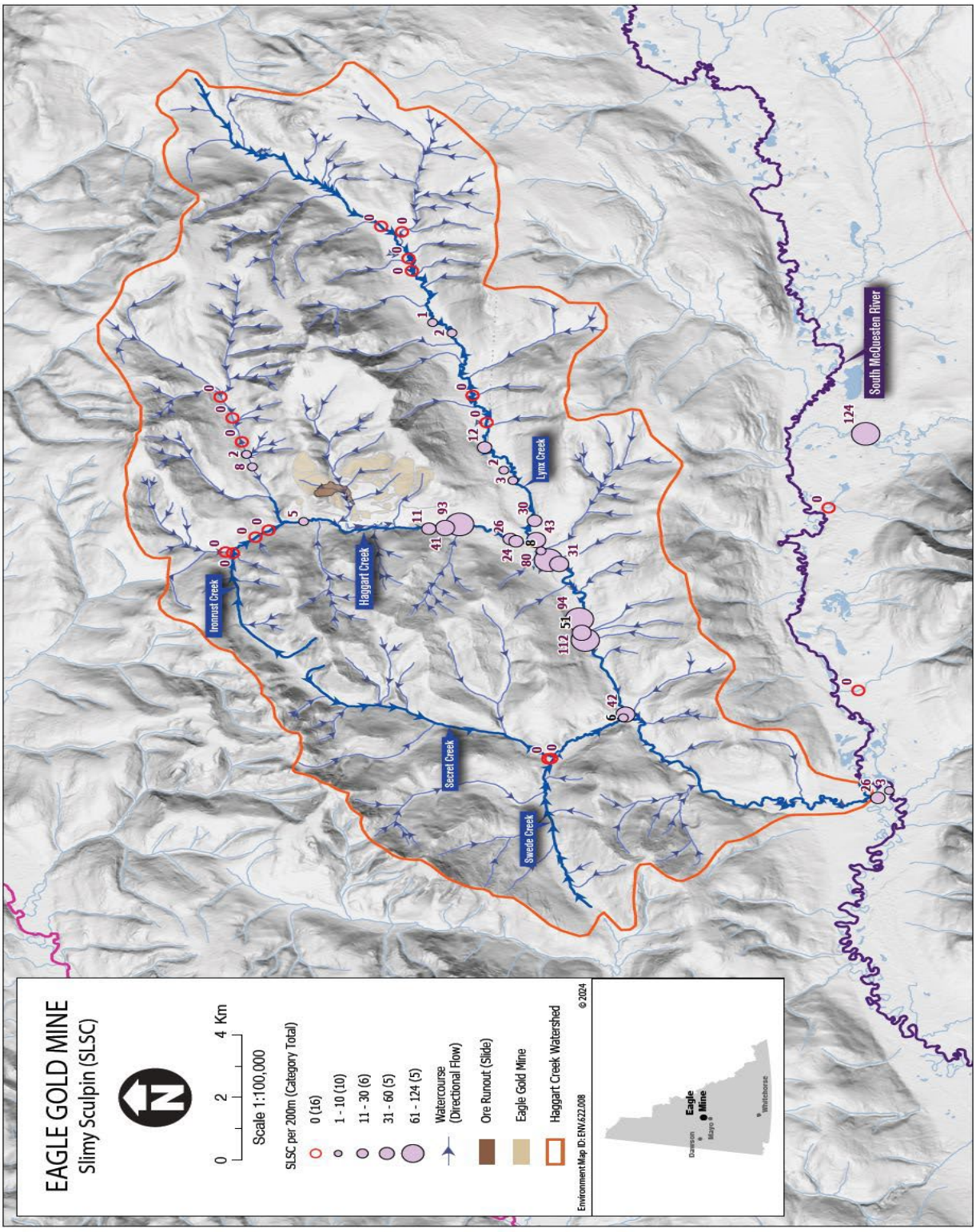


Figure 15. Sites sampled by backpack electrofishing (n= 44) Haggart Creek Watershed, 2024. The diameter of the sampling point and the number indicate the slimy sculpin catch per site. n=16 locations are marked with a small circle, and a zero is present, indicating no slimy sculpin was captured at those sites.

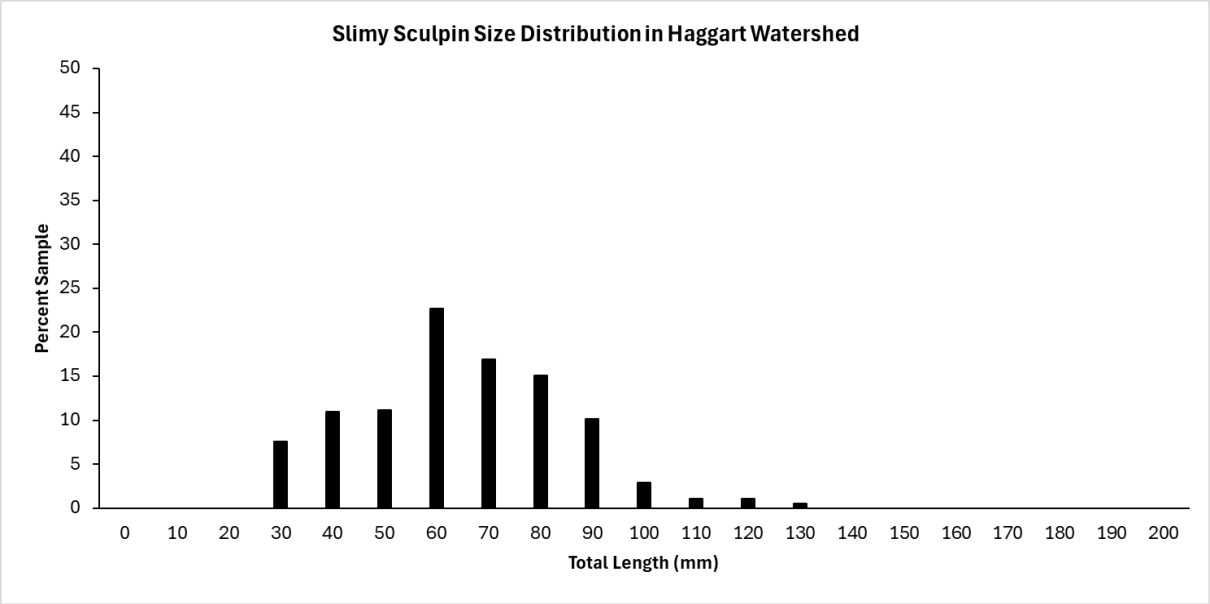


Figure 16. A summary of slimy sculpin total lengths in 10 mm bins from the 2024 assessment. The black bars represent fish captured electrofishing (n=384, 26 sites).

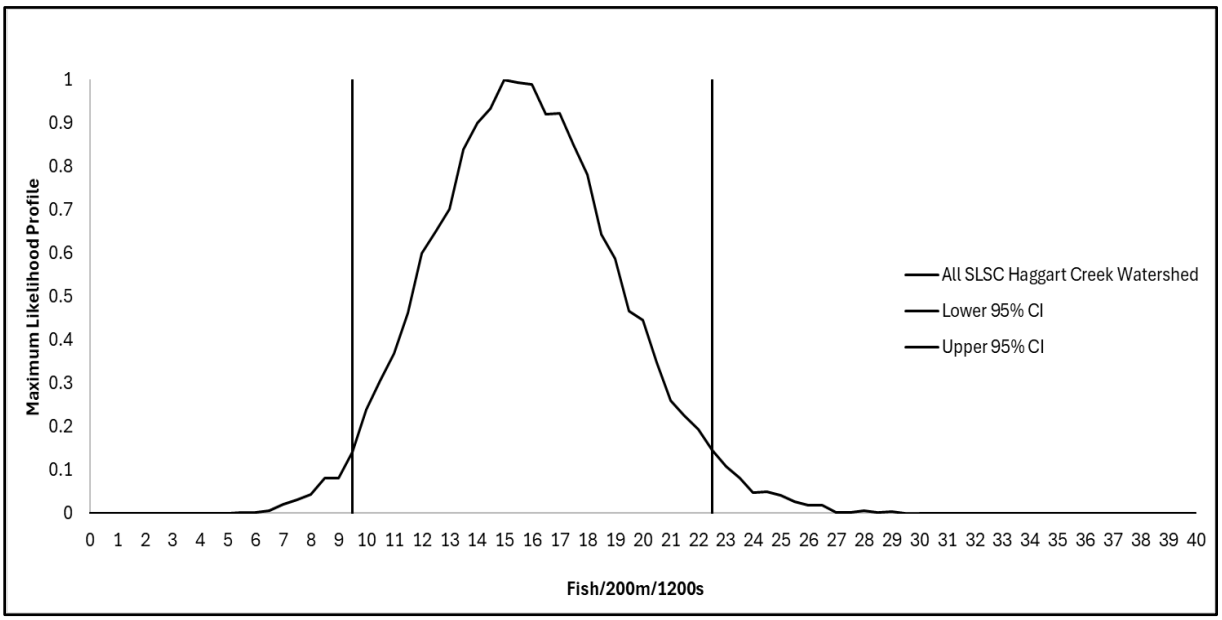


Figure 17. Slimy sculpin total catch per unit effort (CPUE, observed and measured) 15 fish/200m/1200sec (95%C I9.5-22.5) for backpack electrofishing in the Haggart Creek Watershed, 2024.

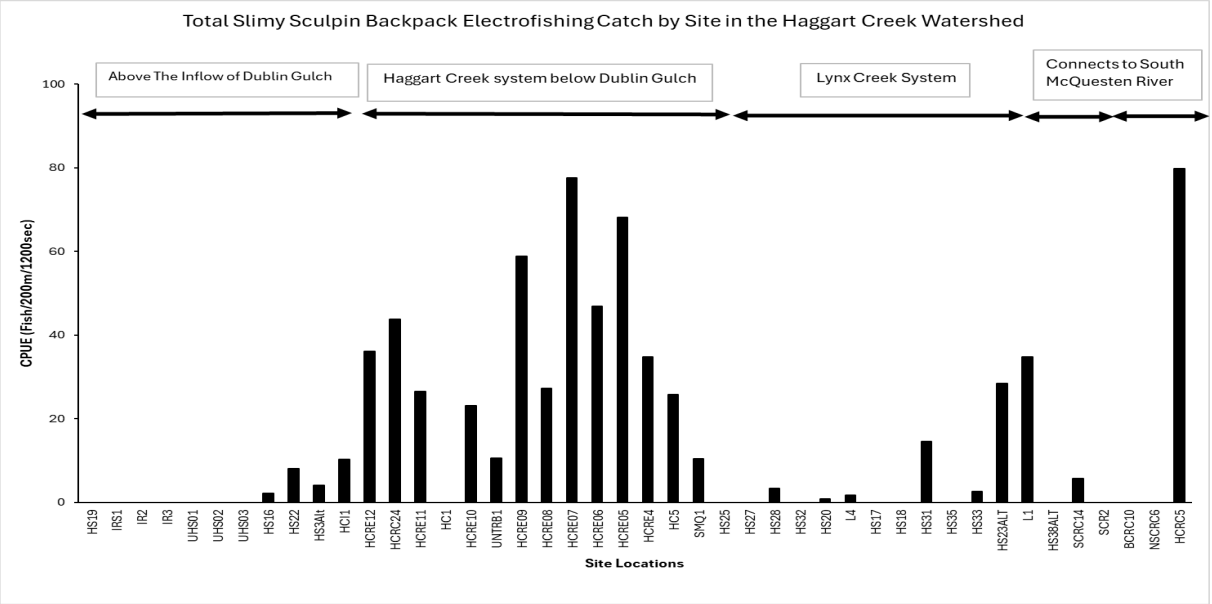


Figure 18. Slimy sculpin catch per unit effort by site for backpack electrofishing in the Haggart Creek Watershed, 2024. Sites are arranged from the headwaters to the confluence with the South McQuesten River.

Fish salvage

Following the completion of the fisheries survey, Victoria Gold Corporation (VGC) was required to comply with an enforcement order issued by the Department of Fisheries and Oceans. This order mandated the installation of fish exclusion fences throughout the watershed and the salvage of fish from the Haggart Creek mainstem (Figure 19). The goal of this work was to fully remove all detectable fish species as part of a salvage operation aimed at reducing or eliminating the risk of fish mortality from cyanide toxicity resulting from activities at the Eagle Gold Mine.

Between August 9 and September 14, consultants working for VGC removed fish from roughly 4.67km section of Haggart Creek. Removal methods included angling, index netting, setting cod traps, seine netting, minnow traps and backpack electrofishing. Netting protocols are currently unknown. Electrofishing followed a multi-pass approach. In total, 99 reaches were electrofished. Block nets were used situationally. Consultant data indicated sampling reaches ranged from 1.2m to 230m in length. At 25 sites, consultants used a multi-pass approach. The methods used to conduct the salvage did not align with the standardized approach and locations used by YG fisheries and FNNND to assess the watershed.

The salvage area primarily included locations where YG fisheries and FNNND were unable to sample during the summer due to safety concerns around the mine site. Salvage activities covered four locations: the pool at the W99 water quality monitoring station and three electrofishing sites (HS3Alt, HCI1, HCRE12). Overall, the consultant led salvage operations resulted in the capture and relocation of 832 Arctic grayling, 9 round whitefish, 12 burbot and 1279 slimy sculpin. Within the removal area, mostly at the pool downstream of W99, YG fisheries and FNND staff PIT tagged 48 Arctic grayling.

The salvage operation introduced significant uncertainty in assessing the Haggart Creek fish population. It will be unclear whether the relocated fish will return to the Haggart Creek system or take up residence elsewhere in the South McQuesten River. The implications of fish salvage for detecting and monitoring trends in fish stocks are currently unknown. Future analysis of the survey data will need to consider this uncertainty when reporting on trends in the population. Conditions in Haggart Creek may require additional fish salvages in the future. Additional monitoring work may be needed to account for the relocation of fish.

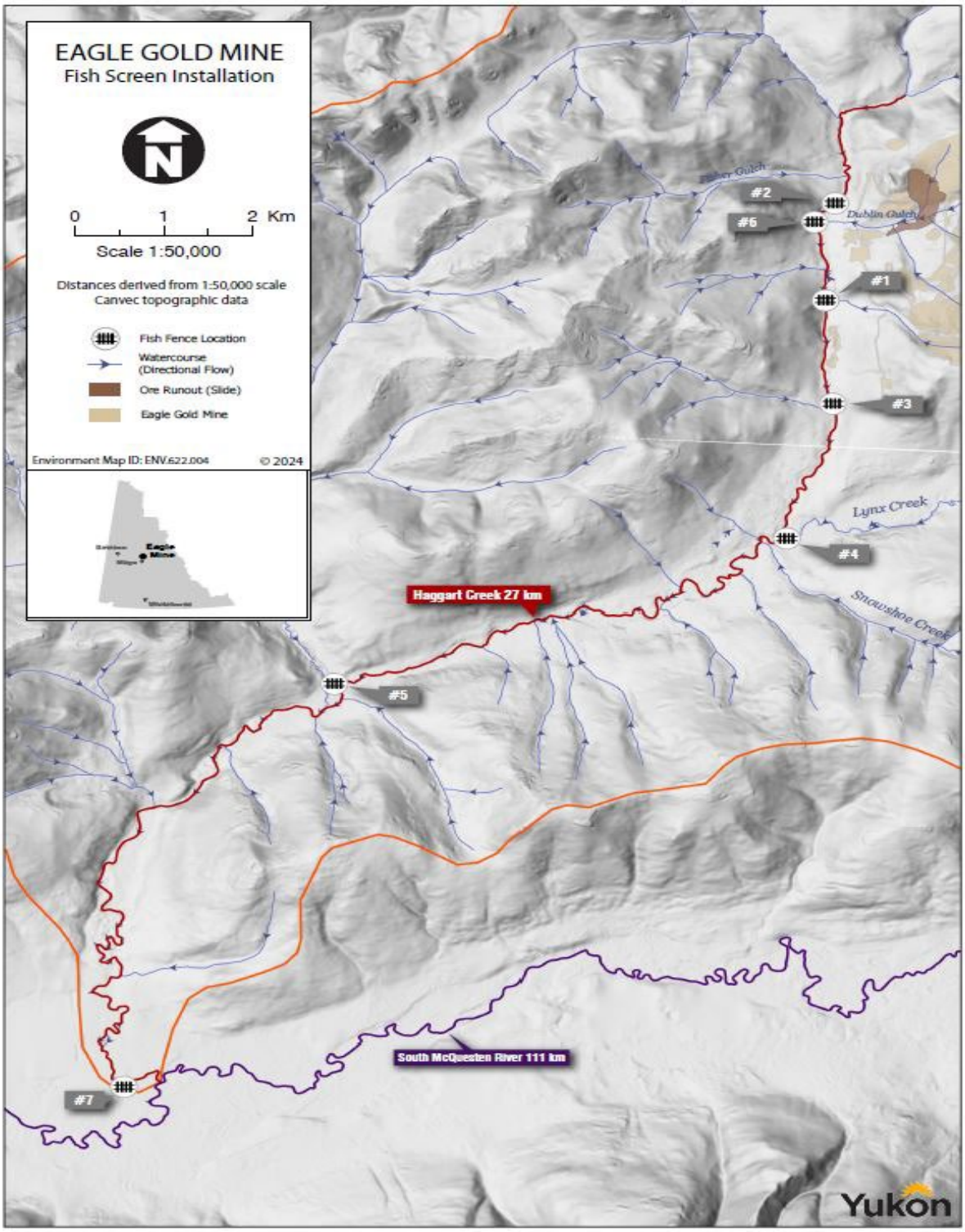


Figure 19. Location of installed fish exclusion screens along Haggart Creek.

Discussion

The purpose of the 2024 Fisheries Monitoring Program was to establish a robust baseline of data for long-term comparisons, helping to detect changes within these populations over time. Rather than focusing on the specific effects of the heap leach failure, our 2024 survey provides insights into the current state of the freshwater fish populations and the condition of the habitat within the Haggart Creek watershed. This discussion synthesizes the key findings of the 2024 Fisheries Monitoring Program in the context of the program's objectives, which included:

- Assessing for the presence, abundance, structure and distribution of freshwater fish species.
- Providing a comparative analysis against previous environmental baseline data to identify and quantify any biologically significant differences.
- Initiating an open-system, multi-year mark-recapture survey using a Jolly-Seber model for Arctic grayling; and
- Conducting a lethal collection of fish for tissue sampling to test for heavy-metal contamination.

Freshwater fish species population dynamics

Our results indicate that the Haggart Creek watershed supports a diversity of fish species, including Arctic grayling, slimy sculpin, round whitefish, and burbot. Abundance index results suggest that Arctic grayling appear to be moderately to highly abundant, with an estimated index density of 7.6 fish/200m/1200sec or 38 Arctic grayling per kilometer. This suggests that the populations are currently healthy.

It was apparent that several sub-drainages play an important role in ensuring the sustainability of Arctic grayling in the Haggart watershed. For example, Ironrust and Upper Haggart Creeks revealed large index values for both juvenile and sub-adult graying (CPUE = 13.8 fish/200m/1200sec.), suggesting these areas provide important rearing habitat. Based on the large index values for adult grayling in Lynx Creek, we believe it serves as important overwintering habitat (CPUE = 7.2 fish/200m/1200sec). Our finding further supports its designation as an Area of Special Consideration under the Yukon Fish Habitat Management System. The mainstem of Haggart had the lowest abundance of Arctic grayling (CPUE = 2.4 fish/200m/1200 sec), despite the presence of suitable habitat throughout. It remains unclear

whether this lower abundance is due to the effects of various developments or environmental factors, Nevertheless, the data provide a strong baseline for future comparisons.

Slimy sculpin were predominantly found in Haggart Creek, with their distribution and abundance varying across the watershed. Significant differences in abundance were observed between sub-drainages. Their reduced presence in tributaries is likely due to several factors, including migration barriers such as culverts and beaver dams, as well as water velocity from steep slopes that restrict their movements. Given their small home ranges and preference for low-velocity habitats, they may be more vulnerable to localized threats.

Environmental and human-caused factors

Witnessed variations in species abundance throughout the watershed may result from both natural and human-caused factors. Identifying significant independent variables during sampling will help account for any additional influences on abundance, particularly threats linked to the Eagle Gold Mine incident. These include factors like contaminant levels, increased turbidity levels, or changes in flow rates. Other factors, such as changing catchability (q), capture efficiency (CE), and environmental conditions like stream temperature, could also attribute to variability in our abundance indices.

Several compounding factors must be considered when assessing the effects of the Eagle Gold Mine on fish productivity. Active placer mining operations are present in the watershed, and forest fires have removed vegetation that once stabilized soils, groundwater temperatures and retained precipitation. As a result, sedimentation has increased due to both wildfires and placer mining. The presence of roads may also contribute to increased sedimentation. MacPherson et al. (2024) summarized how these threats impact fish abundance and distribution, while Noris (2013) and Murdoch et al. (2020) reported the negative effects of turbidity, linear disturbances and changing water quality on Arctic Grayling. Repetitive sampling is necessary to test independent variables in each watershed and identify patterns related to natural variation.

Given the above, the Fisheries Monitoring Program will conduct yearly sampling for three consecutive years, to better understand and differentiate between the effects related to Eagle Gold Mine from those attributed to other human influences and natural variation.

Comparative analysis

The comparison between the 2024 survey and the prior 2010 baseline assessment report shows that no statistically significant change in abundance at the watershed level could be measured. However, the 2010 results showed higher abundance within the mainstem of Haggart Creek than its tributaries. As no sampling occurred from 2010 to 2024, we did not ascertain the cause of this possible abundance shift.

The 2010 report indicated site assessment looked at a local study area prior to the submission of an environmental baseline assessment, whereas the 2024 survey considered the watershed the unit of interest for understanding status, impacts and consequences. Accordingly, comparing data sets is not a pairwise or control-impact style comparison. Although the equipment used was similar, and the variables for catch rate were standardized as much as possible to examine changes in relative abundance, the 2010 survey used smaller sampling sections and a closed-section multi-pass electrofishing approach, resulting in a depletion removal to measure density and catchability.

While the comparison between the two surveys provided valuable insights into changes in dynamics since 2010, the 2024 dataset will serve as the benchmark for assessing future changes throughout the duration of this project.

Capture-recapture survey

In 2024, 207 passive integrated transponder (PIT) tags were implanted into Arctic grayling that were over 155mm FL (175mm total length) in length. These tags were implanted to mark grayling as part of an open-system, multi-year mark-recapture survey using a Jolly-Seber model. In subsequent years, additional tags will be implanted to improve upon and continue the open-system population estimates. As this was the first year of tagging, we did not attempt to estimate the population.

In the spring of 2025, prior to the arrival of grayling spawning, PIT tag arrays will also be installed along the main stem of Haggart Creek to track the timing and movement of tagged fish in the system, with data from the arrays strengthening the mark-recapture survey analysis.

In future years, we will also validate the relationships between catch rate (fish caught per unit effort), capture efficiency (number of fish caught from a known number of available fish), and

catchability). As variations of this relationship are common within stock assessment methods, understanding how these values interact will provide increased confidence in measuring these populations.

Contaminant sampling

In 2024, contaminant sampling was successfully completed. These findings will provide insights into heavy-metal contamination and its effects on fish tissue. These samples and their results will be synthesized in a standalone report in early 2025.

Overall

Overall, the Haggart Creek watershed supports a diverse fish assemblage consistent with the expectations for the Stewart River drainage. The 2024 assessment highlights the ecological value of the watershed, while also identifying areas of concern, particularly in the mainstem.

This survey provides a robust data set for future comparisons and population modelling. The data will aid in joint management and planning for protective measures, in the event of contaminant release. The ongoing development of the Fisheries Monitoring Program, including repetitive sampling and tracking spatial use and migratory patterns, will help detect changes in these populations.

References

Alberta Biodiversity Monitoring Institute and Alberta Sustainable Resource Development (ABMI and ASRD). (2014). Fish Survey Methods for Rivers: ABMI and ASRD Collaboration. Written by Jim Schiek and edited by M.G. Sullivan. Prepared for Alberta Biodiversity Monitoring Institute and Alberta Sustainable Resource Development. 20 pp.

Bonar, S.A., Hubert, W.A., & Willis, D.W. (2009). "Standard Methods for Sampling North American Freshwater Fishes." American Fisheries Society

Cahill, C. (2015). Status of the Arctic Grayling (Thymallus arcticus) in Alberta: Update 2015. Prepared for Alberta Environment and Parks and Alberta Conservation Association. Alberta Wildlife Status Report No.57 (Update 2015). Edmonton, AB. 96pp

Cott, P. A., Chavarie, L., Paszkowski, C. A., Swanson, H. K., & Tonn, W. M. (2023). Status and Management of Fisheries Resources in Canada's Northern Territories.

DeCicco, A. L. 2002a. Stock assessment of Arctic grayling in the Nome River, and age validation of Arctic grayling in the Eldorado River, Seward Peninsula, Alaska 2000. Alaska Department of Fish and Game, Fishery Data Series No. 02-01, Anchorage.

Dunham, J. B., Rosenberger, A. E., Thurow, R. F., Dolloff, C. A., & Howell, P. J. (2009). Coldwater fish in wadeable streams. Standard methods for sampling North American freshwater fishes. American Fisheries Society, Bethesda, Maryland, 119-138.

Environment Yukon. (2010). Status of Yukon Fisheries 2010: An overview of the state of Yukon fisheries and the health of fish stocks, with special reference to fisheries management programs. Yukon Fish and Wildlife Branch Report MR-10-01. 105 pp.

Fisheries and Oceans Canada. (2019). Survey of Recreational Fishing in Canada, 2015. Ottawa, Ontario. Catalogue No. Fs42-1/2015E-PDF978-0-660-29278-6

Gabelhouse Jr, D. W. (1984). A length-categorization system to assess fish stocks. North American Journal of Fisheries Management, 4(3), 273-285.

Garcia, S. M. (1994). The precautionary principle: its implications in capture fisheries management. Ocean & Coastal Management, 22(2), 99-125.

Government of Alaska. Arctic Grayling Species Profile. Retrieved September 30, 2024. https://www.adfg.alaska.gov/index.cfm?adfg=arcticgrayling.main

Government of Alberta. (2013). Standard for Sampling of Small Streams in Alberta. Alberta Environment and Sustainable Resource Development. Edmonton, Alberta. pp19.

Government of Alberta. (2017) Standard Operating Procedure for Small Stream Backpack Electrofishing – IN-stream Operations. Alberta Environment and Parks. Edmonton, Alberta. pp16.

Government of Alberta (GOA). (2018). Electrofishing Standard for Sampling of Rivers in Alberta. Fisheries Management Report. Alberta Environment and Parks. Edmonton, AB. 27p.

Gray, M. A., Curry, R. A., Arciszewski, T. J., Munkittrick, K. R., & Brasfield, S. M. (2018). The biology and ecology of slimy sculpin: A recipe for effective environmental monitoring. Facets, 3(1), 103-127.

Harvey, N., Gray, P., Winterton, J., Jutras., and Levy, M. (2022). Technical Report, Eagle Gold Mine. Victoria Gold Corporation. Vancouver, BC. 333p.

Hedger, R. D., De Eyto, E., Dillane, M., Diserud, O. H., Hindar, K., McGinnity, P., ... & Rogan, G. (2013). Improving abundance estimates from electrofishing removal sampling. Fisheries research, 137, 104-115.

Honkanen, H. M., Dodd, J. A., Fordyce, J. R., Boylan, P., & Adams, C. E. (2018). Density-and species-dependent errors in single-pass timed electrofishing assessment of riverine salmonids. Ecology of Freshwater Fish, 27(1), 98-102.

Jolly, G. M. (1965). Explicit estimates from capture-recapture data with both death and immigration-stochastic model. Biometrika, 52(1-2), 225-247.

Keeler, R. A. (2006). In the Graduate Academic Unit of Biology (Doctoral dissertation, McMaster University).

Keeler, R. A., Breton, A., Peterson, D. P., & Cunjak, R. A. (2007). Apparent survival and detection estimates for PIT-tagged slimy sculpin in five small New Brunswick streams. Transactions of the American Fisheries Society, 136(1), 281-292.

Mackay, W.C., G.R. Ash, and H.J. Noris. (1990). Fish aging methods for Alberta. R.L., & L, Environmental Services Lts. In Association with Alberta Fish and Wildlife Division and Univ. of Alberta, Edmonon. pp113.

MacPherson, L. M., Reilly, J. R., Neufeld, K. R., Sullivan, M. G., Paul, A. J., & Johnston, F. D. (2024). Prioritizing bull trout recovery actions using a novel cumulative effects modelling framework. Fisheries Management and Ecology, 31(1), e12649.

Meador, M.R., McIntyre, J.P., & Pollock, K.H. (2003). "Assessing the efficacy of single-pass backpack electrofishing to characterize fish community structure." Transactions of the American Fisheries Society, 132(1), 39-46.

Murdoch, Alyssa, Chrystal Mantyka-Pringle, and Sapna Sharma. (2020). "Impacts of co-occurring environmental changes on Alaskan stream fishes." Freshwater Biology 65.10 : 1685-1701.

Neufeld, K. and MacPherson, L. (2018). Catch Rate Thresholds for the North Central Native Trout Recovery Program: Bull Trout, Arctic Grayling, Athabasca Rainbow Trout, and

Mountain Whitefish 2018. Alberta Environment and Parks – Fisheries Management. - Draft

Norris, Adam Paul. (2013). Cumulative effects thresholds for arctic grayling in the Wapiti River watershed. Royal Roads University, 2013

Northcote, T. G. (1995). Comparative biology and management of Arctic and European grayling (Salmonidae, Thymallus). Reviews in fish biology and fisheries, 5, 141-194.

Pine, W.E., Hightower, J.E., Coggins, L.G., Lauretta, M.V., and Pollock, K.H. (2012). Design and Analysis of Tagging Studies. Pages 521-572 in A. V. Zale, D. L. Parrish, and T. M. Sutton, editors. Fisheries techniques, 3rd edition. American Fisheries Society, Bethesda, Maryland.

Post, J. R., Ward, H. G., Wilson, K. L., Sterling, G. L., Cantin, A., & Taylor, E. B. (2022). Assessing conservation status with extensive but low-resolution data: Application of frequentist and Bayesian models to endangered Athabasca River rainbow trout. Conservation Biology, 36(3), e13783.

Reilly, J., and K. Neufeld. (2023). GRTS: User-Friendly Method for Busy Biologists. Technical Manual. Alberta Environment and Parks. Edmonton, Alberta. pp5.

Seber, G. A. F. (1965). A note on the multiple-recapture census. Biometrika, 52(1-2), 249-259.

Sinclair, C., and R. Perry. (2019). Review of the status of Yukon's commercial lake trout and lake whitefish fishing industry (MR-19-02). Government of Yukon, Whitehorse, Yukon, Canada. 21 pp.

Stantec. (2010). Eagle Gold Project - Environmental Baseline Report: Fish and Fish Habitat. Project No: 1490-10002. Burnaby, BC.. 195pp.

Stevens, D.L. and Olsen, A. R. 2004. Spatially balanced sampling of natural resources. Journal of the American Statistical Association 99, 262-278.

Vavenby, B. C., Kamloops, B. C., Band, N. T. I., Barriere, B. C., & Goldberg, H. (2001). Reconnaissance (1: 20,000) Fish and Fish Habitat Inventory.

Watkins, O., and S. Spencer. (2018). Assessment of the Fish Community of the Mainstem North Saskatchewan River, 2016. Operations Division of Alberta Environment and Parks, Red Deer North Saskatchewan River, Fisheries Management. Data report, 33 pp.

Reilly, J., and K. Neufeld. (2023). GRTS: User-Friendly Method for Busy Biologists. Technical Manual. Alberta Environment and Parks. Edmonton, Alberta. pp5.

Schiek, J., and M.G. Sullivan. (2014). Fish Survey Methods for Rivers: ABMI and ASRD Collaboration. Alberta Sustainable Resource Development and Alberta Biodiversity Monitoring Institute. Edmonton, Alberta. pp16.

Stantec. (2010). Eagle Gold Project Appendix 5: Environmental Baseline Report: Fish and Fish Habitat. Project No.:1490-10002. Burnaby, BC. pp195.

Stevens, D.L., A.R. Olsen. (2004). Spatially balanced sampling of natural resources. Journal of the American Statistical Association 99, 262-278.

Appendix 1: 2024 Fish Habitat Assessments

2024

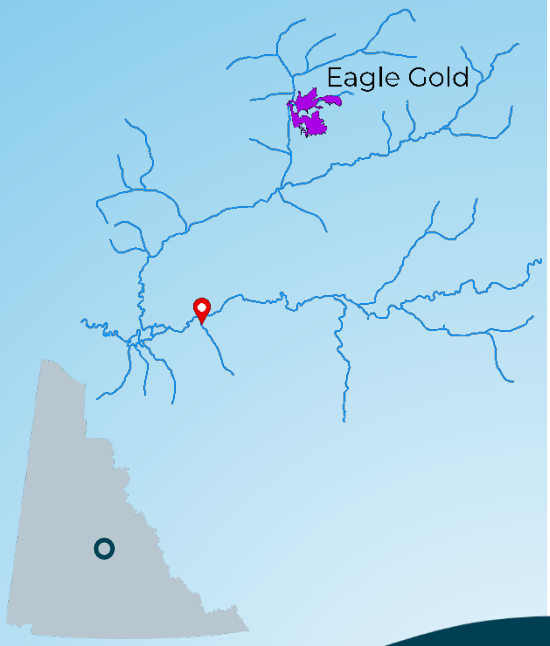
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE BCRC10

WATERSHED
South McQuesten
WATERCOURSE
Big Horn Creek
LOCATION
63.904817 N
135.954535 W
DATE ASSESSED
July 17
SITE TYPE
State
AREA (m²)
341

WATER TEMP
8.9°C
CONDUCTIVITY
N/A
pH
N/A
STAGE
Moderate
TURBIDITY
Moderate



Fish Habitat Assessment

SPAWNING Moderate/Low – cobbles and gravels, moderate to low velocity
OVERWINTERING Poor - few shallow pools within site
REARING Low - good cover but shallow and interrupted
MIGRATION Poor – fish barrier, channel disappears above barrier
STAGING Poor – poorly defined channel, no connectivity, and few areas suitable for holding fish
RIPARIAN Very Good – intact, no disturbance, mixed vegetation in young forest or mature forest stages

Figure 1: Upstream of barrier

Figure 2: Downstream of barrier

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	1.8	20	203
B	1.2	33	178
C	1.6	37	363
D	2.2	28	358
200m	Mean: 1.705	Mean: 29.5	Total: 1102

Table 2: Fish capture information

NO FISH CAUGHT

For more information, please contact: fisheries@yukon.ca

Yukon

2024

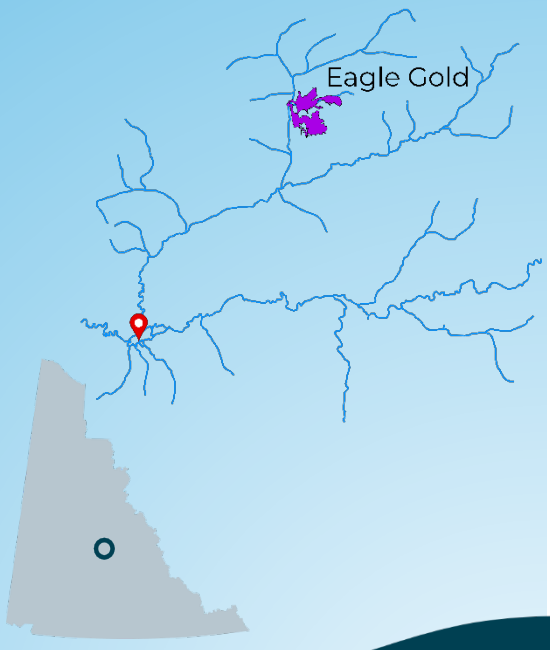
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HC5

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
63.898195 N
136.024022 W
DATE ASSESSED
July 14
SITE TYPE
Impact
AREA (m²)
1950

WATER TEMP
10.9°C
CONDUCTIVITY
412 µs/cm
pH
8.08
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – gravels and cobble, moderate to low velocity
OVERWINTERING	Poor - few pools of moderate depth throughout site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – some boulders, undercut banks, shallow pools, riffles, and functional woody debris
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation in young forest or mature forest stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	9.0	34	276
B	11.0	28	366
C	11.0	26	333
D	8.0	23	232
200m	Mean: 9.75	Mean: 27.75	Total: 1207

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Slimy Sculpin	26	-	-
Burbot	1	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

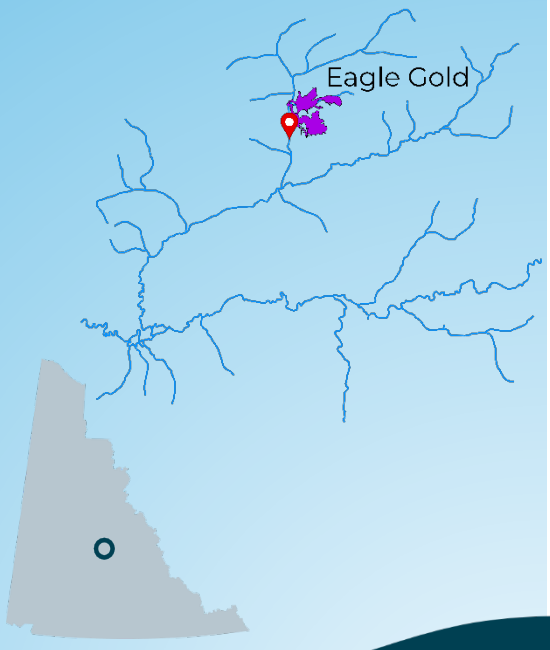
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCI1

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
64.013210 N
135.854241 W
DATE ASSESSED
July 23
SITE TYPE
Impact
AREA (m²)
1150

WATER TEMP
12.7°C
CONDUCTIVITY
299 µs/cm
pH
8.2
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High –cobble and gravels, moderate to low velocity
OVERWINTERING	Poor - few pools throughout the site
REARING	Good - moderate cover, some velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – boulders, extensive riffles, and some shallow pools on margins
RIPARIAN	Moderate – historic disturbances, dominantly shrubs in shrub/herb or pole-sapling stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	5.0	18	356
B	6.0	26	123
C	6.0	25	451
D	6.0	20	356
200m	Mean: 5.75	Mean: 22.25	Total: 1286

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	2	0	0
Slimy Sculpin	11	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

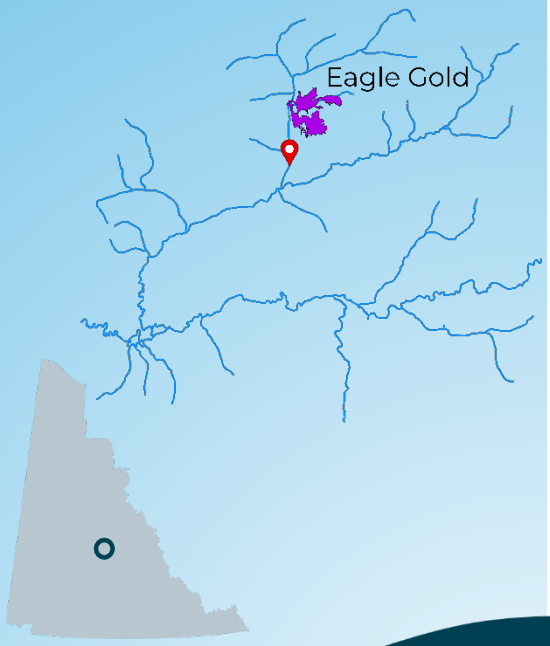
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCRC24

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
64.005693 N
135.850278 W
DATE ASSESSED
July 11
SITE TYPE
Impact
AREA (m²)
1550

WATER TEMP
7.4 °C
CONDUCTIVITY
293 µs/cm
pH
7.76
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – cobble and gravel, moderate to low velocity
OVERWINTERING	Poor - few shallow pools throughout the site
REARING	Good - moderate cover, some velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good - extensive riffles, few boulders, few shallow pools
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation, dominantly shrubs in shrub/herb stage

Figure 1: Upstream, reach D

Figure 2: Downstream, reach D

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	9.0	-	792
B	7.0	-	681
C	7.0	-	608
D	8.0	-	547
200m	Mean: 7.75	Mean: N/A	Total: 2628

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	2	0	0
Slimy Sculpin	92	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

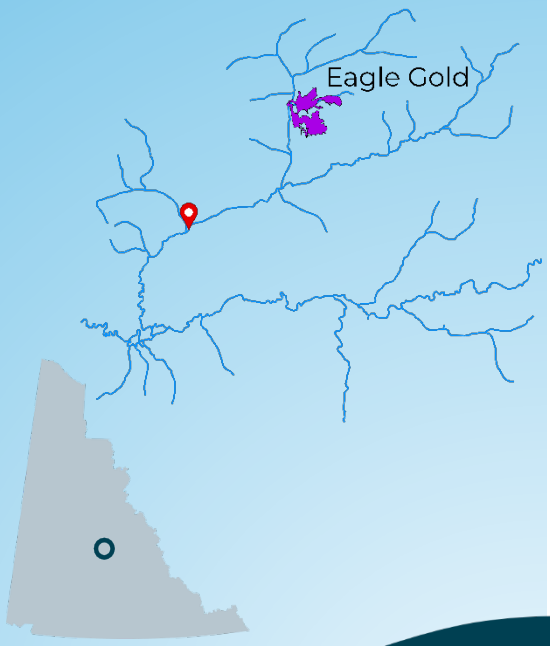
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCRE04

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
63.961734 N
135.978573 W
DATE ASSESSED
July 14
SITE TYPE
Impact
AREA (m²)
2450

WATER TEMP
10.1°C
CONDUCTIVITY
328 µs/cm
pH
8.12
STAGE
Moderate
TURBIDITY
Moderate



Fish Habitat Assessment

SPAWNING	High – cobble, fines, and gravels beds, moderate to low velocity
OVERWINTERING	Moderate – pools on every bend throughout the site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – deep bends, pools, riffles, and slow runs
RIPARIAN	Very Good – intact, minimal disturbances, mixed vegetation, in pole sapling, young forest, and mature forest stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	14.0	19	394
B	13.0	30	442
C	11.0	41	296
D	11.0	43	314
200m	Mean: 12.25	Mean: 33.25	Total: 1446

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	9	4	4
Slimy Sculpin	42	-	-
Burbot	2	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

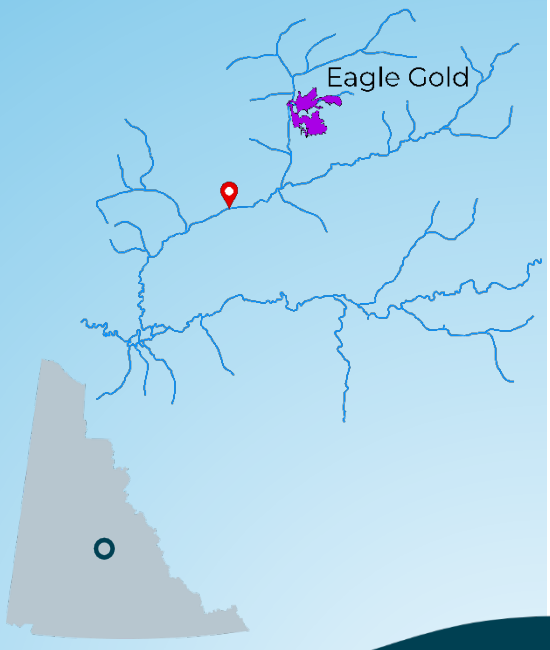
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCRE05

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
63.97287 N
135.92755 W
DATE ASSESSED
July 12
SITE TYPE
Impact
AREA (m²)
2750

WATER TEMP
10.4°C
CONDUCTIVITY
344 µs/cm
pH
7.98
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING Moderate – cobble and fines, moderate to low velocity
OVERWINTERING Poor - few moderately deep pools within site
REARING Very Good - moderate cover, good velocity refuge
MIGRATION Very Good - no barriers, good gradient
STAGING Good – slow runs, shallow pools, extensive riffles
RIPARIAN Very Good – intact, no disturbance, mixed vegetation, in shrub, pole sapling, and young forest stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	9.0	34	366
B	18.0	30	577
C	9.0	23	434
D	19.0	46	595
200m	Mean: 13.75	Mean: 33.25	Total: 1972

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	1	0	1
Slimy Sculpin	112	-	-
Burbot	1	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

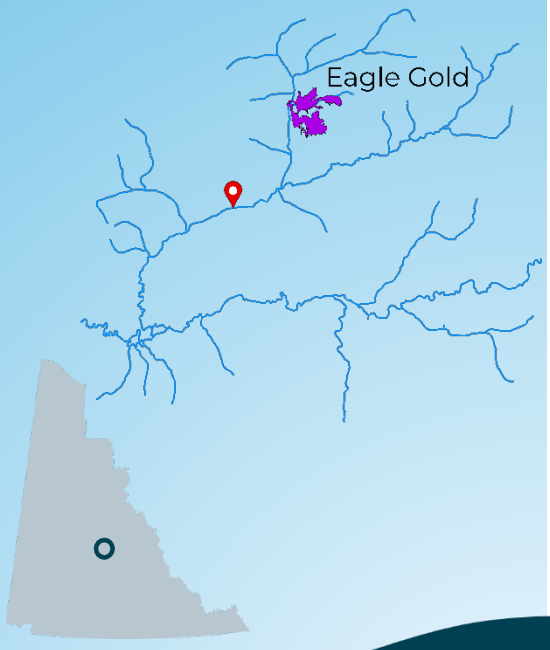
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCRE06

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
63.97386 N
135.92261 W
DATE ASSESSED
July 12
SITE TYPE
Impact
AREA (m²)
2100

WATER TEMP
10.6°C
CONDUCTIVITY
335 µs/cm
pH
7.87
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – gravels and cobble, moderate to low velocity
OVERWINTERING	Poor - few deep pools within the site
REARING	Good - moderate cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – boulders, shallow pools, extensive riffles
RIPARIAN	Good – intact, historic burn extending to riparian area, mixed vegetation, dominantly shrubs in shrub/herb or pole sapling stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	10.0	31.6	423
B	11.0	22.0	305
C	12.0	21.6	284
D	9.0	32.0	294
200m	Mean: 10.5	Mean: 26.8	Total: 1306

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Slimy Sculpin	51	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

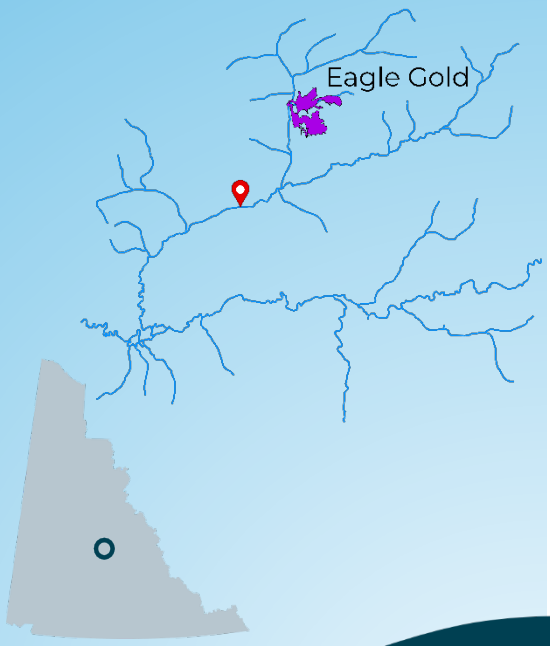
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCRE07

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
63.97466 N
135.91325 W
DATE ASSESSED
July 14
SITE TYPE
Impact
AREA (m²)
2550

WATER TEMP
8.6°C
CONDUCTIVITY
349 µs/cm
pH
8.1
STAGE
Moderate
TURBIDITY
Moderate



Fish Habitat Assessment

SPAWNING	Moderate – cobbles and fines, moderate to low velocity
OVERWINTERING	Poor - few deep pools within the site
REARING	Very Good - moderate cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – undercut banks, glides, shallow pools, riffles
RIPARIAN	Very Good – intact, no disturbance, mixed deciduous and coniferous vegetation in pole sapling, young forest, or mature forest stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	14.0	25	377
B	16.0	20	472
C	12.0	30	382
D	9.0	30	222
200m	Mean: 12.75	Mean: 26.25	Total: 1453

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	5	2	2
Slimy Sculpin	94	-	-
Burbot	1	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

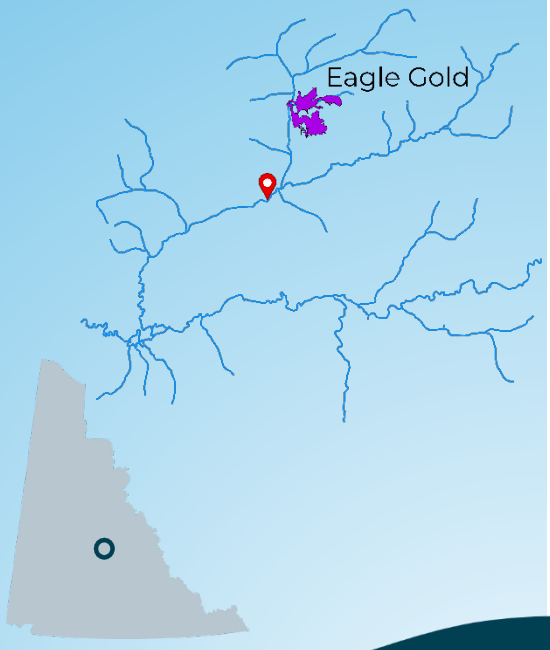
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCRE08

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
63.980551 N
135.875065 W
DATE ASSESSED
July 12
SITE TYPE
Impact
AREA (m²)
2150

WATER TEMP
10.8°C
CONDUCTIVITY
341 µs/cm
pH
9.8
STAGE
Moderate
TURBIDITY
Low/moderate



Fish Habitat Assessment

SPAWNING	Moderate – cobble and fines, moderate to low velocity
OVERWINTERING	Poor - few deep pools clumped within the site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good - boulders, woody debris, undercut banks, riffles, few pools
RIPARIAN	Very Good – intact, mixed herbaceous, deciduous, and coniferous vegetation in mature forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	7.0	-	416
B	7.0	-	191
C	16.0	-	455
D	13.0	-	301
200m	Mean: 10.75	Mean: N/A	Total: 1363

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	11	3	3
Slimy Sculpin	31	-	-
Round Whitefish	1	1	1

For more information, please contact: fisheries@yukon.ca

Yukon

2024

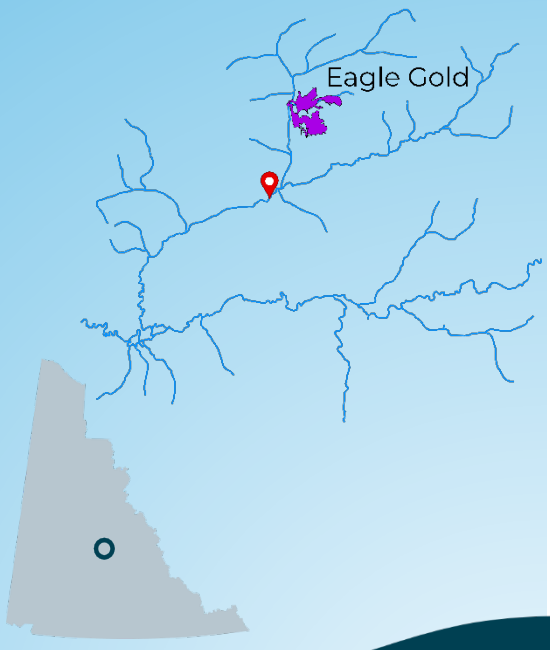
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCRE09

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
63.98327 N
135.87271 W
DATE ASSESSED
July 14
SITE TYPE
Impact
AREA (m²)
1700

WATER TEMP
7.9°C
CONDUCTIVITY
355 µs/cm
pH
7.85
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	High – gravel, cobble, and fines, low/moderate velocity
OVERWINTERING	Moderate – pools of moderate depth throughout
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – abundant undercut banks, pools, woody debris, and riffles
RIPARIAN	Very Good – intact, mixed coniferous and deciduous forest in mature forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	7.0	60	300
B	14.0	25	322
C	6.0	70	269
D	7.0	55	216
200m	Mean: 8.5	Mean: 52.5	Total: 1107

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	5	0	0
Slimy Sculpin	80	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

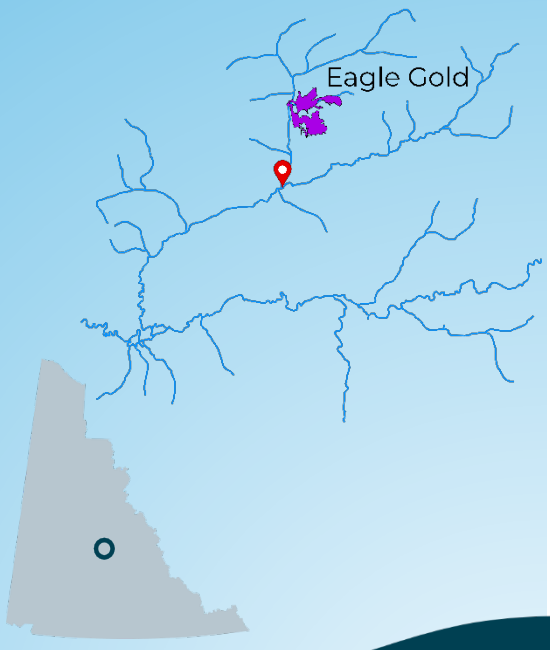
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCRE10

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
63.991553 N
135.860466 W
DATE ASSESSED
July 12
SITE TYPE
Impact
AREA (m²)
1500

WATER TEMP
10.8°C
CONDUCTIVITY
335 µs/cm
pH
8.28
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate – cobble and fines, moderate to low velocity
OVERWINTERING	Poor - few pools of moderate depth throughout site
REARING	Very Good - moderate cover, good velocity refuge
MIGRATION	Very Good - no barriers and good gradient
STAGING	Good - boulders, pools, and extensive riffles
RIPARIAN	Very Good – intact, no disturbance, mixed deciduous and coniferous vegetation in pole sapling or young forest stages

Figure 1: Upstream, reach D

Figure 2: Downstream, reach D

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	6.0	-	300
B	5.0	-	302
C	10.0	-	298
D	9.0	-	344
200m	Mean: 7.5	Mean: N/A	Total: 1244

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	1	0	0
Slimy Sculpin	24	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

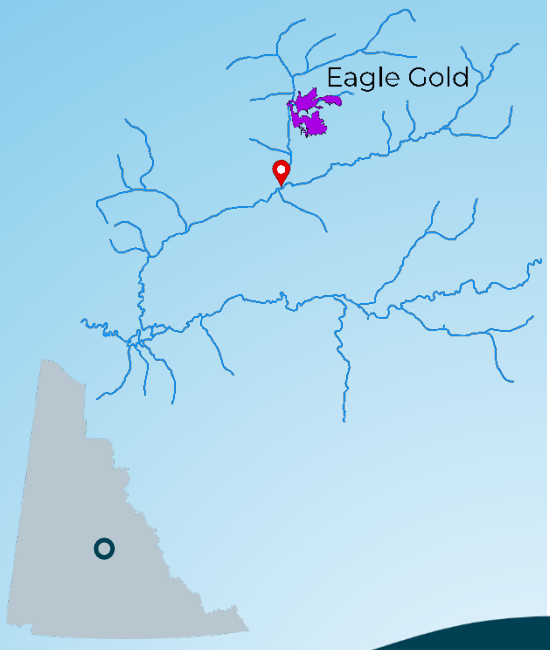
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCRE11

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
63.99298 N
135.85905 W
DATE ASSESSED
July 11
SITE TYPE
Impact
AREA (m²)
1400

WATER TEMP
8.0°C
CONDUCTIVITY
341 µs/cm
pH
8.0
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING Moderate/High –cobble and gravel, moderate to low velocity
OVERWINTERING Poor - few pools throughout the site
REARING Good - moderate cover, good velocity refuge
MIGRATION Very Good - no barriers, good gradient
STAGING Good – undercut banks, boulders, pools, riffles
RIPARIAN Very Good – intact, no disturbance, mixed vegetation dominated by shrubs, shrub/herb or mature forest stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	4.0	-	329
B	13.0	-	182
C	8.0	-	338
D	3.0	-	324
200m	Mean: 7.0	Mean: N/A	Total: 1173

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	5	0	0
Slimy Sculpin	26	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

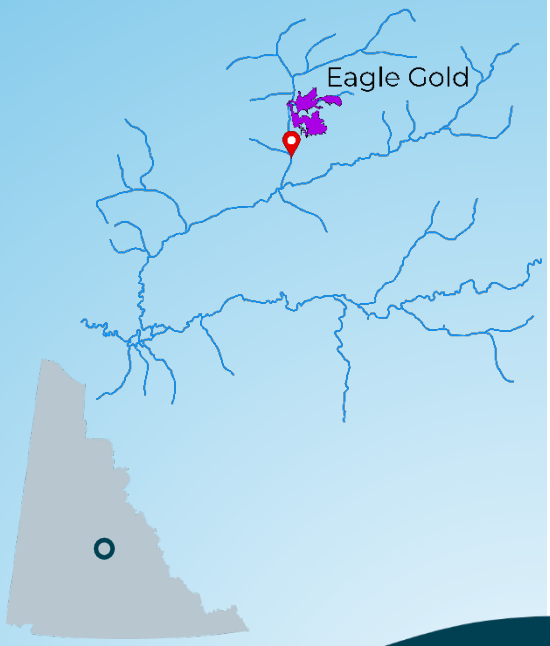
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCRE12

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
64.00921 N
135.85320 W
DATE ASSESSED
July 14
SITE TYPE
Impact
AREA (m²)
1800

WATER TEMP
8.1°C
CONDUCTIVITY
330 µs/cm
pH
8.1
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – cobble and gravels, moderate to low velocity
OVERWINTERING	Poor – very few pools throughout the site
REARING	Moderate - trace cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – few boulders, shallow pools, extensive riffles
RIPARIAN	Poor – low bank stability, disturbed or eroding, limited vegetation, predominantly initial stage with small patches in shrub/herb stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	10.0	25	238
B	7.0	18	305
C	10.0	25	417
D	9.0	15	399
200m	Mean: 9.0	Mean: 20.75	Total: 1359

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	1	0	1
Slimy Sculpin	41	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

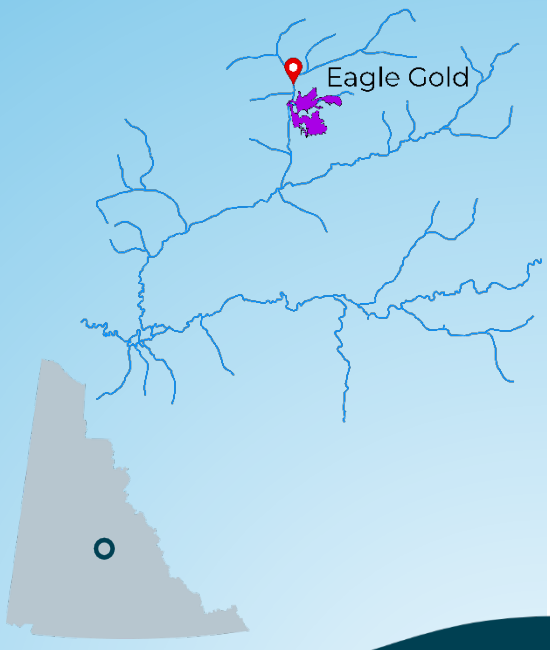
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HS3alt

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
64.046322 N
135.853959 W
DATE ASSESSED
July 20
SITE TYPE
State
AREA (m²)
1350

WATER TEMP
7.6°C
CONDUCTIVITY
193.6 µs/cm
pH
N/A
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/Low – cobbles and boulders, low to moderate velocity
OVERWINTERING	Poor - few pools throughout site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – boulders, some undercut banks, shallow pools, riffles, and woody debris
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation, dominantly shrubs in shrub/herb stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	7.0	25	452
B	8.0	17	538
C	6.0	12	230
D	6.0	12	260
200m	Mean: 6.75	Mean: 14	Total: 1480

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	4	0	2
Slimy Sculpin	5	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

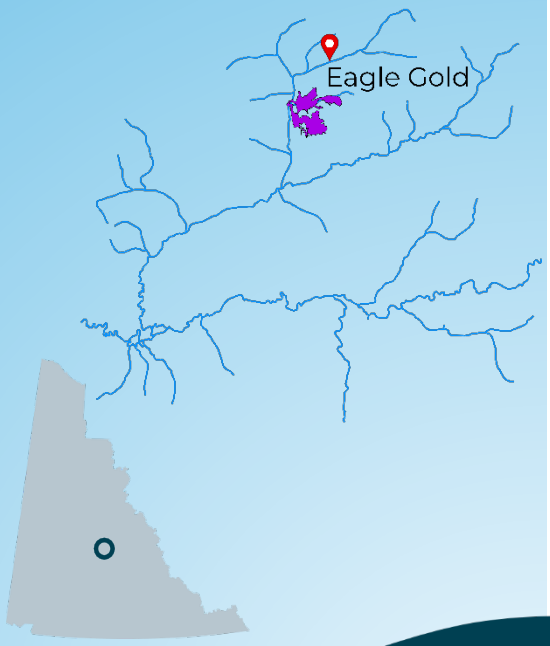
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HS16

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
64.059302 N
135.307421 W
DATE ASSESSED
July 19
SITE TYPE
State
AREA (m²)
950

WATER TEMP
8.6°C
CONDUCTIVITY
312 µs/cm
pH
8.09
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High –cobbles and fines, moderate to low velocity
OVERWINTERING	Poor - few pools, none over 0.3m deep
REARING	Very Good - moderate cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good - boulders, shallow pools, extensive riffles
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation, dominantly shrubs in shrub and herb stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	2.0	-	274
B	5.0	-	254
C	5.0	-	187
D	7.0	-	345
200m	Mean: 4.75	Mean: N/A	Total: 1060

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	14	7	8
Slimy Sculpin	2	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

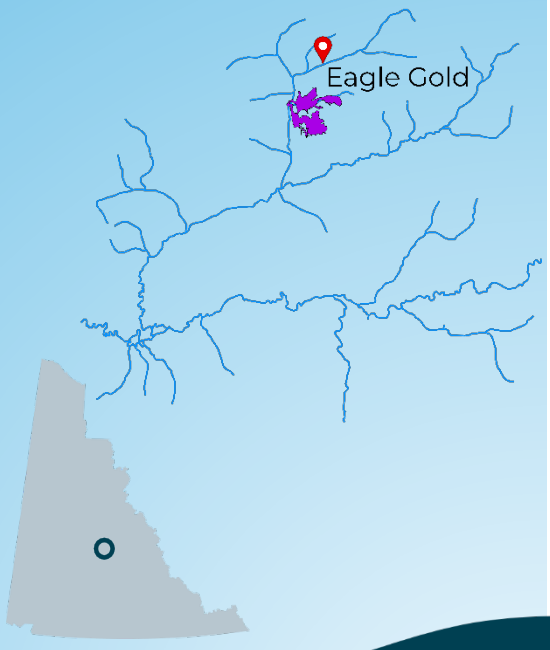
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HS22

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
64.057653 N
135.816021 W
DATE ASSESSED
July 20
SITE TYPE
State
AREA (m²)
627.5

WATER TEMP
5.4°C
CONDUCTIVITY
193.7 µs/cm
pH
N/A
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING Moderate/Low – boulders and cobble, moderate to low velocity
OVERWINTERING Poor - few pools throughout the site
REARING Very Good - abundant cover, good velocity refuge
MIGRATION Very Good - no barriers, good gradient
STAGING Good - boulders, shallow pools, extensive riffles
RIPARIAN Very Good – intact, no disturbance, mixed vegetation, dominantly shrubs in shrub and herb stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	3.2	23	286
B	3.1	13	374
C	3.3	22	115
D	2.95	35	377
200m	Mean: 3.14	Mean: 23.25	Total: 1188

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	17	10	10
Slimy Sculpin	8	-	-
Burbot	1	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

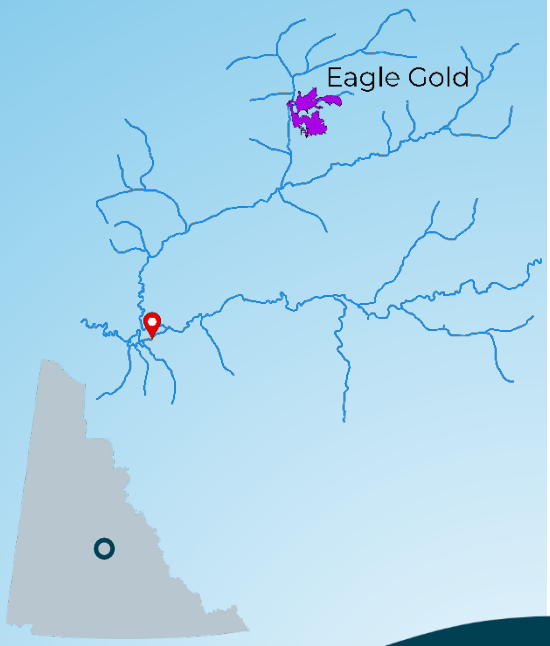
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE SMQBC1

WATERSHED
South McQuesten
WATERCOURSE
South McQuesten
LOCATION
63.895498 N
136.023613 W
DATE ASSESSED
July 17
SITE TYPE
Impact
AREA (m²)
2700

WATER TEMP
8.0°C
CONDUCTIVITY
320 µs/cm
pH
8.27
STAGE
Moderate
TURBIDITY
Moderate



Fish Habitat Assessment

SPAWNING High – fines and gravels, low to moderate velocity
OVERWINTERING Poor - no pools of moderate depth within the site
REARING Good – abundant cover, some velocity refuge
MIGRATION Very Good - no barriers, good gradient
STAGING Good - shallow riffles at the confluence of the South McQuesten river and Haggart creek
RIPARIAN Very Good – intact, no disturbance, mixed vegetation, dominantly grasses and shrubs in pole-sapling and young forest stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	23	-	329
B	31	-	339
C	-	-	-
D	-	-	-
200m	Mean: 27	Mean: N/A	Total: 668

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	7	0	0
Slimy Sculpin	3	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

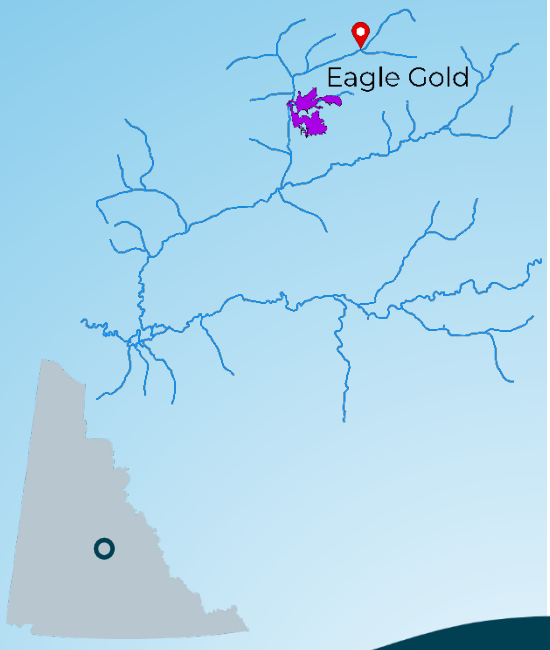
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE UHS01

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
64.066613 N
135.767783 W
DATE ASSESSED
July 19
SITE TYPE
State
AREA (m²)
607.5

WATER TEMP
6°C
CONDUCTIVITY
248 µs/cm
pH
N/A
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – gravels and cobble, moderate to low velocity
OVERWINTERING	Poor - few pools, none over 0.5m deep
REARING	Very Good - moderate cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good - boulders, shallow pools, extensive riffles
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation, dominantly shrubs in shrub and pole sapling stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	3.35	18	316
B	2.85	15	475
C	2.35	15	273
D	3.6	18	282
200m	Mean: 3.0375	Mean: 16.5	Total: 1346

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	10	0	5

For more information, please contact: fisheries@yukon.ca

Yukon

2024

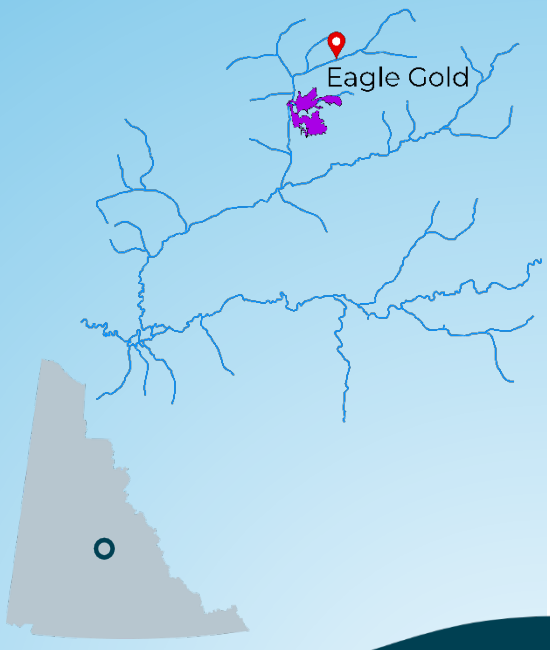
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE UHS02

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
64.060641 N
135.798769 W
DATE ASSESSED
July 19
SITE TYPE
State
AREA (m²)
749

WATER TEMP
8.4°C
CONDUCTIVITY
301.4 µs/cm
pH
N/A
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – gravels and cobble, moderate to low velocity
OVERWINTERING	Poor - few pools, none over 0.4m deep
REARING	Very Good - moderate cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good - boulders, shallow pools, extensive riffles
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation, dominantly shrubs in shrub and pole sapling stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	3.73	24	381
B	5.0	23	234
C	2.25	25	291
D	4.0	19	303
200m	Mean: 3.745	Mean: 22.75	Total: 1209

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	19	0	6

For more information, please contact: fisheries@yukon.ca

Yukon

2024

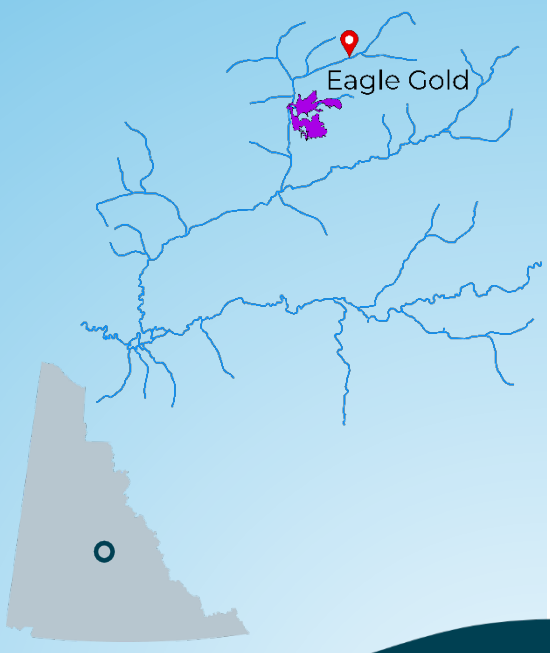
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE UHS03

WATERSHED
Haggart Creek
WATERCOURSE
Haggart Creek
LOCATION
64.063404 N
135.782719 W
DATE ASSESSED
July 19
SITE TYPE
State
AREA (m²)
1150

WATER TEMP
6.4°C
CONDUCTIVITY
340 µs/cm
pH
8.1
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – gravels and cobble, moderate to low velocity
OVERWINTERING	Poor - few pools, none over 0.3m deep
REARING	Very Good - moderate cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good - boulders, shallow pools, extensive riffles
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation, dominantly shrubs in shrub and pole sapling stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	10.0	10	305
B	5.0	10	120
C	4.0	25	225
D	4.	12	341
200m	Mean: 5.75	Mean: 14.25	Total: 991

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	7	4	6

For more information, please contact: fisheries@yukon.ca

Yukon

2024

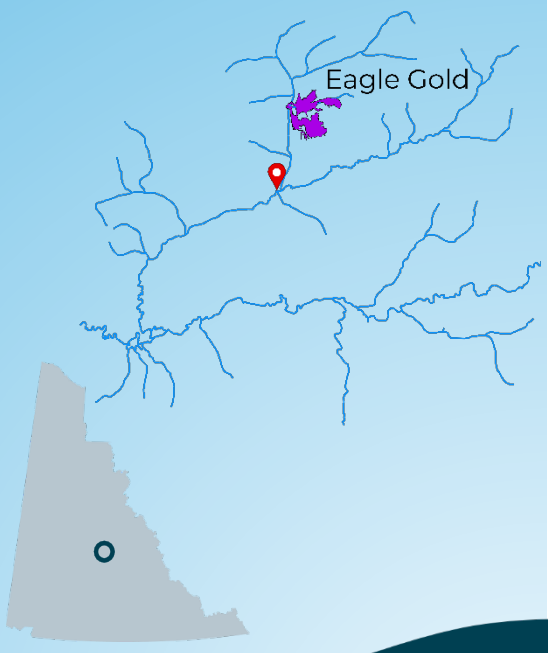
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE UNTRB1

WATERSHED
Haggart Creek
WATERCOURSE
Unnamed tributary
LOCATION
63.985233 N
135.866439 W
DATE ASSESSED
July 22
SITE TYPE
State
AREA (m²)
397.5

WATER TEMP
6.9°C
CONDUCTIVITY
235.6 µs/cm
pH
N/A
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – gravels and cobble, moderate to low velocity in lower reaches
OVERWINTERING	Poor – few pools throughout the site
REARING	Good - abundant cover, some velocity refuge
MIGRATION	Poor – beaver dam and steep gradients
STAGING	Good – undercut banks, boulders, abundant functional woody debris, pools
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation in mature forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	2.25	8	265
B	1.5	7	300
C	1.9	16	145
D	2.3	11	195
200m	Mean: 1.9875	Mean: 10.5	Total: 900

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	1	0	0
Slimy Sculpin	8	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

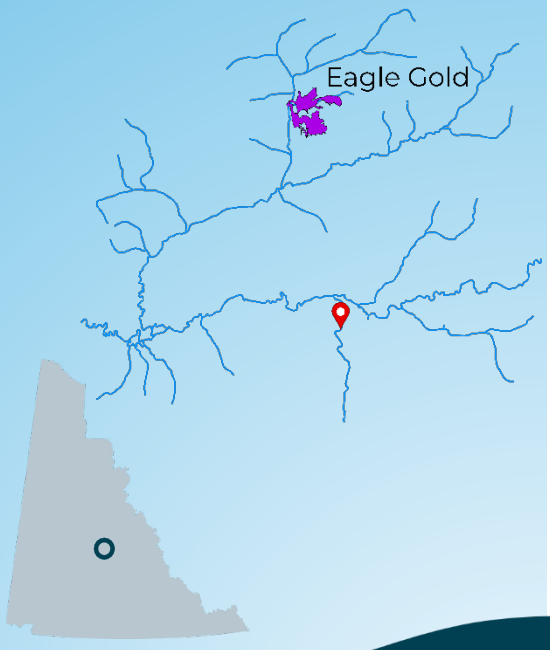
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HCRC5

WATERSHED
South McQuesten
WATERCOURSE
Haldane Creek
LOCATION
63.907201 N
135.774969 W
DATE ASSESSED
July 13
SITE TYPE
State
AREA (m²)
600

WATER TEMP
14.5°C
CONDUCTIVITY
395 µs/cm
pH
8.1
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	High – gravels and cobbles, low velocity
OVERWINTERING	Moderate - pools of moderate depth within the site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Very Good – pools, woody debris, undercut banks, riffles, and boulders
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation in mature forest stages

Figure 1: Upstream, reach D

Figure 2: Downstream, reach D

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	2.0	-	296
B	5.0	-	311
C	2.0	-	418
D	3.0	-	850
200m	Mean: 3.0	Mean: N/A	Total: 1850

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	1177	0	0
Slimy Sculpin	124	-	-
Burbot	21	-	-
Chinook	3	-	-
Arctic Lamprey	3	-	-
Northern Pike	3	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

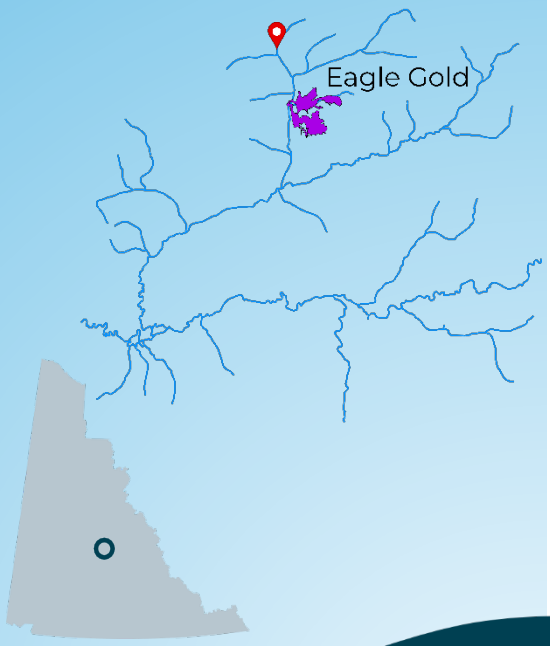
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HS19

WATERSHED
Haggart Creek
WATERCOURSE
Ironrust Creek
LOCATION
64.062853 N
135.876718 W
DATE ASSESSED
July 18
SITE TYPE
State
AREA (m²)
255

WATER TEMP
4.2°C
CONDUCTIVITY
305 µs/cm
pH
8.01
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/Low – boulders and cobbles, moderate to low velocity
OVERWINTERING	Poor - few shallow pools throughout site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – boulders, undercut banks, shallow pools, riffles, and functional woody debris
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation in shrub/herb or pole sapling stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	1.65	18	259
B	0.6	20	233
C	0.3	18	158
D	2.55	25	394
200m	Mean: 1.275	Mean: 20.25	Total: 1044

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	16	0	14

For more information, please contact: fisheries@yukon.ca

Yukon

2024

HAGGART CREEK WATERSHED

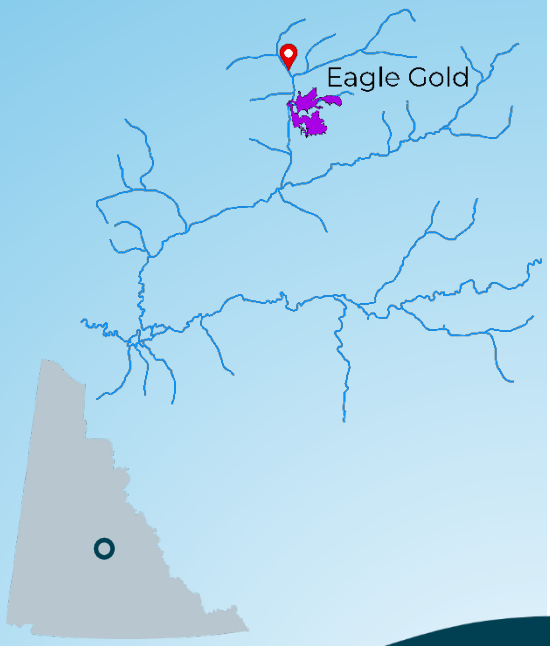
Fish and Fish Habitat Assessment

SITE IR2

WATERSHED
Haggart Creek
WATERCOURSE
Ironrust Creek
LOCATION
64.05262 N
135.86009 W
DATE ASSESSED
July 19
SITE TYPE
State
AREA (m²)
552.5

WATER TEMP
4.0°C
CONDUCTIVITY
216 µs/cm
pH
8.25

STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – cobble and gravels, moderate to low velocity
OVERWINTERING	Moderate – few shallow pools throughout site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – some boulders, undercut banks, shallow pools, riffles, and functional woody debris
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation in young forest or mature forest stages

Figure 1: Upstream, reach B

Figure 2: Downstream, reach B

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	2.5	15	317
B	2.4	20	356
C	3.5	15	297
D	2.65	30	280
200m	Mean: 2.76	Mean: 20	Total: 1250

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	9	6	8

For more information, please contact: fisheries@yukon.ca

Yukon

2024

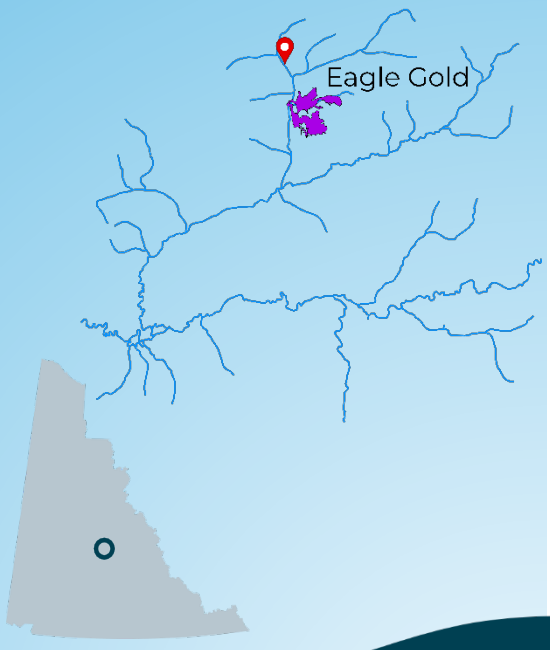
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE IR3

WATERSHED
Haggart Creek
WATERCOURSE
Ironrust Creek
LOCATION
64.05576 N
135.86534 W
DATE ASSESSED
July 19
SITE TYPE
State
AREA (m²)
677

WATER TEMP
6.3°C
CONDUCTIVITY
206 µs/cm
pH
8.20
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – cobble and gravels, moderate to low velocity
OVERWINTERING	Moderate - few shallow pools throughout site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – some boulders, shallow pools, riffles, and functional woody debris
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation in shrub/herb to young forest stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	2.5	20	302
B	3.3	15	380
C	3.35	15	287
D	4.3	18	297
200m	Mean: 3.385	Mean: 17	Total: 1266

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	13	4	8

For more information, please contact: fisheries@yukon.ca

Yukon

2024

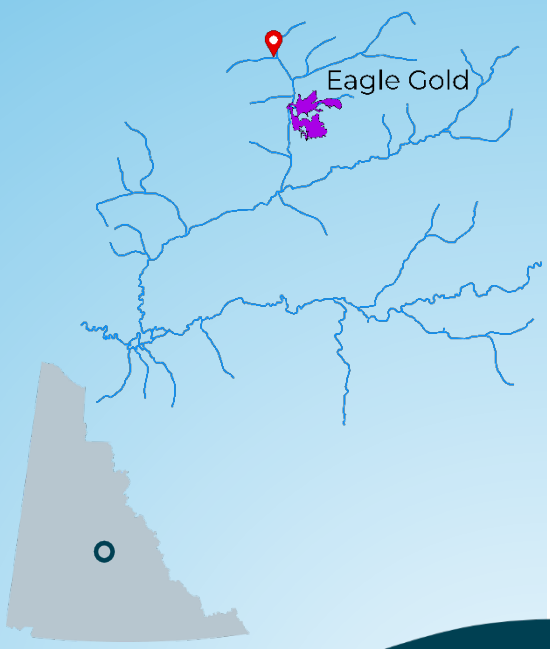
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE IRS1

WATERSHED
Haggart Creek
WATERCOURSE
Ironrust Creek
LOCATION
64.061045 N
135.877266 W
DATE ASSESSED
July 18
SITE TYPE
State
AREA (m²)
422.5

WATER TEMP
3.2°C
CONDUCTIVITY
97.6 µs/cm
pH
8.43
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – gravels and cobble, moderate to low velocity
OVERWINTERING	Poor - few pools of moderate depth throughout site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – some boulders, undercut banks, shallow pools, riffles, and functional woody debris
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation in young forest or mature forest stages

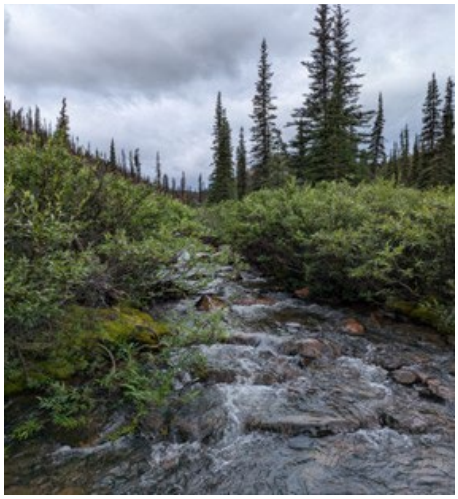


Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	10.0	20	305
B	5.0	28	120
C	4.0	20	225
D	4.	25	341
200m	Mean: 5.75	Mean: 23.25	Total: 991

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	8	0	4
Slimy Sculpin	1	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

HAGGART CREEK WATERSHED

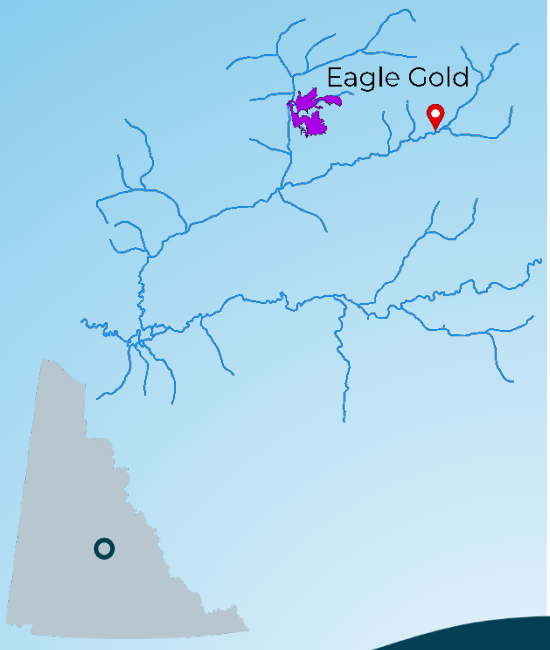
Fish and Fish Habitat Assessment

SITE HS17

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
64.0224598 N
135.6652981 W
DATE ASSESSED
July 20
SITE TYPE
State
AREA (m²)
900

WATER TEMP
5.1°C
CONDUCTIVITY
293 µs/cm
pH
7.42

STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – fines and cobbles, low to moderate velocity
OVERWINTERING	Poor – few pools of moderate depth within site
REARING	Very Good – abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – site contains pools, abundant undercut banks and cover, riffles, and some boulders
RIPARIAN	Very Good – intact, no disturbance, mixed coniferous and deciduous forest in young forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	4.0	-	333
B	5.0	-	275
C	6.0	-	311
D	3.0	-	311
200m	Mean: 4.5	Mean: N/A	Total: 1230

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	4	1	1

For more information, please contact: fisheries@yukon.ca

Yukon

2024

HAGGART CREEK WATERSHED

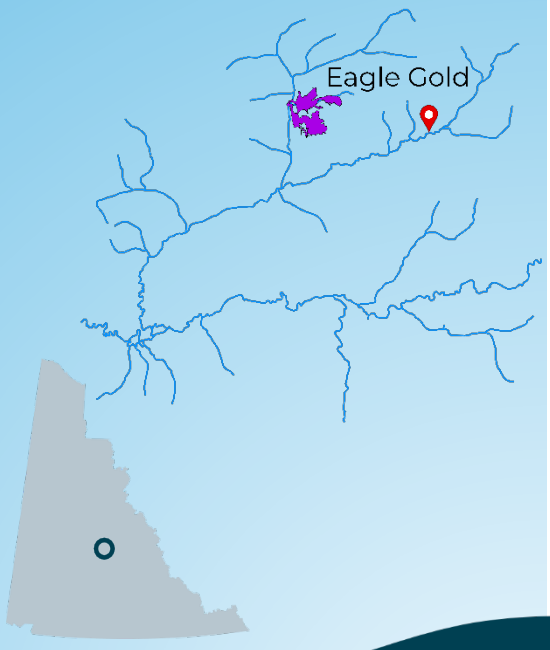
Fish and Fish Habitat Assessment

SITE HS18

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
64.0216560 N
135.6728801 W
DATE ASSESSED
July 20
SITE TYPE
State
AREA (m²)
1000

WATER TEMP
5.1°C
CONDUCTIVITY
318 µs/cm
pH
7.4

STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – cobbles and gravels, low to moderate velocity
OVERWINTERING	Poor - few pools of moderate depth within the site
REARING	Good – moderate cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – boulders, pools, undercuts, runs, and riffles
RIPARIAN	Very Good – intact, no disturbance, mixed coniferous and deciduous forest in young forest stage and deciduous forest in pole-sapling stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	2.0	-	315
B	6.0	-	316
C	7.0	-	214
D	5.0	-	218
200m	Mean: 5.0	Mean: N/A	Total: 1063

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	16	3	4

For more information, please contact: fisheries@yukon.ca

Yukon

2024

HAGGART CREEK WATERSHED

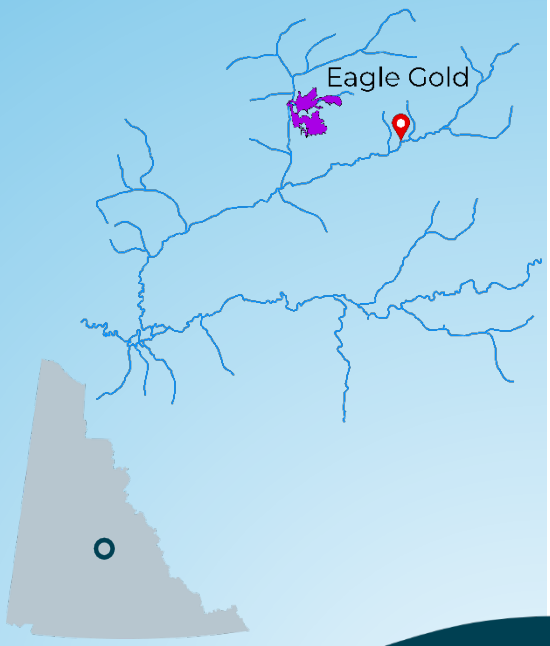
Fish and Fish Habitat Assessment

SITE HS20

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
64.01555 N
135.70941 W
DATE ASSESSED
July 20
SITE TYPE
State
AREA (m²)
762.5

WATER TEMP
4.7°C
CONDUCTIVITY
341 µs/cm
pH
8.05

STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – cobble and gravel, low to moderate velocity
OVERWINTERING	Moderate – pools of moderate depth throughout site
REARING	Very Good - moderate cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – intermittent pools, abundant undercut banks, slow runs, riffles
RIPARIAN	Very Good – intact, no disturbance, predominantly coniferous forest in mature forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	4.0	25	392
B	4.0	45	407
C	3.15	40	304
D	4.1	45	390
200m	Mean: 3.1825	Mean: 38.75	Total: 1493

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	17	3	4
Slimy Sculpin	1	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

HAGGART CREEK WATERSHED

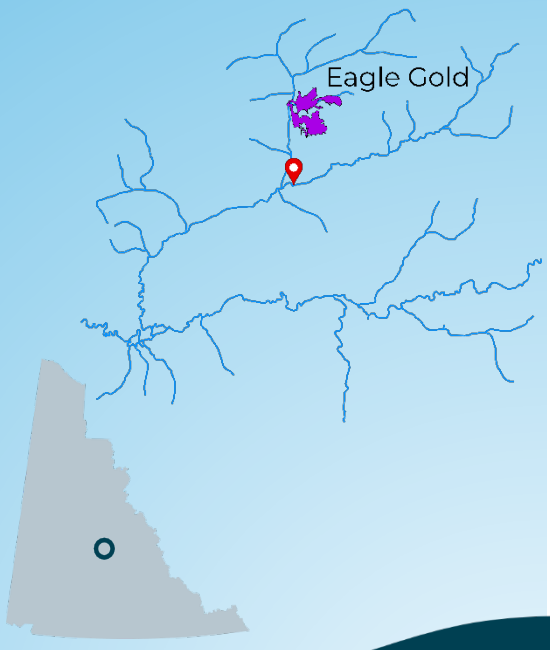
Fish and Fish Habitat Assessment

SITE HS23alt

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
63.98731 N
135.84550 W
DATE ASSESSED
July 22
SITE TYPE
State
AREA (m²)
1247.5

WATER TEMP
6.3°C
CONDUCTIVITY
373 µs/cm
pH
8.14

STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – cobble and gravel substrate, moderate to low velocity
OVERWINTERING	Poor – few pools of moderate depth throughout site
REARING	Good - trace cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – abundant undercut banks, and few boulders, pools, and functional large woody debris
RIPARIAN	Very Good – intact, no disturbance, mixed deciduous and coniferous forest in young forest stage

Figure 1: Upstream, reach D

Figure 2: Downstream, reach D

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	3.95	45	342
B	11.0	25	400
C	5.0	30	277
D	5.0	20	243
200m	Mean: 6.2375	Mean: 30	Total: 1262

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling*	16	8	12
Slimy Sculpin	30	-	-

* 9 Arctic Grayling captured by angling a pool between reach C and D

For more information, please contact: fisheries@yukon.ca

Yukon

2024

HAGGART CREEK WATERSHED

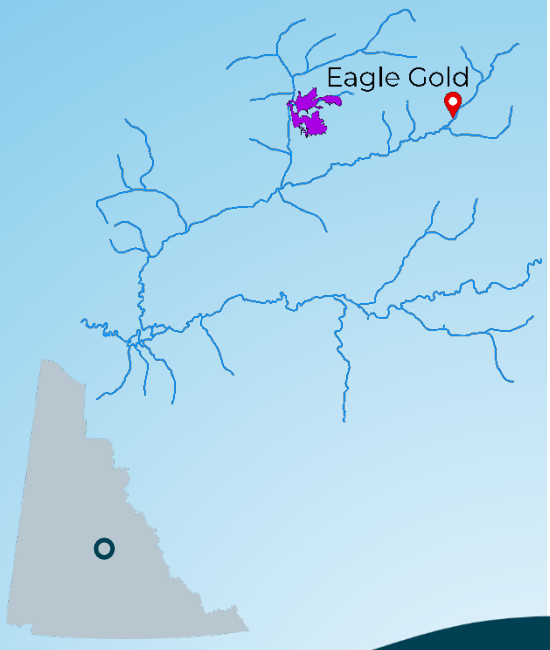
Fish and Fish Habitat Assessment

SITE HS25

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
64.02970 N
135.64331 W
DATE ASSESSED
July 21
SITE TYPE
State
AREA (m²)
455

WATER TEMP
8.9°C
CONDUCTIVITY
342 µs/cm
pH
8.14

STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – cobbles and gravels, low to moderate velocity
OVERWINTERING	Poor - few pools of moderate depth within site
REARING	Very Good - moderate cover, good velocity refuge
MIGRATION	Good – minimal obstructions, good gradient
STAGING	Good – few pools, deep runs, and abundant undercut banks and functional woody debris
RIPARIAN	Very Good – intact, no disturbance, mixed deciduous and coniferous forest in mature forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	1.25	25	282
B	3.75	15	365
C	1.95	20	252
D	2.15	20	266
200m	Mean: 2.275	Mean: 20	Total: 1165

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	5	2	2

For more information, please contact: fisheries@yukon.ca

Yukon

2024

HAGGART CREEK WATERSHED

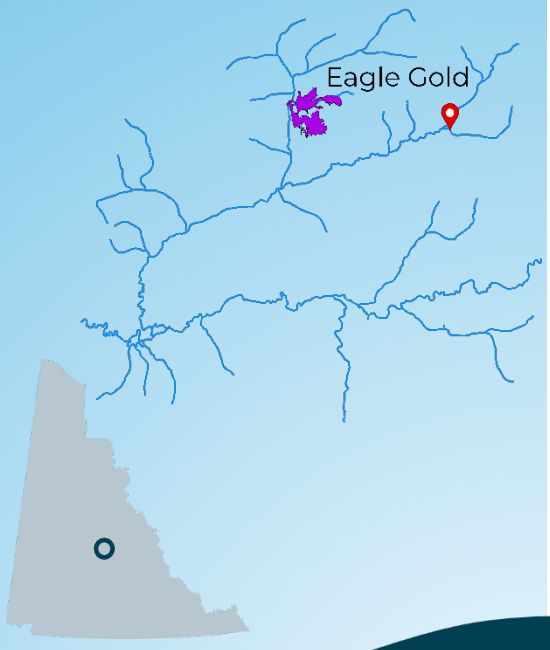
Fish and Fish Habitat Assessment

SITE HS27

WATERSHED
Haggart Creek
WATERCOURSE
Skate Creek
LOCATION
64.02451 N
135.64589 W
DATE ASSESSED
July 20
SITE TYPE
State
AREA (m²)
382.5

WATER TEMP
5.5°C
CONDUCTIVITY
214 µs/cm
pH
8.13

STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate – cobble and gravel, moderate to low velocity
OVERWINTERING	Poor - few pools throughout the site
REARING	Good - abundant cover, some velocity refuge
MIGRATION	Poor – fish passage obstruction in reach A
STAGING	Good – abundant functional woody debris and undercut banks, few boulders and shallow pools
RIPARIAN	Very Good – intact, no disturbance, mixed coniferous and deciduous forest in mature forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	1.75	16	393
B	1.75	30	288
C	1.85	25	218
D	2.30	25	246
200m	Mean: 1.9125	Mean: 24	Total: 1145

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	8	6	8

For more information, please contact: fisheries@yukon.ca

Yukon

2024

HAGGART CREEK WATERSHED

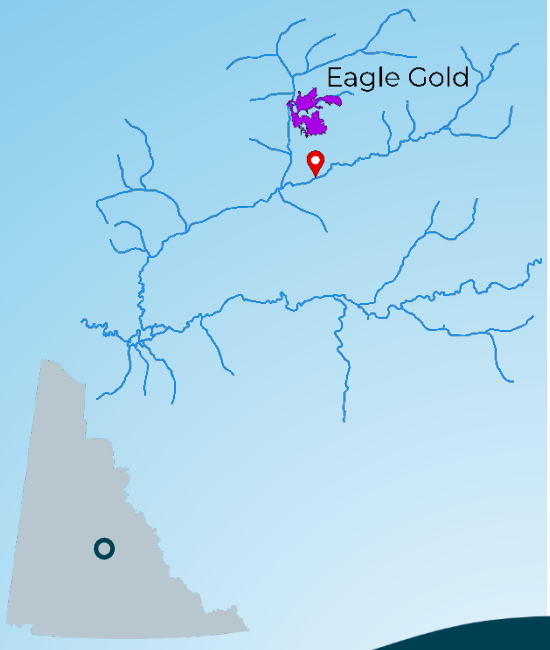
Fish and Fish Habitat Assessment

SITE HS28

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
63.9933528 N
135.8179156 W
DATE ASSESSED
July 21
SITE TYPE
State
AREA (m²)
1050

WATER TEMP
6.1°C
CONDUCTIVITY
372 µs/cm
pH
7.78

STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING Moderate/High – cobble and fines, moderate to low velocity
OVERWINTERING Poor - few pools throughout the site
REARING Good – abundant cover, good velocity refuge
MIGRATION Very Good - no barriers, good gradient
STAGING Good – some boulders, pools, riffles, undercut banks, and functional woody debris
RIPARIAN Very Good – intact, no disturbance, mixed coniferous and deciduous forest in mature forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	4.0	-	218
B	6.0	-	244
C	5.0	-	301
D	6.0	-	300
200m	Mean: 5.25	Mean: N/A	Total: 1063

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	2	0	0
Slimy Sculpin	3	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

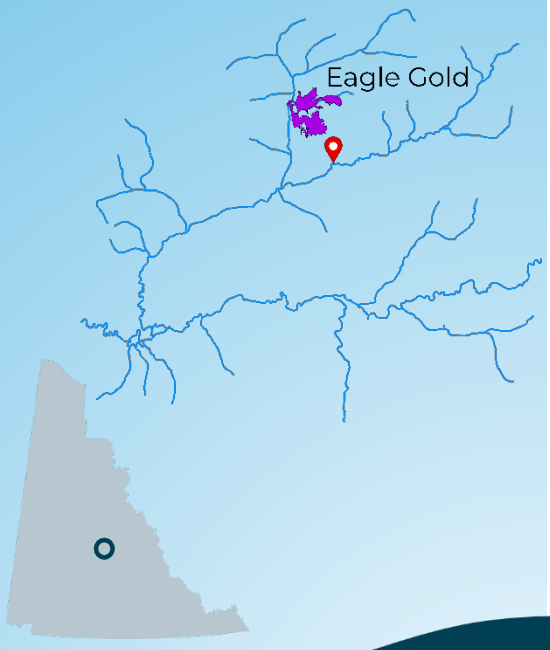
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HS31

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
64.0007813 N
135.7955942 W
DATE ASSESSED
July 21
SITE TYPE
State
AREA (m²)
1100

WATER TEMP
8.8°C
CONDUCTIVITY
373 µs/cm
pH
7.98
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – cobble and fines, low to moderate velocity
OVERWINTERING	Poor - few pools of moderate depth within the site
REARING	Very Good – abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good – site contains riffles, runs, pools, undercut banks, some boulders, and abundant woody debris
RIPARIAN	Very Good – intact, no disturbance, mixed coniferous and deciduous forest in mature forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	6.0	40	237
B	5.0	50	221
C	6.0	110	240
D	5.0	70	289
200m	Mean: 5.5	Mean: 62.5	Total: 987

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	3	1	1
Slimy Sculpin	12	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

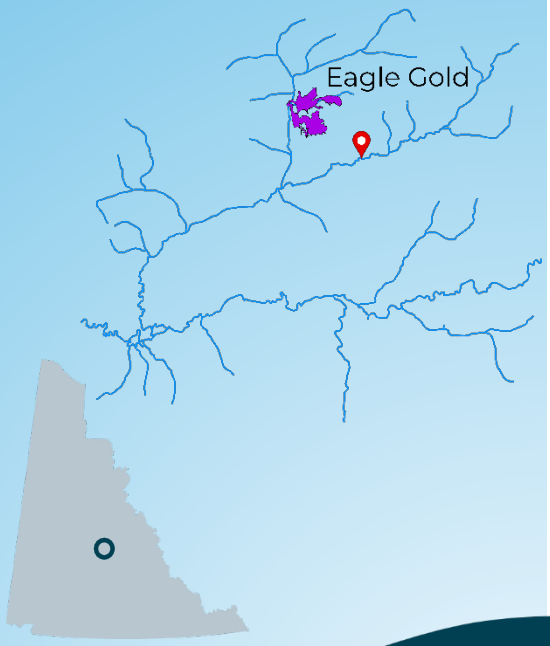
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HS32

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
64.0045976 N
135.7593831 W
DATE ASSESSED
July 21
SITE TYPE
State
AREA (m²)
1000

WATER TEMP
7.1°C
CONDUCTIVITY
366 µs/cm
pH
7.94
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING Moderate/High – cobble and fines, low to moderate velocity
OVERWINTERING Poor – few clumped pools of moderate depth
REARING Very Good – abundant cover, good velocity refuge
MIGRATION Very Good - no barriers, good gradient
STAGING Good – site contained pools, undercut banks, woody debris, abundant cover, riffles, and some boulders
RIPARIAN Very Good – intact, no disturbance, mixed coniferous and deciduous forest in young forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	6.0	-	161
B	5.0	-	235
C	5.0	-	217
D	4.0	-	354
200m	Mean: 5.0	Mean: N/A	Total: 967

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	6	1	1

For more information, please contact: fisheries@yukon.ca

Yukon

2024

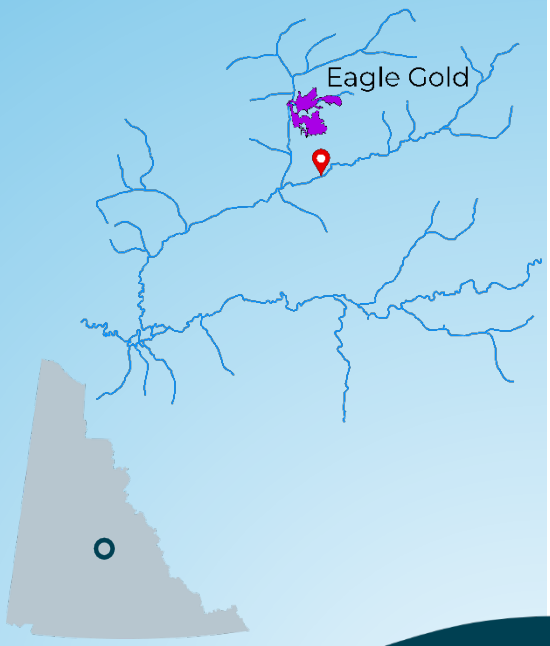
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HS33

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
63.9956574 N
135.8012542 W
DATE ASSESSED
July 21
SITE TYPE
State
AREA (m²)
1250

WATER TEMP
6.1°C
CONDUCTIVITY
376 µs/cm
pH
7.95
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING Moderate/High – cobbles and fines, low to moderate velocity
OVERWINTERING Moderate - pools of moderate depth within the site
REARING Very Good – abundant cover, good velocity refuge
MIGRATION Good – navigable beaver dam within the site, good gradient
STAGING Very Good – abundant pools, undercuts, and cover
RIPARIAN Very Good – intact, historic burn, mixed coniferous and deciduous forest in mature forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	8.0	120	223
B	5.0	115	203
C	5.0	90	293
D	7.0	120	211
200m	Mean: 6.25	Mean: 111.25	Total: 930

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	10	3	2
Slimy Sculpin	3	-	-

For more information, please contact: fisheries@yukon.ca

Yukon

2024

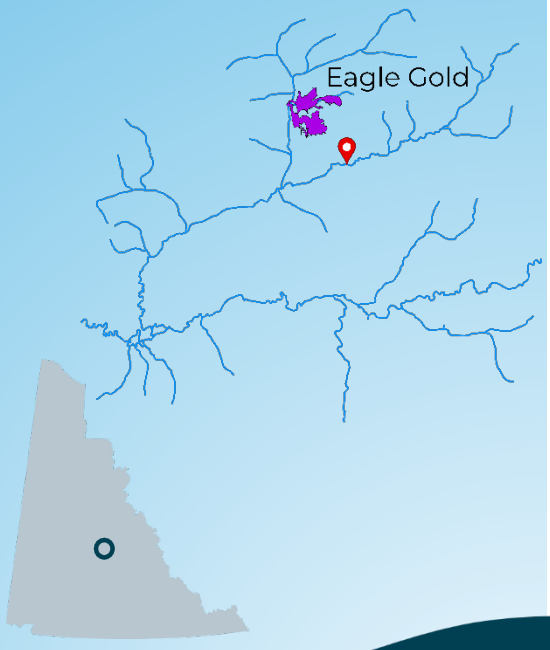
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HS35

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
64.0007262 N
135.7780166 W
DATE ASSESSED
July 21
SITE TYPE
State
AREA (m²)
1100

WATER TEMP
8.7°C
CONDUCTIVITY
376 µs/cm
pH
7.87
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING High – gravels and fines, low to moderate velocity
OVERWINTERING Moderate - pools of moderate depth within the site
REARING Very Good – abundant cover, good velocity refuge
MIGRATION Good - good gradient, some obstructions
STAGING Very Good – abundant pools, undercut banks, and cover, some riffles and boulders
RIPARIAN Very Good – intact, historic burn, mixed coniferous and deciduous forest in dominantly mature forest stage

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	6.0	-	266
B	6.0	-	240
C	4.0	-	272
D	6.0	-	297
200m	Mean: 5.5	Mean: N/A	Total: 1075

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	12	3	3

For more information, please contact: fisheries@yukon.ca

Yukon

2024

HAGGART CREEK WATERSHED

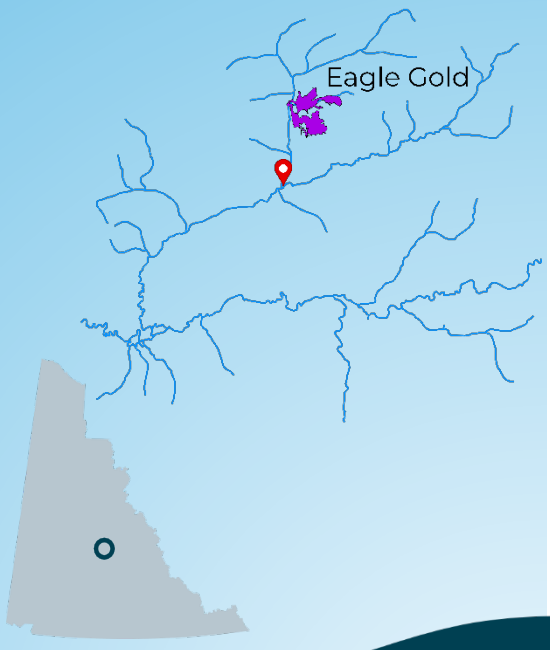
Fish and Fish Habitat Assessment

SITE L1

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
63.98660 N
135.85895 W
DATE ASSESSED
July 13
SITE TYPE
State
AREA (m²)
1200

WATER TEMP
7.3°C
CONDUCTIVITY
360 µs/cm
pH
7.43

STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING High – gravel and cobble, moderate to low velocity
OVERWINTERING Moderate – pools of moderate depth intermittent through the site
REARING Very Good - moderate cover, good velocity refuge
MIGRATION Very Good - no barriers*, good gradient
STAGING Good - intermittent pools, undercut banks, riffles, and slow runs
RIPARIAN Very Good – intact, mixed vegetation in a variety of stages from shrub/herb to mature forest

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	7.0	37	268
B	5.0	49	443
C	6.0	32	520
D	6.0	-	254
200m	Mean: 6.0	Mean: 39.34	Total: 11484

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Slimy Sculpin	43	-	-

* Large beaver dam at the end of the site

For more information, please contact: fisheries@yukon.ca

Yukon

2024

HAGGART CREEK WATERSHED

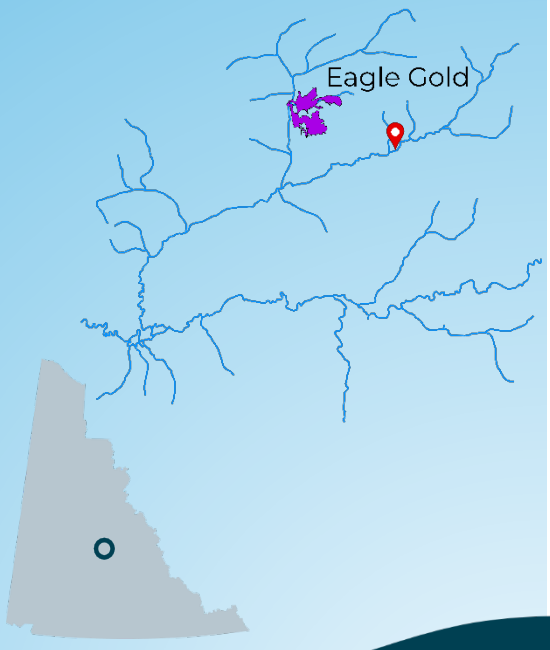
Fish and Fish Habitat Assessment

SITE L4

WATERSHED
Haggart Creek
WATERCOURSE
Lynx Creek
LOCATION
64.01064 N
135.71619 W
DATE ASSESSED
July 21
SITE TYPE
State
AREA (m²)
735

WATER TEMP
5.2°C
CONDUCTIVITY
353 µs/cm
pH
8.02

STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/High – cobble and gravels, low to moderate velocity
OVERWINTERING	Poor – few pools of moderate depth throughout the site
REARING	Very Good - moderate cover, good velocity refuge
MIGRATION	Very Good - no barriers, good gradient
STAGING	Good - boulders, pools, undercut banks, riffles
RIPARIAN	Very Good – intact, no disturbance, mixed vegetation in pole-sapling to mature forest stages

Figure 1: Upstream, reach B

Figure 2: Downstream, reach B

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	4.35	25	426
B	3.55	35	280
C	2.90	25	359
D	3.90	30	261
200m	Mean: 3.675	Mean: 28.75	Total: 1326

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling*	12	10	11
Slimy Sculpin	2	-	-

* 10 Arctic Grayling captured by angling within the site

For more information, please contact: fisheries@yukon.ca

Yukon

2024

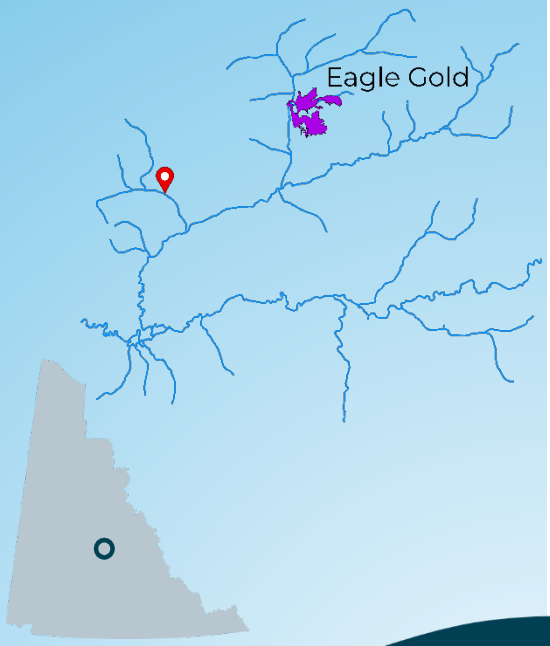
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE HS38alt

WATERSHED
Haggart Creek
WATERCOURSE
Swede Creek
LOCATION
63.97899 N
136.01198 W
DATE ASSESSED
July 21
SITE TYPE
State
AREA (m²)
347.5

WATER TEMP
7.3°C
CONDUCTIVITY
288 µs/cm
pH
8.16
STAGE
Moderate
TURBIDITY
Low



Fish Habitat Assessment

SPAWNING	Moderate/low – cobble and boulders, moderate to low velocity
OVERWINTERING	Poor - few pools of moderate depth throughout site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Very Good - no barriers*, good gradient
STAGING	Good – boulders, undercut banks, shallow pools, riffles, deep runs, and woody debris
RIPARIAN	Very Good – intact, historic burn, mixed vegetation in shrub-herb to mature forest stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	1.25	45	238
B	2.15	20	195
C	1.00	60	265
D	2.55	40	232
200m	Mean: 1.7375	Mean: 41.25	Total: 930

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	6	3	5

* Within site. Hanging culvert located below site impeding fish movement from Haggart creek into Swede creek

For more information, please contact: fisheries@yukon.ca

Yukon

2024

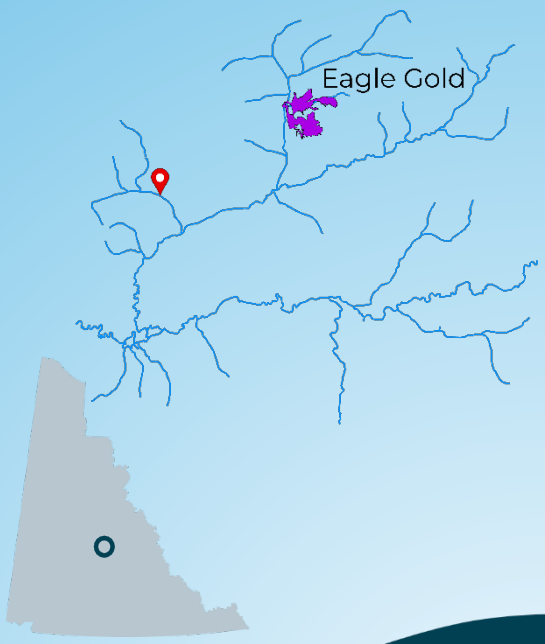
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE SCR2

WATERSHED
Haggart Creek
WATERCOURSE
Swede Creek
LOCATION
63.979015 N
136.011607 W
DATE ASSESSED
August 30
SITE TYPE
State
AREA (m²)
650

WATER TEMP
5.0°C
CONDUCTIVITY
262 µs/cm
pH
8.0
STAGE
Low
TURBIDITY
Moderate



Fish Habitat Assessment

SPAWNING	Moderate/High –cobble and fines, low to moderate velocity
OVERWINTERING	Moderate - pools of moderate depth within the site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Good - no barriers*, good gradient
STAGING	Good – pools, riffles, and abundant functional woody debris
RIPARIAN	Very Good – intact, historic burn, mixed vegetation in shrub-herb to mature forest stages

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	1.20	30	380
B	1.75	48	421
C	1.10	21	312
D	3.5	70	395
200m	Mean: 1.89	Mean: 42.25	Total: 1508

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	16	1	9

* Within site. Hanging culvert located below site impeding fish movement from Haggart creek into Swede creek

For more information, please contact: fisheries@yukon.ca

Yukon

2024

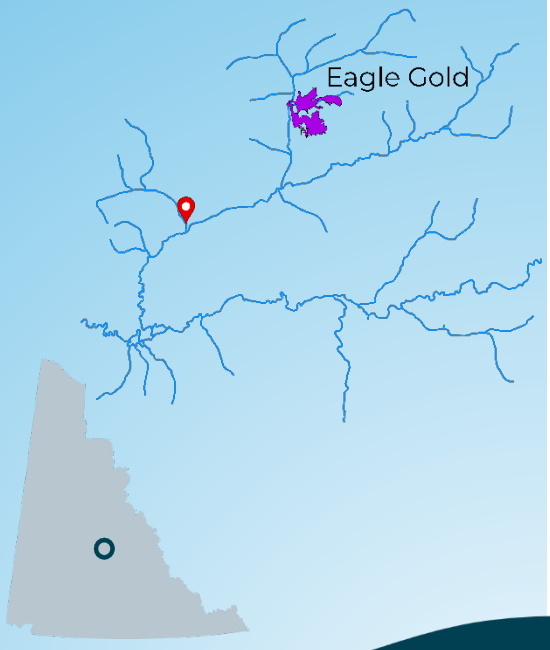
HAGGART CREEK WATERSHED

Fish and Fish Habitat Assessment

SITE SCRC14

WATERSHED
Haggart Creek
WATERCOURSE
Swede Creek
LOCATION
63.962204 N
135.980873 W
DATE ASSESSED
July 14
SITE TYPE
State
AREA (m²)
650

WATER TEMP
8.0°C
CONDUCTIVITY
266 µs/cm
pH
8.21
STAGE
Low
TURBIDITY
Moderate



Fish Habitat Assessment

SPAWNING	Moderate/High –cobble and fines, low to moderate velocity
OVERWINTERING	Moderate - pools of moderate depth within the site
REARING	Very Good - abundant cover, good velocity refuge
MIGRATION	Good - no barriers*, good gradient
STAGING	Good – pools, riffles, and abundant functional woody debris
RIPARIAN	Good – placer activity upstream, shrubs in shrub\herb stage dominant

Figure 1: Upstream, reach A

Figure 2: Downstream, reach A

Fisheries Survey

Table 1: Fish assessment effort information

50m REACH	*WETTED WIDTH (m)*	*MEAN DEPTH (cm)*	*SECONDS*
A	4.0	45	316
B	4.0	14	256
C	3.0	26	377
D	2.0	34	295
200m	Mean: 3.25	Mean: 29.75	Total: 1244

Table 2: Fish capture information

SPECIES	*NUMBER*	*PIT TAGS*	*DNA SAMPLES*
Arctic Grayling	21	15	15
Slimy Sculpin	6	-	-

* Within site. Hanging culvert located below site impeding fish movement from Haggart creek into Swede creek

For more information, please contact: fisheries@yukon.ca

Yukon