2020 Adaptive Management Report for the Fish Habitat Management System for Yukon Placer Mining

# Appendix A: 2020 Water Quality Objective Monitoring and Aquatic Health Monitoring Report

# DRAFT REPORT

## Fish Habitat Management System for Yukon Placer Mining – 2020 Aquatic Health and Water Quality Objective Monitoring Results

YPS-626, Adams Creek Photo Credit: A. MacPhail

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## EXECUTIVE SUMMARY

In 2020, Hemmera was requested by Government of Yukon Energy Mines and Resources (EMR) to assist with execution of the 2020 WQOM and AHM programs, and further the interests of the Yukon government and Fisheries and Oceans Canada (DFO) in evaluating the effectiveness of the Adaptive Management Framework. Historically the monitoring has been completed directly by the Yukon government and DFO. The third-party support with the field sampling for the 2020 Water Quality Objective Monitoring (WQOM) and Aquatic Health Monitoring (AHM) annual programs was catalyzed by several factors including severe limitations in field sampling capacity and logistics imposed by human safety requirements associated with the COVID-19 pandemic. The two monitoring programs are governed by their respective protocols, the WQOM Protocol and AHM Protocol. These protocols describe the objectives, sampling design, and methodology for each program. This report focuses on WQO and AH monitoring based especially on the 2020 program.

The objective of the 2020 WQOM program was to conduct annual monitoring and reporting with some slight changes from 2019. Only grab (discrete) water samples were collected in 2020, and no automated, time integrate sampling was conducted. The objectives of the 2020 AHM included continuation focal studies that began in 2019 to inform AHM protocol re-design. The focal studies initiated in 2019 that continued in 2020 included an *in-situ* sediment analysis to attempt to determine the relationship between *in-situ* sediment characteristics and benthic invertebrate community metrics and evaluate the relationship between measurements of streambed sediment to the degree of disturbance. In addition, the inclusion of replicate sampling for stream invertebrates at a subset of monitoring locations was completed to evaluate the degree of within-site variability in invertebrate community composition. The results of the replicate study are being published separately in a different report.

Twenty-five WQOM stations were sampled in 2020. This included fourteen established WQOM sites and eleven newly established sites. Sampling occurred in the Klondike River watershed (Adams Creek, Hunker Creek and All Gold Creek), Stewart River watershed (Clear Creek), and Yukon River North watershed (Swede Creek and Ok Creek). Sampling was conducted following protocols outlined in **Appendix A** (Detailed Sampling Methods) of *Yukon Placer Mining Industry Water Quality Objectives Monitoring Protocol*. The WQO were met at the majority of monitoring sites sampled as part of the 2020 WQOM program. Observed TSS concentrations in 20% of samples collected from the Klondike River watershed were higher than their respective WQO (in 8 of 41 samples). None of the observed TSS concentrations in samples collected in the Yukon River North watershed were higher than their respective WQO. The relationship between TSS and turbidity was generally consistent across all WQOM stations in 2020.

Sixteen AHM stations were sampled in 2020. This included eleven established AHM sites and five newly established sites. Sampling occurred in the Klondike River watershed (Hunker Creek and Adams Creek) and Yukon River North watershed (Swede Creek). Stream invertebrate sampling and the habitat assessment at each site followed the Canadian Aquatic Biomonitoring Network (CABIN) method and AHM Protocol. In-stream sediment samples were collected in 2020 to provide supporting information for the invertebrate community analysis and to evaluate potential invertebrate community responses to varying sediment conditions. A placer mining development assessment was also conducted to determine the degree of placer mining at each site. Invertebrate community metrics were calculated using the on-line CABIN tools. As part of the 2020 focal studies, an evaluation of the predictive value of local streambed conditions for explaining between-site variations in benthic invertebrate metrics was conducted. In addition, as part of more exploratory work conducted in 2020, Hemmera also evaluated the predictive value of stream discharge and turbidity for explaining between-site variations in benthic invertebrate metrics and the reproducibility of AHM data by comparing sites that were sampled in 2019 and 2020.

For Hunker Creek AHM sites, total abundance was lower in 2020 in comparison to 2019 whereas family richness was higher in 2020 than in 2019. Simpsons Diversity Index and Simpsons Evenness Index were generally higher in 2020 than in 2019. The relative abundance of chironomids (Order Diptera) was much higher in 2020 than 2019 for all Hunker Creek sites, apart from YPS-078 (the most upstream site). This coincided with a decrease in 2020 in percentage of ephemeroptera, plecoptera, and trichopteran (% EPT) at the majority of the sites sampled except for YPS-078, for which there was an increase of these taxa. No discernable trends were identified when evaluating the benthic invertebrate community metrics over a longer time frame for Hunker Creek AHM sites YPS-078 (most upstream) and YPS-544 (most downstream), based on data available from 2006 through 2020. Monitoring of the same ten sites on Hunker Creek in 2019 and 2020 provided insights about the comparability of data between subsequent years of monitoring. Based on the benthic invertebrate community metrics obtained based on CABIN wadable stream protocols, we observed a reasonable agreement in overall abundance estimates per kick-net sample between 2020 and 2019 for 8 of 10 sampling locations. There was little consistency from 2019 to 2020 in the other benthic invertebrate metrics for the ten Hunker Creek stations, including Family Richness, % EPT and percent chironomids (% C). There was no statistically significant relationship ($\alpha = 0.05$) across the ten Hunker Creek sites between the 2019 and 2020 data for these indicators. In addition, there were also no statistically significant relationships between the 2019 and 2020 results for measures of streambed substrate texture and chemistry, including total nitrogen, total organic carbon content, or percent fines (silts plus clays).

In Swede Creek, total abundance at the site showed an increasing trend from 2009 to 2020 at YPS-386. Family richness decreased from 2009 to 2016 and increased from 2016 to 2020. Simpsons Diversity Index values calculated for the site were generally high; however, the low Simpsons Evenness Index values suggest that there was a high degree of dominance by one or few types of organisms. Percent Chironomidae has decreased since 2009, whereas % EPT has increased since 2009. This shift is observed in percent ephemeroptera but not in plecoptera, which remained steady since 2009.

In Adams Creek, there was a general trend of increasing total abundance from downstream to upstream. Family richness followed a similar pattern apart from YPS-625 (second most upstream site, above current placer mining activity), which had the lowest family richness of all sites sampled on Adams Creek. All sites sampled had a low percentage of EPT individuals and unexpectedly, YPS-623, (the second most downstream site, below current placer mining activity) had the highest percentage of EPT. Chironomids were the dominant order in all samples collected on Adams Creek and made up over 55% of the community at each site. The high presence of chironomids combined with the low SEI values suggest that there is a high degree of dominance by one or a few organisms within this family.

For Hunker Creek in 2019, the abundance of benthic invertebrates significantly co-varied with the fines content of sediment samples (silt-clay fraction; <63 µm) collected concurrently with kick-net sampling (generally in depositional areas adjacent to the riffle substrate in the mainstream channel). No similar relationship was observed for the five Adams Creek stations sampled in 2020. The reason for positive co-variation between total abundance and percent fines content is unclear. The remaining benthic community metrics for the Hunker Creek 2019 and 2020 monitoring and Adams Creek 2020 monitoring including taxon richness, abundance, and percent composition of EPT, or abundance and percent composition of Chironomidae did not significantly co-vary with any quantitative measure of substrate quality, based either on the standard CABIN substrate characterization approaches or accessory sediment sampling and laboratory determinations of total organic carbon or grain size.

The streambed invertebrate community metrics across all Hunker Creek sites sampled in 2020 (abundance, richness, SDI, SEI, %EPT, % C) did not vary in relation to either stream discharge or the observed local turbidity. In contrast, total invertebrate abundance decreased significantly with increasing turbidity and increasing stream flow in Adams Creek. Percent EPT showed the opposite pattern: there was a statistically significant increase in % EPT with increasing turbidity and increasing stream flow in Adams Creek.

Consistent with the 2018 and 2019 AH monitoring findings, we cannot draw conclusions based on the 2020 studies as to whether sites are in reference condition or if stream reaches adjacent to or downstream from historical placer mining have improved over time. The current methodology does not yet assess in-stream conditions in a way that allows for evaluating a direct causal relationship between placer mining activity and aquatic health. To improve the AH monitoring, Hemmera recommends four modifications to the AH protocol that includes alteration of the in-situ sampling methodology, further refinement to descriptors used to capture the intensity of assessed placer mining activities, an investigation of the proliferation of certain Chironomidae taxa and other dipteran families, and the addition of periphyton sampling to the program.

This work was performed in accordance with C00055556 and C00058622 between Hemmera Envirochem Inc. (Hemmera), a wholly owned subsidiary of Ausenco Engineering Canada Inc. (Ausenco), and Yukon Energy Mines and Resources (Client), dated July 23, 2020 (C00055556) and March 9, 2021 (C00058622) (Contract). This report has been prepared by Hemmera, based on fieldwork conducted by Hemmera, for sole benefit and use by Yukon Energy Mines and Resources. In performing this work, Hemmera has relied in good faith on information provided by others, and has assumed that the information provided by those individuals is both complete and accurate. This work was performed to current industry standard practice for similar environmental work, within the relevant jurisdiction and same locale. The findings presented herein should be considered within the context of the scope of work and project terms of reference; further, the findings are time sensitive and are considered valid only at the time the report was produced. The conclusions and recommendations contained in this report are based upon the applicable guidelines, regulations, and legislation existing at the time the report was produced; any changes in the regulatory regime may alter the conclusions and/or recommendations.

This Executive Summary is not intended to be a stand-alone document, but a summary of findings as described in the following Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

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## APPENDICES

# LIST OF ACRONYMS AND ABBREVIATIONS

| Acronym / Abbreviation | Definition |
|---|---|
| AH | Aquatic Health |
| AHM | Aquatic Health Monitoring Program |
| AM / AMF | Adaptive Management / Adaptive Management Framework |
| C | Chironomidae |
| CMI | Compliance, Monitoring and Inspections |
| CABIN | Canadian Aquatic Biomonitoring Network |
| CSAS | Canadian Science Advisory Secretariat |
| DFO | Fisheries and Oceans Canada |
| E | Ephemeroptera |
| EC | Electrical Conductivity |
| EMR | Energy, Mines and Resources |
| EPT | Ephemeroptera, Plecoptera and Trichoptera |
| FHMS | Fish Habitat Management System |
| P | Plecoptera |
| RCA | Reference Condition Approach |
| SDI | Simpson's Diversity Index |
| SEI | Simpson's Evenness Index |
| T | Trichoptera |
| TSS | Total Suspended Solids |
| YG | Yukon Government |
| WQO | Water Quality Objective |
| WQOM | Water Quality Objective Monitoring |
| NTU | Nephelometric Turbidity Unit |

# LIST OF SYMBOLS AND UNITS OF MEASURE

| Symbol / Unit of Measure | Definition |
|---|---|
| °C | Degrees Celsius |
| mm | Millimeters |
| cm | Centimeters |
| m | Meters |
| mg/L | Milligrams per liter |
| m/s | Meters per second (unit of stream velocity) |
| $m^3/s$ | Cubic meters per second (unit of total stream flow, or discharge) |
| µS/cm | Micro-Siemens per centimeter (unit of electrical conductivity, EC). |

# 1.0 INTRODUCTION

The Government of Yukon and Department of Fisheries and Oceans Canada (**DFO**) jointly implemented in 2008 the "**Fish Habitat Management System for Yukon Placer Mining**" (**FHMS**). The FHMS is intended to achieve the appropriate statutory and desired protection and conservation of fish and fish habitat in balance with supporting a sustainable Yukon placer mining industry. The FHMS is the system for managing placer mining activities and is supported by the **Adaptive Management Framework** (**AMF**) which monitors the effectiveness of the FHMS and recommends on how it can be improved (AMF: YPAHWG 2010).

There are three environmental effects monitoring programs and associated protocols within the AMF, including the following: Water Quality Objectives Monitoring (**WQOM**); Aquatic Health Monitoring (**AHM**); and Economic Health.

Annual WQOM and AHM has been conducted since 2007. The FHMS covers the major portion of Yukon watersheds, comprising more than 60% of the spatial extent of the Yukon (Figure 1). These are the watersheds that are expected to have some potential for placer-based production of gold and include the vast majority of staked placer claims within the Yukon. WQOM and AHM are monitored in different watershed areas in different years, with a varying frequency and intensity of longer-term monitoring across different catchments.

Several reviews have been completed since 2018 to critically evaluate various aspects of the AMF. It has been concluded based on these reviews that the initial design and implementation of the AMF included many of the key components necessary for successful adaptive management. However, further work and adjustments have been recommended to improve the AMF. A component of these studies has been to evaluate the WQOM and AHM protocols to ensure that they are generating monitoring results which can be used in the AMF. Investigations into the data collection methods and interpretative approaches continued in 2020 and is discussed in this report.

## 1.1 AMF Overview/Purpose

The FHMS for Yukon Placer Mining is used to manage the effects of placer mining on fish and fish habitat. It is founded on principles of adaptive management and a risk-based approach to decision making. The FHMS specifies sets of operational and reclamation standards and requirements for placer mining based on watershed sensitivity and fish habitat suitability. These requirements are designed to support the FHMS in achieving its dual objectives of a sustainable Yukon placer mining industry alongside the conservation and protection of fish and fish habitat supporting fisheries (YPISC and YPWC 2005, YPS 2008a).

There is uncertainty about whether the FHMS will balance its two management objectives, or whether the system will shift towards one objective over the other. To monitor for and respond to this shift, Yukon government uses adaptive management. Three effects monitoring programs are used to evaluate the effectiveness of the FHMS: WQOM, AHM, and Economic Health Monitoring (**EHM**). The purposes of the WQOM and AHM programs are to assess if the WQO are being achieved and if aquatic ecosystem health is being maintained in streams exposed to placer mining. If water quality objectives and/or aquatic health goals are not being achieved, the data collected should ideally support an analysis about whether the results are due to placer mining activities or other causes. Whether the overall outcome of the monitoring program is acceptable or not depends on the observed conditions and decision rules prescribed in the Adaptive Management Framework (YPS 2008a).

This report focuses on the monitoring of water quality and aquatic health based especially on the 2020 program. The EHM report is found in the Adaptive Management Report for 2020 and includes information about how effective the FHMS is at providing the opportunity to maintain the viability of placer mining.

### 1.2 Scope and Objectives of the 2020 Monitoring Program and Relation to Water Quality Objective Monitoring and Aquatic Health Monitoring

The two monitoring programs are governed by their respective protocols, the **WQOM Protocol** and **AHM Protocol**. These protocols describe the objectives, sampling design, and methodology for each program.

The 2020 program prioritized sampling sites that were visited in 2019. WQOM and AHM were completed at the same monitoring locations in 2020. This is consistent with the AMF program execution when the protocols were first implemented (i.e., the AHM studies were conducted concurrently with WQOM studies). However, the aforementioned protocols for each of WQOM and AHM require follow-up monitoring at sites for which the monitoring provides evidence of potential adverse effects (for example, an observed TSS level that exceeds its respective WQOM) to further investigate the underlying cause(s) and ecological implications. Those sites for which there was evidence of potential adverse effects differed between WQOM and AHM and this resulted in follow-up monitoring at different sites for the two monitoring programs, and a progressively reduced alignment between the two monitoring programs in terms of watersheds and sites monitoring within a given year. The large amount of information that has been gathered on stream invertebrate community health since the inception of the program, therefore, is not consistently accompanied by parallel information on total suspended solids or other water quality data that may be indicative of placer mining activity in the same stream reaches and over the same observational period. In addition, a review of the reliance of interpretations from the AHM on the Canadian Biomonitoring Network (CABIN) Reference Condition Approach (RCA) was completed in 2018-19 by the Canadian Science Advisory Secretariat (CSAS). This review identified some limitations of the existing AHM protocol and provided some recommendations.

For the WQOM data collected from 2007 through 2020, key facets of water quality status and trends have been summarized in the draft report entitled *Fish Habitat Management System (FHMS) 14-Year Water Quality Monitoring Review* (Hemmera 2021). The WQOM are based largely on the monitoring of total suspended solids (TSS), in light of the potential influence on suspended and settled sediment loads from the managed placer mining activities.

In 2020, Hemmera was requested by Yukon Energy Mines and Resources (EMR) to assist with execution of the 2020 WQOM and AHM programs and further the interests of the Yukon government and DFO in evaluating the effectiveness of the AMF. Historically the monitoring has been completed directly by the Yukon government and DFO. The third-party support with the field sampling for the 2020 WQOM and AHM annual programs was catalyzed by several factors including severe limitations in field sampling capacity and logistics imposed by human safety requirements associated with the COVID-19 pandemic.

Just as the 2019 field season included specialized AHM studies to develop an appreciation of the degree of within-site versus between-site variation in stream invertebrate community composition, the AHM methodologies for the 2020 field season differed slightly from the established protocol, especially with regard to relative emphasis on evaluating conditions in reference areas in comparison with areas potentially influenced by placer mining, and greater alignment of the WQOM and AHM programs. In particular, the

2020 program provides a continuation of the work initiated by the Department of Fisheries and Oceans (DFO) in 2019 to achieve a better understanding of aquatic health in Yukon watercourses, and inform changes to the protocol. The 2020 AHM monitoring plan aims to understand invertebrate community response to different levels of disturbance, and to better characterize natural variability under reference conditions.

The 2020 monitoring was, nonetheless, completed in a manner that was generally consistent with previous monitoring efforts to ensure continuity with previous years of data.

The objectives of the 2020 AHM and WQOM programs were as follows:

- Conduct annual WQOM and reporting. Water quality sampling was changed slightly in 2020 with only grab samples collected and no automated, time-integrated sampling was conducted in 2020 (i.e., based on the deployment of ISCO compositing automated samplers).
- Continue focal studies that began in 2019 to inform AH protocol re-design. AHM in 2019 and 2020 did not use the CABIN stream invertebrate community multivariate analysis approach and associated Reference Condition Approach (which has previously been adapted to Yukon stream ecosystems) for the analyses, since several challenges were identified in the 2019 CSAS report. Instead, the analysis was descriptive and exploratory to try and understand invertebrate community response to different levels of disturbance and to characterize natural variability under reference conditions. The two focal studies conducted in 2019, that were continued in 2020 included:
    - Inclusion of replicate sampling for stream invertebrates at a subset of monitoring locations to evaluate the within-site variability in invertebrate community composition and metrics, and
    - An in-situ sediment analysis to attempt to determine the relationship between in-situ sediment characteristics and benthic invertebrate community metrics and correlation of sediment measurements to the degree of disturbance.

In addition, for the 2020 monitoring program, we evaluated different approaches for interpreting the overall environmental data obtained through WQO and AM monitoring, such as the estimation of TSS load carried by a water course (the product of the measured TSS concentration and instantaneous stream discharge) in reference reaches within headwater areas, in various tributary flows with or without active placer mining activity, and in mainstem flows downstream from active or recent placer operations in comparison to the estimated load immediately upstream. The 2020 monitoring locations included areas of interest to Tr'ondëk Hwëch'in, and, where possible, well-established monitoring sites.

Results of the in-situ sediment analysis are provided below in **Section 4.3.3** and **4.4.2**. However, the results of the replication study will be published in a separate report.

### 1.3 Unique Characteristics of the 2020 Monitoring Program in Light of COVID-19

The WQOM and AHM monitoring in 2020 faced a unique, unprecedented challenge: the COVID-19 pandemic. The pandemic introduced a set of challenges that most people around today have never dealt with. These challenges included no in-person meetings between Hemmera, DFO, TH and YG and additional health and safety guidelines (i.e. social distancing in enclosed areas, wearing masks etc.) to be followed during field work. To ensure communication between the three parties in the absence of not being able to meet in person, Hemmera, DFO and YG were able to meet and discuss details of the monitoring program over video formats such as Microsoft Teams, Webex or Zoom. The switch to video-based meeting format came with its own set of challenges (bad connections, different software requirements, etc.) however, it still allowed for individuals to meet each other, and to discuss project components in an open forum.

Enhanced health and safety guidelines were introduced as part of the field monitoring to ensure no spread of the virus to Yukon and specifically Dawson City. Hemmera developed a COVID-19 Field Procedures document for all field work in Canada that included:

- Background on the virus itself
- Local health authority guidance
- Pre-trip planning requirements for travel and client meetings
- Transportation considerations
- Guidance around accommodation
- Personal hygiene practices
- Cleaning and disinfection, and
- Personal protective equipment.

These protocols were especially important given the fact that one of the crew members in July, and both in September were from British Columbia, which had active COVID-19 cases at that time.

# 2.0 STUDY LOCATIONS

Maps outlining the study locations sampled for the 2020 AHM and WQOM monitoring were completed by Yukon government. These figures are appended at the end of the report.

For the combined 2020 WQOM and AHM monitoring program, three targeted study areas were selected based on accessibility, comparability to recent monitoring data (i.e., the 2019 AHM Study, ref) and areas of interest to the Tr'ondëk Hwëch'in:

**Study Area 1: Hunker Creek** is a watercourse in the Klondike River Watershed that is heavily influenced by placer mining activity, with an abundance of historical data and on-going active placer activity. The mouth of Hunker Creek discharges into the Klondike River Watershed. Several WQOM and AHM sites were selected as part of a targeted study (**Appendix A**) to continue data collection in the highly impacted creek and to follow-up on AHM work completed in 2019.

**Study Area 2: Adams Creek** is a tributary Bonanza Creek. Adams Creek has experienced very little placer mining, while downstream areas in Bonanza Creek have experienced heavy placer mining activity recently and around the period of the 2020 sampling events. Adams Creek and Bonanza Creek are a part of the larger Klondike River Watershed. Active mining in Adams Creek is concentrated in the lower reaches of Adams Creek, with relatively undisturbed areas in the upper reaches that are currently staked for further development. One existing site and several new sites were monitored (**Appendix A**) to assess existing and potential baseline conditions prior to further placer development in the watercourse. Adams Creek defines the southern boundary of settlement land parcel R-20A and is an area of interest to the Tr'ondëk Hwëch'in.

**Study Area 3: Swede Creek** is minimally influenced by placer mining activity, and is a tributary to the Yukon River, adjacent to Sunnydale subdivision, as well as an area of great interest to the Tr'ondëk Hwëch'in. One site at the mouth of the creek was monitored in 2020 (**Appendix A**) as the mouth of Swede Creek is an important habitat for Pacific salmon species, including Chinook salmon. An additional site nearby on OK Creek was also monitored due to ease of access and proximity to Swede Creek.

Additional opportunistic grab water samples were collected during the September 2020 WQOM monitoring event:

**All Gold Creek** is a heavily placer mined watercourse in the Klondike River Watershed. The Creek was explored at the end of the sampling campaign to scope a potential reference site in the upper reaches of the creek. Historical placer impacts were found to be extensive and locating an unimpacted reference site was unsuccessful due to difficult access in the upper reaches and extent of historical placer activity. Two exploratory samples were collected during reconnaissance of Goldbottom Creek (**Appendix A**): (1) one sample in a minimally impacted area above active mining, and (2) one sample at the mouth of creek immediately downstream of all historical and active placer operations.

**Clear Creek** was sampled due concern from locals who observed turbid conditions area at the time of the September 2020 sampling campaign; one sample was collected to investigate if TSS levels were above the WQO (**Appendix A**).

# 3.0 WATER QUALITY OBJECTIVE MONITORING

## 3.1 Introduction

### 3.1.1 Background and Purpose

The purpose of the WQO monitoring program is to assess if the WQO are being achieved, and if not, whether exceedances of the WQO are due to placer mining activities or other causes (YPS 2008a, b). The WQO performance measure is total suspended solids concentration (TSS in mg/L). The WQO are established for Yukon streams based on watershed sensitivity to placer mining activity and fish habitat suitability of a stream. Streams in more sensitive watersheds or with a higher fish habitat suitability classification have more stringent WQO: lower concentrations of TSS are tolerated within these watercourses. Streams in less sensitive watersheds or with a lower fish habitat suitability classification have less stringent WQO, and a higher TSS concentration threshold is established for these watercourse. The WQO for a specific stream and larger watershed are found in the placer mining Watershed Authorizations[1] and can also be viewed on Government of Yukon's digital map GeoYukon[2].

Monitoring through stream sample collection and analysis supports a determination about whether the observed TSS is below or above the WQO. Whether the results of the monitoring program are acceptable or not within the context of adaptive management depends on the conditions that are observed and the criteria for decision making:

- Any failure to achieve the WQO in highly sensitive habitat or habitat of moderate-high sensitivity is generally considered to be unacceptable.
- The expected significance of a failure to achieve WQO in other habitat classes will depend upon the frequency and magnitude of the failure.
- TSS results attributable to lasting natural occurrences are not considered to be an unacceptable outcome.
- Results attributable to non-compliance at placer mining operations will be dealt with as an enforcement issue and not adaptive management issues.

These different criteria are applied to the 2020 AQOM data in the results and discussion section below. The Water Quality Objective Monitoring Protocol guides sampling design for the annual monitoring program, including locations, timing, frequency, and methods employed (YPS 2008).

## 3.2 Methodology

Twenty-five WQOM stations were sampled in 2020 (**Table 3.1**), including 14 established WQOM sites and an additional 11 new sites. Five new sites from Adams Creek were selected as combined WQOM and AHM monitoring sites; however, most historical sites are designated as either a WQOM sites or AHM as these have typically been separate monitoring programs. An additional 10 AHM sites were sampled for TSS during the 2020 monitoring program on Hunker Creek as TSS is within the water quality analysis suite for the AHM program.

1 Available online: https://yukon.ca/en/doing-business/licensing/find-watershed-authorization-placer-mining
2 Available online: https://mapservices.gov.yk.ca/GeoYukon/

The WQOM sites were sampled from July 28th to 30th in conjunction with the AHM sampling program and sampled again in the period from September 22nd to 25th to capture low-flow conditions. Additional exploratory and/or opportunistic samples were collected during the September 2020 sampling campaign to explore areas which may serve as potential reference sites for continued monitoring (e.g., KL_HU10) or could provide additional information on sediment imports for streams and watersheds sampled during the 2020 monitoring program (e.g., opportunistic sample collected on Stampede Creek prior to confluence of Adams Creek to investigate potential sediment inputs from Stampede Creek to Adams Creek).

**Table 3.1 Water Quality Objective Monitoring Stations**

| Watershed | Study Area | WQOM Site ID | AHM Site ID | Watercourse | Site Description | Site Type | Habitat Classification | Site Status |
|---|---|---|---|---|---|---|---|---|
| Klondike River | Adams Creek and Tributaries | KL_BO_AD01 | YPS-622 | Adams Creek | Adams Creek mouth | Test | Low | New |
| | | KL_BO_AD02 | YPS-623 | Adams Creek | Adams Creek downstream placer settling pond (PM18-006) | Test | Low | New |
| | | KL_BO_AD03 | YPS-624 | Adams Creek | Adams Creek upstream placer operation (PM10-051) | Test | Low | New |
| | | KL_BO_AD04 | YPS-625 | Adams Creek | Adams Creek downstream Stampede Gulch | Test | Low | New |
| | | KL_BO_AD05 | YPS-626 | Adams Creek | Adams Creek upstream Hawley Gulch | Potential Ref. | Low | New |
| | | KL_BO_AD06 | - | Adams Creek | Adams Creek above all mining | Potential Ref. | Low | New |
| | | KL_BO_AD_SG01 | - | Stampede Gulch | Stampede Gulch near confluence with Adams Creek | Undefined | Low | New |
| | All Gold Creek | KL_AL01 | - | All Gold Creek | All Gold Creek below all mining | Test | Moderate-Low | Established |
| | | KL_AL02 | - | All Gold Creek | All Gold Creek above most mining | Test | Low | New |
| | Hunker Creek and Tributaries | KL_HU01 | - | Hunker Creek | Hunker Creek below all mining | Test | Moderate-Low | Established |
| | | KL_HU02 | - | Hunker Creek | Hunker Creek downstream of Hawley Gulch | Test | Moderate-Low | Established |
| | | KL_HU03 | - | Hunker Creek | Hunker Creek downstream of Last Chance Creek | Test | Low | Established |
| | | KL_HU_KM10 | - | Hunker Creek | Hunker Creek at KM10 | Test | Low | Established |
| | | KL_HU04 | - | Hunker Creek | Hunker Creek upstream of Last Chance Creek | Test | Low | Established |
| | | KL_HU05 | - | Hunker Creek | Hunker Creek downstream of Goldbottom Creek | Test | Low | Established |
| | | KL_HU_GO01 | - | Goldbottom Creek | Goldbottom Creek mouth | Test | Low | Established |
| | | KL_HU06 | - | Hunker Creek | Hunker Creek upstream of Goldbottom Creek | Test | Low | Established |
| | | KL_HU_KM20 | - | Hunker Creek | Hunker Creek at KM20 | Test | Low | Established |
| | | KL_HU07 | - | Hunker Creek | Hunker Creek above all mining left fork | Test | Low | Established |
| | | KL_HU08 | - | Hunker Creek | Hunker Creek right fork | Test | Low | Established |
| | | KL_HU09 | - | Hunker Creek | Hunker Creek above all mining and downstream of right and left fork | Potential Ref. | Established | Established |
| | | KL_HU10 | - | Hunker Creek | Hunker Creek above all mining (upstream right fork) | Potential Ref. | Low | New |
| Stewart River | Clear Creek | YN_CLE02 | - | Clear Creek | Clear Creek upstream highway bridge | Test | Moderate-High | Established |
| Yukon River North | Swede Creek and Ok Creek | YN_OK01 | - | OK Creek | OK Creek mouth | Test | Moderate-High | Established |
| | | YN_SW01 | YPS-386 | Swede Creek | Swede Creek mouth | Test | Area of special consideration | Established |

### 3.2.1 Field Methods

At each WQO monitoring station, in-situ field measurements (temperature, pH, specific conductivity, dissolved oxygen, turbidity) were collected, and a water sample was obtained. Field forms and notes are provided in **Appendix B**. In-situ field measurements and water samples were collected at all WQO monitoring sites visited in 2020. All sites were sampled for laboratory measured TSS, and settable solids. Representative photos were taken at each site and are provided in **Appendix C**.

Stream water samples were collected using sampling methods outlined in Appendix A (Detailed Sampling Methods) of *Yukon Placer Mining Industry Water Quality Objectives Monitoring Protocol* (Yukon Placer Water Quality Working Group, 2016 *draft*). Water samples were collected using a grab sample method by either wading into the stream or river, or sampling from the stream bank when stream channels were very narrow. Sample collection followed the following key techniques, outlined in detail in Appendix A of *Yukon Placer Mining Industry Water Quality Objectives Monitoring Protocol* (Yukon Placer Water Quality Working Group, 2016):

- Whenever safe and practical, samples were be collected at mid-point (thalweg area) rather than nearshore areas or side-channels, typically by wading into the centre of the stream. When streams were unsafe to enter or very narrow (narrow enough to reach across safely to midpoint from stream bank), samples were collected from the shore.
- Samples were collected in a location where water was flowing freely and free of floating debris.
- When wading into the stream, the technician entered the stream downstream from the monitoring location, then waded upstream to the collection point and waited for any re-suspended sediment to be carried away prior to sampling.
- To collect the sample, a pre-cleaned sample bottle was plunged beneath the stream surface with the opening facing down, and immediately oriented upstream to allow the current to fill the bottle. Care was taken to avoid collecting scum and film.
- Once the bottle was full, it was removed it from the water by forcing it forward (into the current) and upwards, and immediately capped.

Samples collected for analysis of TSS were collected in 1L pre-cleaned Nalgene bottles, stored in coolers, and submitted to the CMI laboratory for TSS analysis within three (3) days of collection.

In-situ field measurements were collected using a YSI PRO Plus multimeter by submerging the meter and waiting for readings to stabilize prior to recording. Field turbidity measurements were collected by using a portable HACH Turbidity Meter instrument that was routinely calibrated.

Stream flow measurements were collected using a hand-held water velocity meter after sample collection (not prior as to risk disturbing stream bed sediments), following methods outlined in Appendix B (Flow Measurements) of the *Yukon Placer Mining Industry Water Quality Objectives Monitoring Protocol* (Yukon Placer Water Quality Working Group, 2016):

- The bankful width was measured using measuring tape secured across the length of the stream, and the stream was divided into five (5) segments;
- Water depth and flow was measured at each segment;

- The flow measurement was obtained by repeatedly raising, lowering and sweeping the head of the flow velocity meter up and down, side to side in the water column, for at least one minute, allowing the on-board computer to make multiple velocity measurements and compile an average.

Flow measurements of each segment were used to calculate total discharge at each monitoring site, where:

$$V = average\ velocity\ measurement$$
$$W = width\ of\ segment$$
$$D = depth\ of\ segment$$
$$Station\ discharge\ (Q_{segment}) = V \times W \times D$$
$$Total\ discharge\ (Q_T) = Q_{segment\ A} + Q_{segment\ B} + Q_{segment\ C} + Q_{segment\ D} + Q_{segment\ E}$$

### 3.2.2 Laboratory Methods

Sediment load (TSS) analysis was conducted by the CMI Water Lab following the standard operating procedure outlined in Standard Methods – For the Examination of Water and Wastewater (APHA 2012). In summary, (i) a 250 mL aliquot was extracted from the homogenized sample bottle and filtered using a pre-weighted 55 mm diameter 934-AH glass microfiber filter, (ii) the filter was dried in an oven for 4 hours at 103-105 ° and moved to a desiccator to balance temperature before weighting, (iii) the final weights of the filter were weighed to four decimal precision (in grams) to determine the filtered sediment load and to calculate TSS in mg/L where TSS = [sediment mass in grams/sample volume in mL].

## 3.3 Monitoring Results

### 3.3.1 Total Suspended Solids

The purpose of the WQO monitoring program is to assess if the WQO are being achieved**,** where the WQO performance measure is the total suspended solids concentration (TSS in mg/L), and also to determine if observed exceedances of the WQO are due to placer mining activities or other causes. The TSS results for the three targeted studies (Hunker Creek, Adams Creek and Swede Creek), and additional exploratory/opportunistic samples (Clear Creek, All Gold Creek) are summarized below with respect to site habitat suitability classification.

#### Hunker Creek

Monitoring in 2020 on Hunker Creek included twelve WQOM stations from the mouth to the upper reaches, and one station at the mouth of the Goldbottom Creek tributary (KL_HU_GO01) (**Figure 1**). **Table 3.2** presents TSS results in order from the most northerly station at the mouth of Hunker Creek (KL_HU01), upstream to the stations above active mining operations in the southern reaches (KL_HU10).

The majority of Hunker Creek is classified as low habitat suitability, with the exception of two stations located near the mouth of the creek prior to confluence with the Klondike River that are classified as Moderate-Low habitat suitability sites: KL_HU01 and KL_HU02. The TSS levels for KL_HU01 and KL_HU02 were observed to be in the range from 90.8 to 204.4 mg/L and were consistently higher than the WQO of 80 mg/L for both the July and September monitoring events. The 2020 results are comparable to 2019 results, with TSS ranging from 2.7 to 19.4 mg/L at station KL_HU01 in 2019 (KL_HU02 was not sampled in 2019). Higher frequency sampling was conducted in 2019 from June 19th to September 24th, with three of 113 samples exceeding the WQO between July 17th and July 19th.

## Table 3.2 Hunker Creek 2020 TSS Monitoring Results

| Site ID | Habitat Classification | WQO (TSS in mg/L) | Sample Date | Measured TSS (mg/L) | Above or Below WQO? |
|---|---|---|---|---|---|
| **WQOM Sites** | | | | | |
| KL_HU01 | Moderate-Low | 80 | 28-Jul-20 | 204.4 | *Above* |
| | | | 24-Sep-20 | 90.8 | *Above* |
| KL_HU02 | Moderate-Low | 80 | 28-Jul-20 | 194.4 | *Above* |
| | | | 24-Sep-20 | 91.2 | *Above* |
| KL_HU03 | Low | 200 | 28-Jul-20 | 193.2 | Below |
| | | | 24-Sep-20 | 48.4 | Below |
| KL_HU_KM10 | Low | 200 | 28-Jul-20 | 349.6 | *Above* |
| | | | 24-Sep-20 | 24.4 | Below |
| KL_HU04 | Low | 200 | 28-Jul-20 | 240.4 | *Above* |
| | | | 24-Sep-20 | 53.6 | Below |
| KL_HU05 | Low | 200 | 29-Jul-20 | 21.6 | Below |
| | | | 24-Sep-20 | 20.8 | Below |
| KL_HU_GO01 | Low | 200 | 29-Jul-20 | 5.2 | Below |
| | | | 24-Sep-20 | 18.8 | Below |
| KL_HU06 | Low | 200 | 29-Jul-20 | 28.4 | Below |
| | | | 24-Sep-20 | 27.2 | Below |
| KL_HU_KM20 | Low | 200 | 29-Jul-20 | 16.8 | Below |
| | | | 24-Sep-20 | 35.6 | Below |
| KL_HU07 | Low | 200 | 29-Jul-20 | 3.6 | Below |
| | | | 24-Sep-20 | 2.0 | Below |
| KL_HU08 | Low | 200 | 29-Jul-20 | 3.2 | Below |
| | | | 24-Sep-20 | 2.8 | Below |
| KL_HU09 | Low | 200 | 29-Jul-20 | 13.6 | Below |
| | | | 24-Sep-20 | 1.2 | Below |
| KL_HU10 | Low | 200 | 24-Sep-20 | 0.8 | Below |
| **AHM Sites** | | | | | |
| YPS-051 | Low<br>Low | 200 | 28-Jul-20 | 230.4 | *Above* |
| | | | 24-Sep-20 | 34.0 | Below |
| YPS-078 | Low | 200 | 29-Jul-20 | 3.6 | Below |
| | | | 24-Sep-20 | 1.2 | Below |
| YPS-079 | Low | 200 | 29-Jul-20 | 37.6 | Below |
| | | | 24-Sep-20 | 26.8 | Below |
| YPS-080 | Low | 200 | 29-Jul-20 | 36.0 | Below |

| Site ID | Habitat Classification | WQO (TSS in mg/L) | Sample Date | Measured TSS (mg/L) | Above or Below WQO? |
|---|---|---|---|---|---|
| YPS-544 | Moderate-Low | 80 | 28-Jul-20 | 229.6 | *Above* |
| YPS-611 | Low | 200 | 29-Jul-20 | 44.4 | Below |
| YPS-612 | Low | 200 | 28-Jul-20 | 92.8 | Below |
| YPS-613 | Low | 200 | 28-Jul-20 | 92.4 | Below |
| YPS-614 | Moderate-Moderate | 50 | 28-Jul-20 | 313.6 | *Above* |
| | | | 24-Sep-20 | 27.6 | Below |
| YPS-621 | Low | 200 | 29-Jul-20 | 85.2 | Below |

Stations in low habitat suitability area typically are below the WQO of 200 mg/L, however two samples collected in July 2020 had TSS concentrations that were higher than the WQO (350 mg/L TSS at KL_HU_KM10, and 240 mg/L at KL_HU04). In 2019, TSS ranged from 9.6 to 1075 mg/L at KL_HU04 with 3 of 93 samples exceeding the WQO, and TSS ranged from 5.6 to 396 mg/L at station KL_HU_KM10 with 2 of 110 samples exceeding the WQO. Relative to 2020, for which TSS WQO exceedances were observed only in July, TSS WQO exceedances were observed at KL_HU_KM10 and KL_HU04 in mid-July, mid-August and early-September in 2019 (**Appendix D**).

Long-terms trends in Hunker Creek are summarized in the Fish Habitat Management System (FHMS) 14-Year Water Quality Monitoring Review (Hemmera, 2021) which summarizes similar findings to the 2019 and 2020 program, where the highest TSS exceedances are observed in the lower reaches in the stream, especially at stations with the more stringent WQO for the Moderate-Low habitat suitability class. Similarly, occasional WQO exceedances (<30% samples) are observed in the low habitat suitability classes since 2008.

Placer disturbance (historical and active) is evident from the mouth of Hunker Creek to at least KM20 on the access road (i.e., KL_HU_KM). Stretches of the creek have clearly been reworked and rerouted, and in some sections evidence of operations (equipment, activity such as moving material or sluicing) is visible from the road. TSS levels are generally lower at stations in the upper sections of the creek above the bulk of placer disturbance, in range from 0.8 to 13.6 mg/L in 2020. It is not clear, however, if the lower suspended sediment loads observed at these stations is due to decreased placer activity or simply due to their locations being in the upper reaches where sediment inputs from tributaries may be lower.

A new potential reference station was established for Hunker Creek during the September 2020 sampling event (Station KL_HU10). Field staff drove up the Hunker Creek right fork to the end of the access road (near station KL_HU08) and hiked for approximately 600 m to locate a potential reference station. The area selected appeared unimpacted by anthropogenic activity with the exception of a footpath adjacent to the creek and placer stakes along the footpath. Not surprisingly, the upper reaches of Hunker were observed to occupy narrow steam channel with visibly lower flow discharge relative to the downstream reaches, where the channel is wide with considerable flow and relatively higher sediment inputs from feeding tributaries. Thus, comparison of TSS in the reference station in the narrow channel in the upper reaches and the larger channel lower in the valley will need to consider the variable stream characteristics before attributing TSS levels to placer or other anthropogenic influence.

Additional TSS water samples were collected along Hunker Creek at AHM monitoring stations during the 2020 monitoring program to support interpretation of AHM data interpretation and analysis. The TSS for samples collected at the additional AHM sites are presented in **Table 3.2** with the habitat suitability classes for the given stream reach. Of the 17 TSS samples collected on Hunker Creek for the AHM program, 3 samples had a TSS concentration that was greater than the WQO. The exceedances at YPS-051 and YPS-544 are consistent with the exceedances and TSS concentrations at nearby stations KL_HU_KM10 and KL_HU01, respectively. There is no WQOM station near AHM station YPS-61, which is located in an area classified as Moderate High habitat suitability. The TSS concentration in the water sample collected on July 28th was 314 mg/L, relative to the WQO of 50 mg/L for the stream reach.

The TSS concentrations were an order of magnitude higher for the July sampling event relative to results from the September sampling event for all WQOM (and AHM) stations downstream from Goldbottom Creek. Stations upstream from Goldbottom Creek typically exhibited TSS concentrations for the two sampling events that were similar.

**Adams Creek**

One established WQOM station (KL_BO_AD01) and five new stations were sampled in conjunction with the 2020 AHM program on July 30th, 2020. All five stations were sampled again on September 23rd, 2020. An additional station (KL_BO_AD06), farther upstream, was investigated in September, and sampled as an additional reference station for Adams Creek above all anthropogenic influence.

Two placer operations are currently active on Adams Creek, one near the mouth and another approximately 1 km upstream. The established WQOM station KL_BO_AD01 is located downstream at the mouth of Adams Creek, and the new KL_BO_AD02 station was established immediately downstream from the operation's settling pond. Continuing upstream, additional sites were established and sampled as follows:

- KL_BO_AD03: located immediately upstream from the active mining operations
- KL_BO_AD04: upstream above all active mining in an area with remnants of historical placer workings
- KL_BO_AD_SG01: one opportunistic sample was collected from the mouth of Stampede Gulch immediately prior to confluence with Adams Creek to investigate potential sediment inputs from Stampede Gulch to Adams creek
- KL_BO_AD05: upstream of all active placer and historical mining, upstream of Stampede Gulch
- KL_BO_AD06: upstream of all active placer and historical mining (approx. 1 km upstream of KL_BO_AD05)

During the September 23, 2020 field work on Adams Creek, sampling and observations were completed at the five stations working upstream, starting in the morning. The morning samples were completed prior to any evident active placer operations for that day. When returning downstream to depart from Adams Creek, we noticed a marked increase in turbidity at the two stations downstream from operations that had become active following the morning observations. A second set of water samples was, therefore, collected at these two stations to better capture the change in TSS before and after the commencement of placer operations for the day (**Table 3.3**). TSS levels in the morning were well below the 200 mg/L WQO (15.2 and 10 mg/L at stations KL_AD01 and KL_AD02). TSS in the samples collected in the afternoon were above the WQO and ranged from 725-728 mg/L. Future programs should consider sampling during a typical work-day window (10 am to 4 pm) to have a better chance at capturing conditions while placer operations are active. Alternatively, an automated ISCO sampler could be installed to collect samples multiple times a day to better inform variability at the mouth of Adams Creek.

With the exception of the two samples discussed above, TSS levels in Adams Creek were very low at the time of sampling (morning of September 23rd) and ranged from 0.4 to 15.2 mg/L. TSS concentrations observed at potential reference sites above active and historical monitoring ranged from 0.8 to 4.4 mg/L. Results from the sample collected from the mouth of Stampede Gulch reported 0.4 mg/L TSS, demonstrating minimal sediment inputs from Stampede Gulch to Adams Creek.

There was no discernible seasonal difference in TSS concentrations in samples from Adams Creek collected in July or September of 2020.

**Table 3.3 Adams Creek Study TSS Results**

| Site ID | Habitat Classification | WQO (TSS in mg/L) | Sample Date | Measured TSS (mg/L) | Above or Below WQO? |
|---|---|---|---|---|---|
| KL_BO_AD_SG01 | Low | 200 | 23-Sep-20 | 0.8 | Below |
| KL_BO_AD01 | Low | 200 | 30-Jul-20 | 13.6 | Below |
| | | | 23-Sep-20 **(AM)*** | 15.2 | Below |
| | | | 23-Sep-20 **(PM)*** | 725 | Above |
| KL_BO_AD02 | Low | 200 | 30-Jul-20 | 9.6 | Below |
| | | | 23-Sep-20 **(AM)*** | 10 | Below |
| | | | 23-Sep-20 **(PM)*** | 728 | Above |
| KL_BO_AD03 | Low | 200 | 30-Jul-20 | 2.8 | Below |
| | | | 23-Sep-20 | 2.4 | Below |
| KL_BO_AD04 | Low | 200 | 30-Jul-20 | 2.8 | Below |
| | | | 23-Sep-20 | 0.4 | Below |
| KL_BO_AD05 | Low | 200 | 30-Jul-20 | 2 | Below |
| | | | 23-Sep-20 | 4.4 | Below |
| KL_BO_AD06 | Low | 200 | 23-Sep-20 | 0.8 | Below |

*Samples collected prior to placer operations in the morning, and again following commencement of placer operations in the afternoon.

### Swede Creek and other Creeks in the Yukon River North Watershed

Swede Creek is a watercourse in the Yukon River (North) watershed with multiple placer claims slated for potential future placer development on the watercourse. Swede Creek was deemed to be minimally influenced by past and current placer mining activity, however. One site (YPS-386) was sampled 300 m upstream from AQOM station (YN-SW01) at the mouth of the creek in 2020. The mouth of Swede Creek is an important habitat for Pacific salmon species (i.e., Chinook salmon) and the habitat suitability classification for this site is an *area of special consideration* with the most stringent water quality objective of the YG specified habitat classes (25 mg/L).

The measured TSS concentration near the mouth of Swede Creek (**Table 3.4**) was very low for both of the July (2.0 mg/L) and September (1.6 mg/L) monitoring events. Suspended solids in Swede Creek are well below the WQO and do not appear to pose a risk to fish habitat.

Additional samples were collected opportunistically at OK Creek on the way to sampling Swede Creek, as the site is a Moderate-High suitability class and a potential fish habitat. TSS results were well below the 25 mg/L WQO: 6.0 mg/L (July) and 5.6 mg/L (September).

### Table 3.4 Yukon River North Watershed TSS Results (Swede Creek and OK Creek)

| Site ID | Watercourse | Habitat Classification | WQO (TSS in mg/L) | Sample Date | Measured TSS (mg/L) | Above or Below WQO? |
|---|---|---|---|---|---|---|
| YN_SW01 | Swede Creek | Area of special consideration | 25 | 30-Jul-20 | 2.0 | Below |
| | | | | 23-Sep-20 | 1.6 | Below |
| YN_OK01 | OK Creek | Area of special consideration | 25 | 30-Jul-20 | 6.0 | Below |
| | | | | 23-Sep-20 | 5.6 | Below |

**Clear Creek**

While mobilizing for the September field program, CMI was notified of concerns from locals who had noted a recent increase in turbidity in Clear Creek (within the Stewart River Watershed). We collected a sample on the way to the planned study sites at an established WQOM on Clear Creek upstream from a bridge crossing (ST_CL02). The measured TSS concentration in a grab sample from ST_CL02 in Clear Creek, with a Moderate-Moderate habitat suitability classification, was lower than the WQO of 50 mg/L: the TSS concentration in the water sample collected on September 23$^{rd}$ was 30.4 mg/L (**Table 3.5**).

### Table 3.5 Clear Creek TSS Results

| Site ID | Watercourse | Habitat Classification | WQO (TSS in mg/L) | Sample Date | Measured TSS (mg/L) | Above or Below WQO? |
|---|---|---|---|---|---|---|
| ST_CL02 | Clear Creek | Moderate-Moderate | 50 | 22-Sep-20 | 30.4 | Below |

**All Gold Creek**

All Gold Creek watercourse in the Klondike River Watershed is an intensively placer mined. All Gold Creek was explored at the end of the sampling campaign to locate a potential reference site in the upper reaches of the creek. Historical placer impacts were found to be extensive and locating an unimpacted reference site was not feasible due to difficult access in the upper reaches and extent of historical placer activity.

Although the search for an ideal reference site was unsuccessful, two exploratory samples were collected during reconnaissance of Goldbottom Creek on September 24th:

- KL_AL01: mouth of All Gold Creek downstream from placer operations in a heavily reworked zone.
- KL_AL02: new site selected immediately upstream from Lucky Creek and placer infrastructure (possibly an historical placer operations), as far as access would allow with a small truck. The placer operation downstream from Lucky Creek appeared to be inactive; however, we are unsure about the extent of historical or active placer activity upstream of the station.

TSS results in All Gold Creek were relatively low (2.8-6.8 mg/L) and similar at the station upstream of activity and at the station downstream from all placer operations (**Table 3.6**).

**Table 3.6 All Gold Creek TSS Results**

| Site ID | Watercourse | Habitat Classification | WQO (TSS in mg/L) | Sample Date | Measured TSS (mg/L) | Above or Below WQO? |
|---|---|---|---|---|---|---|
| KL_AL01 | All Gold Creek | Moderate-Low | 80 | 25-Sep-20 | 6.8 | Below |
| Kl_AL02 | All Gold Creek | Low | 200 | 25-Sep-20 | 2.8 | Below |

### 3.3.2 Quality Assurance and Quality Control

Five duplicate samples were collected and measured for quality-assurance and quality-control. The methodology for TSS measurement is very simple and not prone to error; however, a small subset of duplicates was selected to demonstrate reproducibility of the data and sample heterogeneity.

The relative percent difference (RPD) for duplicate-sample pairs ranged from 6% to 67%. An RPD of less than 10% was observed for any sample with a TSS concentration greater than 50 mg/L. Some sample heterogeneity is to be expected due to the nature of sample collection, and TSS results should be considered to have a margin of error of approximately ± 7 mg/L based on the maximum difference for the results of the five duplicate-sample pairs (**Table 3.7**).

**Table 3.7 Duplicate Sample Results (TSS in mg/L)**

| Site ID: | YN_SW01 | KL_HU03 | KL_AL01 | KL_BO_AD02 | YPS-621 |
|---|---|---|---|---|---|
| Sample TSS (mg/L) | 0.8 | 51.6 | 5.6 | 13.6 | 85.2 |
| Duplicate TSS (mg/L) | 1.6 | 48.4 | 6.8 | 9.6 | 92.4 |
| *RPD* | *67%* | *6%* | *19%* | *34%* | *8%* |

## 3.4 Discussion

### 3.4.1 Are Water Quality Objectives Being Achieved?

The WQO were being achieved at the majority of monitoring sites sampled as part of the 2020 WQOM program. Observed TSS concentrations in 20% of samples collected from the Klondike River watershed were higher than their respective WQO (in 8 of 41 samples) (**Table 3.8**). None of the observed TSS concentrations in samples collected in the Yukon River North watershed were higher than their respective WQO (**Table 3.8**).

Exceedances in the Klondike watershed were measured in samples collected at the mouth of the Hunker Creek in a Moderate-Low habitat suitability zone, and the two opportunistic samples collected at the mouth of Adams Creek at a time of day after initiation of placer operations, which resulted in a visible increase in turbidity in the creek (Low habitat suitability). The TSS concentration was lower than the WQO when samples were collected the same morning prior to operations starting for the day (**Table 3.8**). Long-term trends in the Klondike River watershed areas are presented in the Fish Habitat Management System (FHMS) 14-Year Water Quality Monitoring Review (Hemmera, 2021 draft).

In the Yukon River North watershed, no exceedance of WQO criteria were observed in Clear Creek during the September 22nd sampling event following requests from locals to check water-quality in the visibly turbid stream; Clear Creek is classified as a Moderate-High habitat suitability. All samples collected in Swede Creek (high habitat suitability) and OK Creek (Moderate-High habitat suitability) were below their respective WQO (**Table 3.9**).

Overall, 17% of samples collected during the 2020 WQOM program exceeded TSS criteria, particularly in areas with higher suitability classes and thus lower acceptable TSS levels (**Table 3.10**).

### Table 3.8 Klondike Watershed WQOM Results Summary

| | All Gold Creek | Adams Creek | Gold-bottom Creek | Hunker Creek | Stampede Gulch | Entire Watershed |
|---|---|---|---|---|---|---|
| **n stations** | 2 | 6 | 1 | 12 | 1 | 22 |
| **n samples** | 2 | 13 | 2 | 23 | 1 | 41 |
| **min TSS (mg/L)** | 2.8 | 0.4 | 5.2 | 0.8 | 0.8 | 10.0 |
| **max TSS (mg/L)** | 6.8 | 728 | 18.8 | 350 | 0.0 | 1100 |
| **WQO (TSS in mg/L)** | 80 - 200 | 200 | 200 | 50 - 200 | 200 | 50 - 200 |
| **n WQO Exceedances** | 0 | 2 | 0 | 6 | 0 | 8 |
| **% Exceeding** | *0%* | *15%* | *0%* | *26%* | *0%* | *20%* |

### Table 3.9 Yukon River North Watershed WQOM Results Summary

| | OK Creek | Swede Creek | Entire Watershed |
|---|---|---|---|
| **n stations** | 1 | 1 | 3 |
| **n samples** | 2 | 2 | 5 |
| **min TSS (mg/L)** | 5.6 | 1.6 | 37.6 |
| **max TSS (mg/L)** | 6 | 2 | 38.4 |
| **WQO (TSS in mg/L)** | 25 | 25 | 25 |
| **n WQO exceedances** | 0 | 0 | 0 |
| **% Exceeding** | 0% | 0% | 0% |

### Table 3.10 WQOM Results Summary by Habitat Suitability Class

| Habitat Suitability: | Low | Moderate-Low | Moderate-Moderate | Moderate -High | Area of Special Consideration | Entire 2020 Program |
|---|---|---|---|---|---|---|
| **n stations** | 19 | 3 | 1 | 2 | 1 | 25 |
| **n samples** | 36 | 5 | 1 | 2 | 2 | 46 |
| **min TSS (mg/L)** | 0.4 | 6.8 | 30.4 | 5.6 | 1.6 | 14.4 |
| **max TSS (mg/L)** | 728 | 204 | 30.4 | 30.4 | 2.0 | 965 |
| **# WQO exceedances** | 4 | 4 | 0 | 1 | 0 | 8 |
| **% Exceeding** | 11% | 80% | 0% | 50% | 0% | 17% |

### 3.4.2 Turbidity-TSS Relationships

Turbidity is routinely used as a surrogate measure of TSS since it can be measured in the field in real-time using an appropriately calibrated hand-held or fixed position turbidity meter. The use of turbidity for water quality monitoring, however, requires an understanding of the quantitative relationship between TSS and turbidity, which can vary across water courses and seasons to the extent that the suspended sediment composition reflect different proportions of particle types such as organic detritus versus coarser aluminosilicate sands versus finer textured silts and clay. To evaluate the utility of real-time discrete and near continuous turbidity measurements for advancing the objectives of the WQOM, turbidity and TSS relationships were examined for the 2020 monitoring in the Klondike River Watershed, with a focus on Hunker Creek and Adams Creek. Turbidity in the Yukon River North watershed (OK Creek and Swede Creek) were generally below detection of the portable field meter and therefore not included in the comparison.

The slope of the log-log linear regression relationship between TSS and turbidity for Hunker Creek stations was the same for the July and September sampling periods (**Figure 3.1** and **Figure 3.2**). The intercept was slightly different between the two sampling periods, reflective of a higher TSS for a given turbidity measurement in July than September.

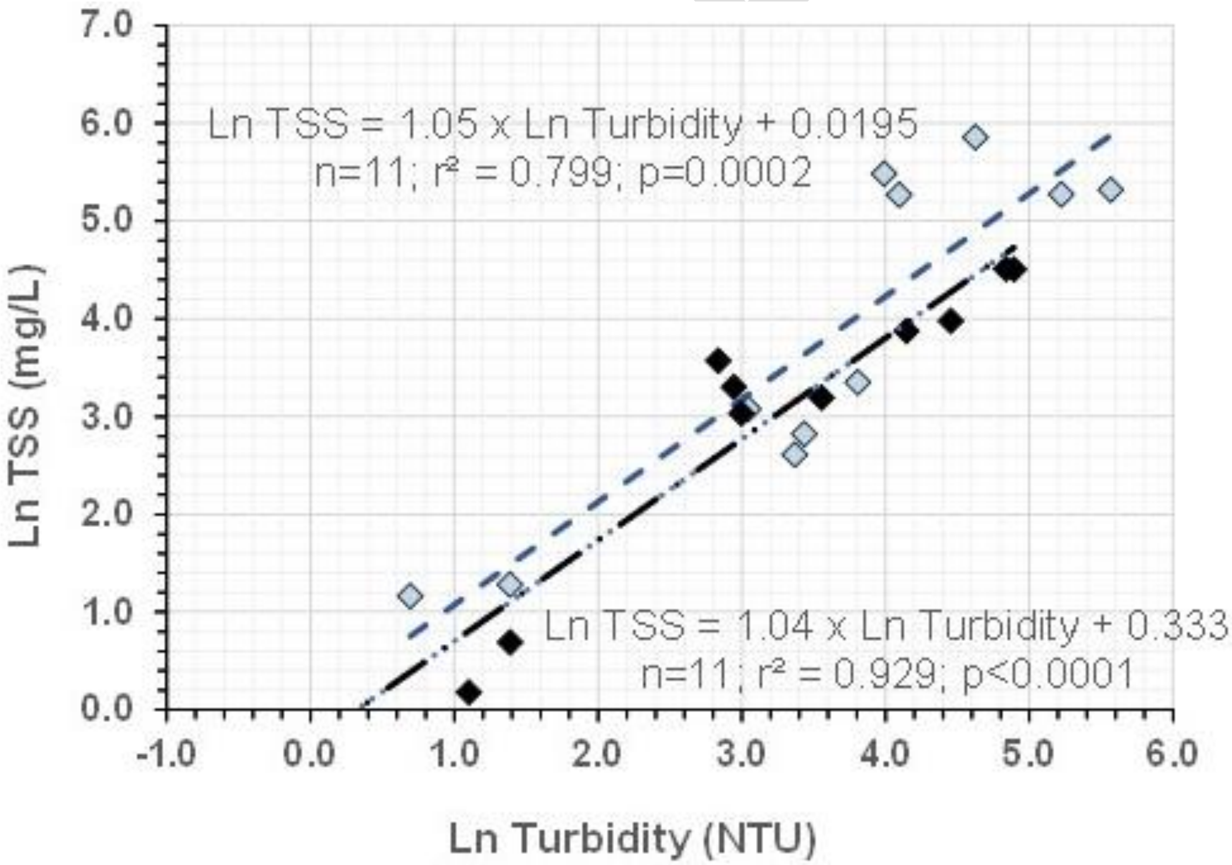


**Figure 3.1 Log-log TSS Turbidity Relationship for Hunker Creek Samples in 2020. Solid symbols and lower line show September data. Lighter symbols and upper dashed line show July data**

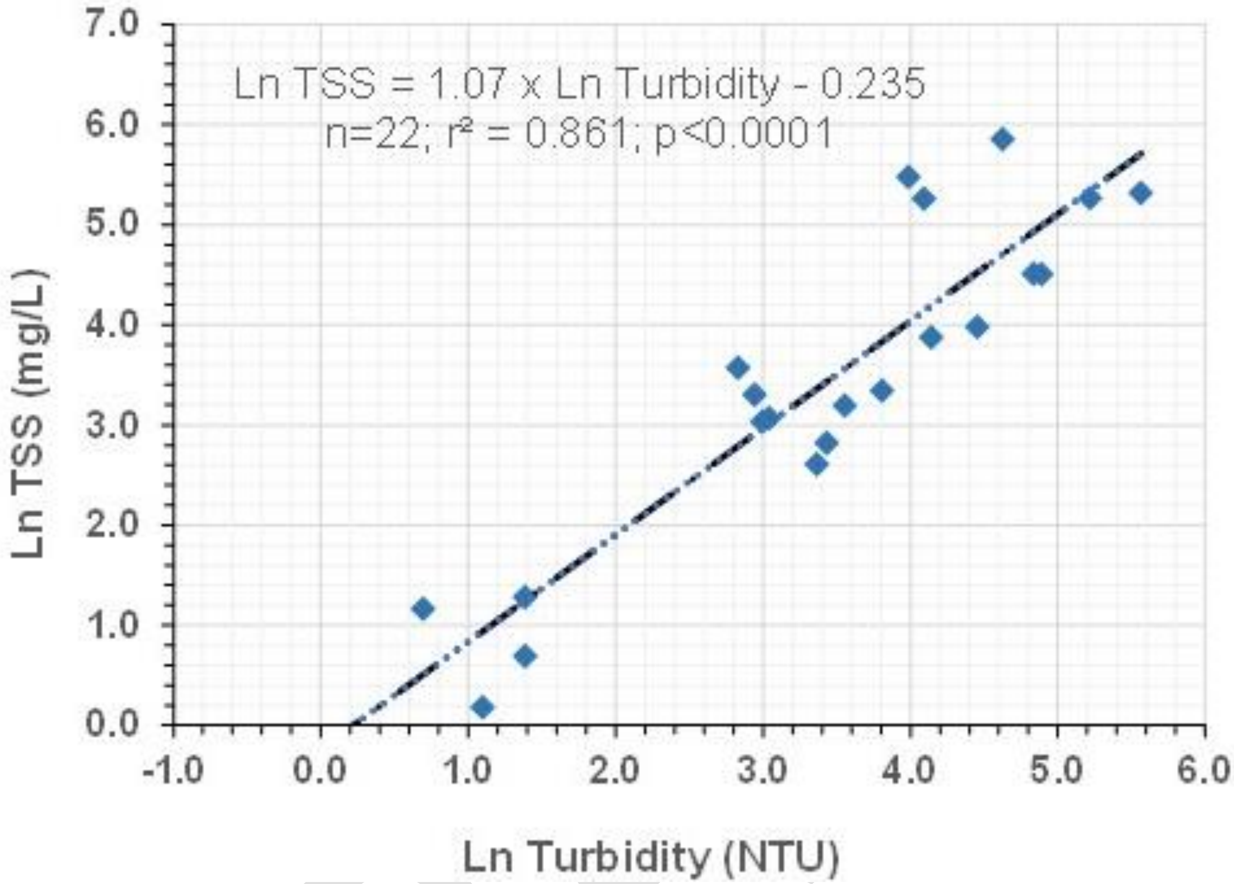


**Figure 3.2 Log-log TSS Turbidity Relationship for Adams Creek Samples; Both Sampling Events Combined**

The TSS and turbidity in Adams Creek were very low in both July and September, with the exception of the monitoring during the afternoon of September 23rd, 2020, at stations YPS-622 and 623. The elevated TSS was observed to be directly related to placer mining in the lower reaches of Adams Creek, near its mouth. For the purpose of evaluating this bivariate relationship, turbidity values recorded as below the detection limit were substituted with an assumed value of 0.5 NTU.

The relationship between TSS and turbidity was generally consistent across all WQOM stations monitoring in 2020 (**Figure 3.3**: data for Swede Creek and Stampede Gulch stations are not included since all turbidity measurements were lower than the detection limit). Excluding those samples with a non-detected turbidity value, the overall regression relationship for the natural log of TSS on the natural log of turbidity is illustrated in **Figure 3.3**.

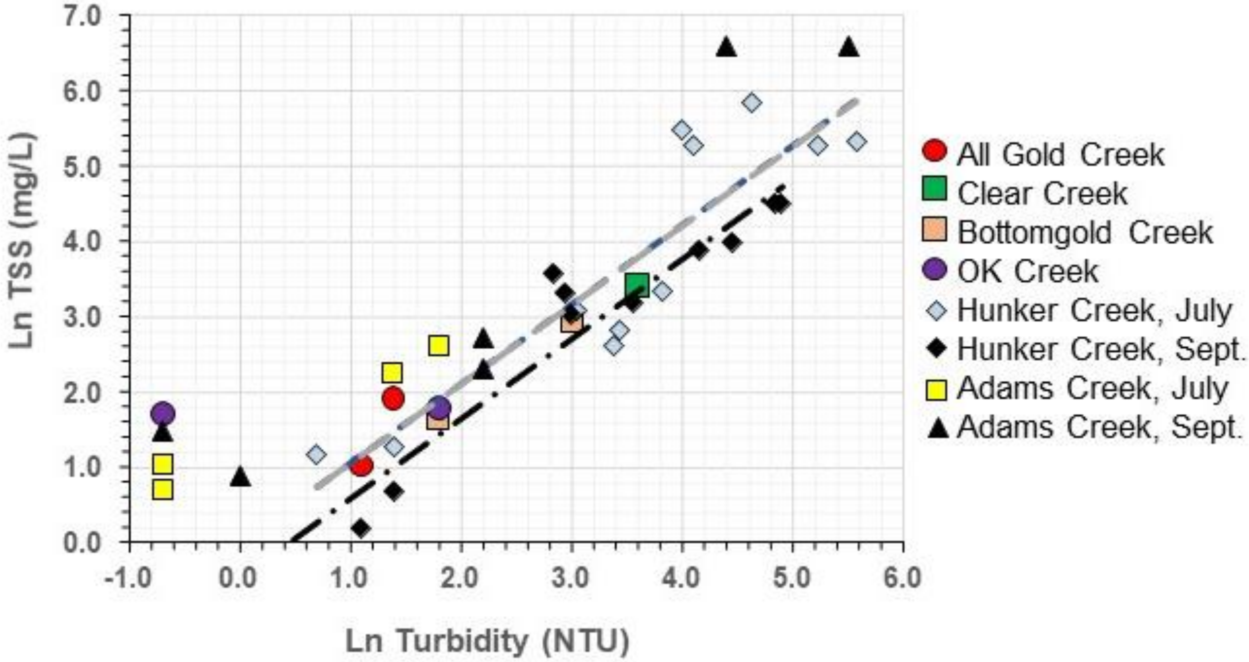


**Figure 3.3 TSS-turbidity Relationship for Majority of 2020 Sites**

The overall regression of the natural logarithm of TSS on the natural logarithm of turbidity is provided in **Figure 3.4** for all 2020 data combined. The associated equations for the upper and lower 95% confidence limits on the log-log linear relationship provided in **Figure 3.4** are as follows:

Lower 95% Confidence Limits: $\text{Ln TSS} = 1.20 \times \text{Ln Turbidity} + 0.59$ [1]

Upper 95% Confidence Limits: $\text{Ln TSS} = 0.881 \times \text{Ln Turbidity} - 0.46$ [2]

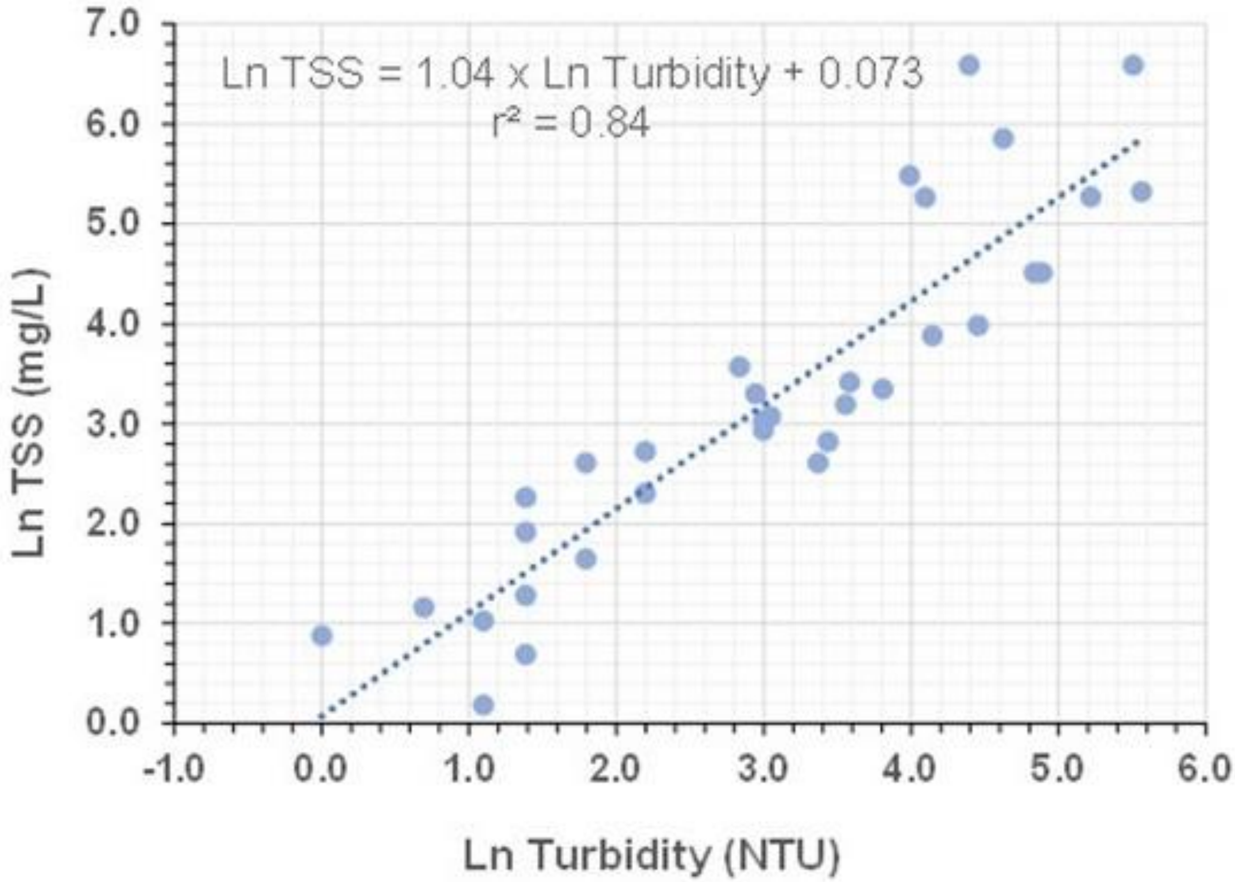


**Figure 3.4 Generalized Form of TSS-turbidity Regression Equation Based on 2020 Monitoring Data**

Based on this regression relationship, the turbidity associated with various WQO based on TSS concentrations are provided in **Table 3.11**.

**Table 3.11 Turbidity Levels Equivalent to WQO TSS Thresholds**

| TSS WQO (mg/L) | Predicted Turbidity for WQO<br>average (lower 95%, upper 95%) |
|---|---|
| 25 mg/L | 20.1 NTU (8.9 NTU, 65 NTU) |
| 50 mg/L | 40.5 NTU (20.1 NTU, 154 NTU) |
| 200 mg/L | 154 NTU (51 NTU, 693 NTU) |

# 4.0 AQUATIC HEALTH MONITORING

## 4.1 Introduction

### 4.1.1 Background and Purpose

AH monitoring provides information about how effective the FHMS is at protecting fish and fish habitat. The key questions it addresses are (YPS 2008a):

- Are there stream systems and watersheds exposed to placer mining where aquatic health is not being maintained in reference condition (i.e. the same condition as streams not exposed to human activity)? If so, is this due to placer mining activity or to other causes?
- Are the test sites in habitats of higher sensitivity in reference condition? If not, is this due to placer mining activity or to other causes?
- Where historically mined sites are not in reference condition is there an overall improvement over time?

For streambed invertebrate community monitoring and interpretations based on Environment and Climate Change Canada (ECCC) Canadian Aquatic Biomonitoring Network (CABIN) protocols for wadable streams, the term "reference condition" has a formally specified meaning, in relation to the multivariate community composition of streambed invertebrate communities sampled in regionally representative reference stream reaches.

Due to current deliberations about the Yukon Regional Reference Model and the AH protocol design, the reference condition approach (RCA) was not used in 2018-2020. Instead, the Intergovernmental Management Group is working on an AH protocol redesign informed by the 2019 Canadian Science Advisory Secretariat (CSAS) protocol evaluation and other specialized studies. An interim approach, and targeted studies have been carried out in 2019 and 2020, to begin to answer several key questions that will be used to inform a revised approach to aquatic health monitoring.

Consistent with the 2018 and 2019 AHM report, results from the 2020 monitoring program were not compared to the 2013 Yukon Regional Reference Model. Instead, an interim assessment approach has been used for the 2020 samples, which relies on characterization of physical habitat, degree of placer mining development, evaluation of several invertebrate community metrics and a qualitative description of the invertebrate community in comparison to local reference sites. Several targeted studies were carried out as part of the 2019 AHM program to answer key questions to inform the study redesign. The targeted studies for 2019 were as follows:

- Replicate study to better characterize within-site variability in benthic invertebrate community composition to evaluate the need to incorporate site replication into the study design.
- In-situ sediment sampling to explore benthic invertebrate community response to selected sediment parameters, and whether in-situ sediment results are an indicator of placer mining activity.

Many of the same sites in 2019 were monitored in 2020 as in other previous years (e.g. 2019 Hunker Creek), and so we have considered similarities and differences between the years of data where feasible. Given the limited replicate samples conducted in 2020 (n=3), a replicate study will be conducted as part of the larger aquatic health synthesis that will include aquatic health sampling conducted in the past five years.

Results of the in-situ sediment analysis are provided below in **Section 4.3.3** and **4.4.2**. However, the results of the replication study will be provided in a separate report.

## 4.2 Methodology

### 4.2.1 Field Methods

The AHM program was conducted by Hemmera employees Andrew MacPhail and Andrew Brown. Sampling was conducted on Hunker Creek on July 28th and July 29th and on Adams Creek and Swede Creek on July 30th. A total of 16 sites were sampled in the Klondike River (15) and Yukon River (1) watersheds (**Table 4.1**).

**Table 4.1 Sites Sampled in 2020 as part of AHM program.**

| Watershed | Sub-Watershed | Reference sites | Test sites | Grand Total |
|---|---|---|---|---|
| Klondike River | Hunker Creek | n/a | YPS-078 YPS-611 YPS-079 YPS-080 YPS-614 YPS-051 YPS-621 YPS-613 YPS-612 YPS-544 | **10** |
| | Adams Creek | YPS-626 | YPS-622 YPS-623 YPS-624 YPS-625 YPS-626 | **5** |
| Yukon River | Swede Creek | n/a | YPS-386 | **1** |
| | | | **Total** | **16** |

#### *4.2.1.1 Benthic Invertebrates*

Annual sampling of benthic invertebrates is carried out over a three-week period beginning no earlier than the second week of July and extending no later than the start of the second week of August of each year. Repeat site visits are sampled at the same location each visit while new site locations are chosen based on ease of access as well as representation of the sample stream. Stream invertebrate sampling followed the Canadian Aquatic Biomonitoring Network (CABIN) method, which involved 3-minute travelling kick sampling in riffle habitats into a net with a triangular aperture measuring 36 cm per side and mesh 400 µm openings (Environment Canada 2012a). During sampling, the field technician moved across the stream channel (from bank to bank, depending on stream depth and width) in an upstream direction. With the net being held immediately downstream of the technician's feet, the detritus and invertebrates dislodged from the substrate were conveyed into the kick-net by the stream current and collected. After three minutes of sampling time, the sampler returned to the stream bank with the sample. The kick-net was rinsed with water to move debris and invertebrates into the collection cup at the bottom of the net. The collection cup was then removed, and the contents poured into a labelled plastic jar and preserved using a solution of approximately 10% buffered alcohol in ambient water. The sampling was replicated three times (i.e. three kicks instead of one) at YPS-612, YPS-622 and YPS-626.

More information regarding field sampling procedures can be found in the CABIN field sampling protocol (http://www.ec.gc.ca/rcba-cabin/default.asp?lang=en&n=74876ADD-1) as well as in the AHM Protocol.

#### *4.2.1.2 Sediment*

Collection of in-situ sediment samples was carried out to answer the following key question:

- How does the benthic invertebrate community respond to varying sediment parameters?

To further characterize substrate conditions at each site, in-stream sediment samples were collected in 2020 to provide supporting information for the invertebrate community analysis and to evaluate potential invertebrate community responses to varying sediment conditions.

Representative sediment samples were collected from three locations within the sample area using a metal spoon. Areas selected for sampling were typically depositional areas (i.e. typically located on the banks of creeks where velocities are slowed down due to an in-stream feature and the suspended sediment can drop out of suspension from the water column). Ideally, samples would be collected within the main channel, however, due to the inability to keep any sediment on the sampling spoon while removing the sediment from the channel, depositional areas are targeted.

The three grab samples were homogenized in a stainless-steel bowl and approximately 300-550g was transferred to a sediment bag for storage in a cool dark environment until submission to the analytical laboratory. Additional data that were recorded included depth of easily penetrable sediments, depth of sediment sampled, sediment texture and colour, as well as other descriptive sample characteristics. Samples were submitted to ALS Environmental Laboratories for analysis of particle size, total organic carbon, total nitrogen, and moisture.

Sediment parameters analyzed in the laboratory were used to support the interpretation of the invertebrate community results. Total abundance, richness, % EPT (percent of community composed of ephemeroptera, plecoptera and trichophtera), and % C (percent of community composed of chironomid dipterans) were plotted against the sediment parameters to visually explore potential relationships.

#### *4.2.1.3 Habitat Characterization*

Environmental variables can provide explanatory information for data interpretation. Stream habitat characteristics were measured during field sampling and are used to inform potential differences observed in the stream invertebrate communities that could be due to environmental factors rather than anthropogenic influences.

A habitat assessment was conducted at each site following CABIN field sampling protocols as well as in the AHM protocols. Data collected during site visits includes basic water chemistry (YSI Probe: pH, temperature, conductivity, dissolved oxygen), detailed water chemistry (laboratory analysis: nutrients, physical and chemical properties and metals), environmental variables (stream width, depth, slope and velocity, riparian vegetation and site characteristics), stream substrate characterisation (100 pebble count) and invertebrate community samples using a kick net. All information is recorded on a standard field form and several standardized photos are taken of each site while on the ground and from the air, when possible (Appendix B – Field Forms, Appendix C - Photolog).

#### *4.2.1.4 Streamflow Measurements*

Stream flow measurements were collected using a hand-held water velocity meter (Global Water Flow Probe) after sample collection (not prior as to risk disturbing stream bed sediments), following methods outlined in Appendix B (Flow Measurements) of the *Yukon Placer Mining Industry Water Quality Objectives Monitoring Protocol* (Yukon Placer Water Quality Working Group, 2016):

- The bankfull width was measured using measuring tape secured across the length of the stream, and the stream was divided into five (5) segments;
- Water depth and flow was measured at each segment;
- The flow measurement was obtained by repeatedly raising, lowering and sweeping the head of the flow velocity meter up and down, side to side in the water column, for at least one minute, allowing the on-board computer to make multiple velocity measurements and compile an average.

Flow measurements of each segment were used to calculate total discharge at each monitoring site, where:

$$V = average\ velocity\ measurement$$
$$W = width\ of\ segment$$
$$D = depth\ of\ segment$$
$$Station\ discharge\ \left(Q_{segment}\right) = V\ \times W \times D$$
$$Total\ discharge\ \left(Q_T\right) = Q_{segment\ A} +\ Q_{segment\ B} + Q_{segment\ C} + Q_{segment\ D} + Q_{segment\ E}$$

### 4.2.2 Laboratory Methods

Samples were sent to Cordillera Consulting in Summerland, British Columbia, for sorting and taxonomic identification. Organisms were identified to the lowest practical level (e.g. typically genus or species). At the beginning of the sorting process, each sample was examined and evaluated for estimation of total invertebrate numbers. If the total number was estimated to be greater than 600, then the laboratory's sub-sampling protocol was followed. A minimum of 5% of each sample was sorted, in accordance with Quality Assurance/Quality Control (QA/QC) requirements of Environment Canada (2014). Sorting efficiency and sub-sampling accuracy and precision were quantified using methods specified by Environment Canada (2012b, 2014). Based on the QA/QC results, the data were judged to be of acceptable quality. The enumeration and identification report from Cordillera Consulting is included in **Appendix E**.

### 4.2.3 Data Analysis

#### *4.2.3.1 Placer Mining Development Assessment*

The degree of placer mining at each site was estimated using the following approach. When possible during 2016 to 2020 field sampling, streams were flown upstream of sampling locations and photographs were taken along with notes about placer activity. Based on the information collected, the proximity of recent (<2 years) placer mining development as well as older (>2 years) placer mining development was assessed.

The intensity of placer mining development (low, moderate, high) was estimated from aerial photographs taken during field sampling, as well as from aerial photographs available on the Yukon Placer Watershed Atlas. The intensity of placer mining presented in this report is based on a visual estimate of placer mining development within the watershed upstream of each sample location and may not reflect actual placer mining activities that would be expected to affect aquatic health. In the future, additional sources of information will be incorporated from Yukon government databases, mining inspection reports, and GIS mapping exercises.

#### *4.2.3.2 Benthic Invertebrate Community Composition*

The following variables were calculated to characterize benthic invertebrate communities:

- Community metrics including total abundance, family level taxonomic richness, Simpson's Evenness Index (SEI), Simpson's Diversity Index (SDI), % Chironomidae (C), % Ephemeroptera (E), % Plecoptera (P), % Trichoptera (T), and EPT (Ephemeroptera, Plecoptera, Trichoptera) individuals
- Relative abundance of major taxonomic groups (e.g., Ephemeroptera, Plecoptera, Trichoptera, Diptera)

Invertebrate community metrics were calculated using the on-line CABIN tools based on family-level taxonomic identification.

The metrics are described as follows:

- Total abundance – absolute number of individuals standardized for each kick per CABIN sampling protocols.
- Family level taxonomic richness – total number of taxonomic families identified at a site.
- Simpson's Diversity Index – measures the proportional distribution of organisms in the community, which takes into account the number of species present and how evenly the abundance is distributed among these taxa. Values range from 0 to 1; values closer to 1 indicate that a higher diversity of taxa compared to sites with values closer to 0.
- Simpson's Evenness Index – is a measure of how evenly the abundance is distributed among the taxa present at a site. Values range from 0 to 1; values closer to 1 indicate equal numbers of all taxa present in a sample and values closer to zero indicate a high degree of dominance by one or a few organisms.

Total abundance at each site was presented graphically to provide a visual comparison of trends in abundance over time. Relative abundances of major taxonomic groups were also summarized and presented graphically to provide a visual representation of broad level taxonomic composition and total invertebrate abundance at each site.

## 4.3 Monitoring Results

### 4.3.1 Summary of Aquatic Health Field Observations, Measurements and Physical Characteristics

#### *4.3.1.1 Degree of Placer Mining*

Placer mining development upstream of sites sampled in Hunker Creek was estimated as high, with the exception of YPS-078 (Hunker Creek upstream of Ontario Creek) which was estimated as moderate-low. In Adams Creek, placer mining development varied from high in the lower reaches near its confluence with Bonanza Creek and low farther up the Adams Creek in the headwaters. On Swede Creek, active placer mining was occurring approximately 4 km upstream of YPS-386; however, there was no evidence of active or historical mining within the reach assessed at YPS-386 (**Table 4.2**).

### Table 4.2 Degree of Placer Mining Development at Sites Sampled in Hunker Creek, Adams Creek and Swede Creek.

| Name | Site | Degree of Placer Mining (low, mod, high) | Upstream Distance to Active (within 2 years) Mining Development (km) | Upstream Distance to old (older than 2 years) Mining Development (km) | Comments |
|---|---|---|---|---|---|
| **Hunker Creek** | | | | | |
| Hunker Creek downstream of Hester Creek inflow | YPS-051 | High | 0.0 | 0.0 | Active placer near site. Ford upstream of site. |
| Hunker Creek upstream of Ontario Creek | YPS-078 | Mod-low | 0.2 | 0.0 | Site very close to Hunker Creek Rd. |
| Hunker Creek upstream of Gold Bottom Creek | YPS-079 | High | 0.0 | 0.0 | Active placer upstream of site. |
| Hunker Creek downstream of Gold Bottom Creek | YPS-080 | High | 0.5 | 0.0 | Active placer upstream of site. |
| Hunker Creek | YPS-544 | High | 0.2 | 0.2 | Water pipe and foot bridge near site |
| Hunker Creek | YPS-611 | High | 0.6 | 0.0 | Could hear active placer mining activity upstream |
| Hunker Creek | YPS-612 | High | 1.0 | 0.0 | Old bridge upstream of site. |
| Hunker Creek | YPS-613 | High | 0.5 | 0.0 | Active placer upstream of site. |
| Hunker Creek | YPS-614 | High | 1.0 | 0.0 | Active placer upstream of site. |
| Hunker Creek | YPS-621 | High | 3.0 | 0.0 | Active placer upstream of site. |

| Name | Site | Degree of Placer Mining (low, mod, high) | Upstream Distance to Active (within 2 years) Mining Development (km) | Upstream Distance to old (older than 2 years) Mining Development (km) | Comments |
|---|---|---|---|---|---|
| **Adams Creek** | | | | | |
| Adams Creek below active mining just before confluence with Bonanza River | YPS-622 | High | 0.2 | 0.0 | Below all mining activities. At creek before going under Bonanza Creek road |
| Adams Creek below active mining | YPS-623 | High | 0.1 | 0.0 | Right below active workings, no sluicing evident at time of sampling |
| Adams Creek just upstream of active mining | YPS-624 | High-moderate | 0.0 | 0.0 | Out of active mining area but still in historical mining area. |
| Adams Creek upstream of all active mining | YPS-625 | Moderate | 0.0 | 0.0 | Out of active mining area but still in historical mining area. |
| Adams Creek upstream of all active and historical mining | YPS-626 | Low | 0.0 | 0.0 | Above all placer mining influence. |
| **Swede Creek** | | | | | |
| Swede Creek before confluence with Yukon River. | YPS-386 | Low | 3.8 | n/a | Section of reach assessed is staked for placer but not evidence of placer disturbance near site. |

#### *4.3.1.2 In-situ Water Quality*

Field *in-situ* water quality data were collected successfully and consistently at each of the stations visited. A summary of field parameter measurements for the stations, including air temperature, surface water temperature, field pH, surface water conductivity, concentrations of dissolved oxygen and turbidity readings are presented below in **Table 4.3**. Field forms for each station are provided in **Appendix A**.

### Table 4.3 Observed In-Situ Parameter measurements, July 2020

| Station | Station Type | Date (dd/mm/yyyy) | Parameter | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Air Temperature (°C) | Water Temperature (°C) | pH (pH units) | Conductivity (µs/cm) | Specific Conductivity (µScm) | Dissolved Oxygen (mg/L) | Turbidity (NTU) |
| **Hunker Creek** | | | | | | | | | |
| YPS-078 | Test | 29/07/2020 | 17 | 6.0 | 7.69 | 317.2 | 446.1 | 9.73 | 8.95 |
| YPS-611 | Test | 29/07/2020 | 17.5 | 9.6 | 7.64 | 392.3 | 583.3 | 9.02 | 56.2 |
| YPS-079 | Test | 29/07/2020 | 14 | 8.5 | 7.97 | 377.9 | 489.3 | 8.95 | 49.5 |
| YPS-080 | Test | 29/07/2020 | 10.5 | 6.8 | 8.00 | 330.1 | 454.3 | 9.74 | 73.1 |
| YPS-614 | Test | 28/07/2020 | 14 | 8.7 | 7.88 | 479.1 | 365.1 | 9.35 | 132 |
| YPS-051 | Test | 28/07/2020 | 13.1 | 8.8 | 7.53 | 437.4 | 570.9 | 8.82 | 128 |
| YPS-621 | Test | 29/07/2020 | 10.5 | 7.3 | 7.46 | 445.1 | 604.4 | 9.54 | 73.1 |
| YPS-613 | Test | 28/07/2020 | 15.1 | 9.0 | 7.84 | 510.0 | 664.0 | 9.30 | 61.9 |
| YPS-612 | Test | 28/07/2020 | 13 | 9.6 | 7.78 | 558 | 712 | 8.67 | 76.6 |
| YPS-544 | Test | 28/07/2020 | 10.5 | 10.6 | 7.58 | 612 | 766 | 8.48 | 391 |
| **Adams Creek** | | | | | | | | | |
| YPS-622 | Test | 30/07/2020 | 6.5 | 3.5 | 7.78 | 289.0 | 436.0 | 10.79 | 4.04 |
| YPS-623 | Test | 30/07/2020 | 11 | 4.2 | 7.75 | 298.6 | 441.2 | 10.51 | 3.11 |
| YPS-624 | Test | 30/07/2020 | 15 | 4.1 | 7.53 | 261.9 | 387.5 | 10.48 | 1.50 |
| YPS-625 | Test | 30/07/2020 | 20 | 5.2 | 7.73 | 250.2 | 359.1 | 10.25 | 2.01 |
| YPS-626 | Potential Reference | 30/07/2020 | 22 | 4.3 | 7.66 | 137.9 | 202.9 | 10.34 | 17.1 |
| **Swede Creek** | | | | | | | | | |
| YPS-386 | Test | 30/07/2020 | 23 | 8.9 | 7.40 | 153.9 | 200.7 | 8.92 | 1.8 |

**Hunker Creek**

Air temperature at the time of sampling on Hunker Creek ranged from 10.5°C to 17.5 °C. Water temperature was highest at the most downstream site (YPS-544, 10.6°C) and lowest at the most upstream site (YPS-078, 6.0°C). Similar to water temperature, conductivity was highest at the most downstream site (YPS-544,612 µS/cm) and lowest at the most upstream site (YPS-078, 317.2 µS/cm). Specific conductivity followed a similar pattern with the highest specific conductivity at the most downstream site (YPS-544, 766 µS/cm), however, the lowest specific conductivity was found at YPS-614 (365.1 µS/cm). pH in Hunker Creek was slightly alkaline and ranged from 7.46 at YPS-621 to 8.00 at YPS-080. Dissolved oxygen values ranged from 9.74 mg/L at YPS-080 to 8.48 mg/L at YPS-544. As expected, the highest turbidity occurred at the most downstream site (YPS-544,391 NTU) and lowest occurred at the most upstream site (YPS-078, 8.95 NTU).

**Adams Creek**

Air temperature at the time of sampling on Hunker Creek ranged from 6.5°C to 22°C. Water temperature ranged from 3.5°C at YPS-622 to 5.2°C at YPS-625. pH in Adams Creek was slightly alkaline and ranged from 7.66 at YPS-626 to 7.78 at YPS-622. Both conductivity and specific conductivity were highest at the most downstream site, YPS-622 with values of 289 and 426 µS/cm, respectively. Both parameters decreased as sampling progressed upstream, with the lowest values occurring at YPS-626 with values of 137.9 µS/cm for conductivity, and 202.9 µS/cm for specific conductivity. Dissolved oxygen values ranged from 10.79 mg/L at YPS-622 to 10.25 mg/L at YPS-625. As expected, the highest turbidity occurred at the most downstream site (YPS-622, 4.04 NTU) and decreased upstream with the lowest turbidity occurring at YPS-624 (1.50 NTU).

**Swede Creek**

Air temperature at the time of sampling Swede Creek was approximately 23°C, the highest of the three days sampled. Water temperature was 8.9°C and the pH was slightly alkaline at 7.40. Conductivity and specific conductivity were 153.9 µS/cm and 200.7 µS/cm, respectively. Dissolved oxygen was 8.92 mg/L and the turbidity was low with a value of 1.80 NTU.

#### *4.3.1.3 Streamflow and Stream Channel Characteristics*

Streamflow and Stream Channel Characteristics for the July 2020 AHM survey are summarized below in **Table 4.4** Additional flow measurements were also measured at select AHM and WQOM sites during the September 2020 WQOM sampling program; all AHM and WQOM site flow measurements are tabulated in **Appendix F**.

**Table 4.4 Streamflow and Stream Channel Characteristics**

| Channel Characteristics | | YPS-544 | YPS-612 | YPS-613 | YPS-621 | YPS-051 | YPS-614 | YPS-080 | YPS-079 | YPS-611 | YPS-078 | YPS-622 | YPS-623 | YPS-624 | YPS-625 | YPS-626 | YPS-386 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Channel Width (m) | Wetted | 6.1 | 7.8 | 8.0 | 8.0 | 7.7 | 5.2 | 4.2 | 4.2 | 3.1 | 2.9 | 4.0 | 2.5 | 3.8 | 3.2 | 2.3 | 22.5 |
| Channel Depth (m) | Mean | 0.32 | 0.20 | 0.15 | 0.17 | 0.16 | 0.19 | 0.32 | 0.11 | 0.14 | 0.09 | 0.17 | 0.19 | 0.12 | 0.10 | 0.16 | 0.36 |
| Channel Velocity (m/s) | Mean | 0.36 | 0.46 | 0.42 | 0.28 | 0.44 | 0.44 | 0.28 | 0.46 | 0.36 | 0.22 | 0.50 | 0.54 | 0.36 | 0.28 | 0.08 | 0.82 |
| Discharge ($m^3/s$) | Run | 0.58 | 0.59 | 0.43 | 0.43 | 0.44 | 0.39 | 0.28 | 0.16 | 0.16 | 0.06 | 0.18 | 0.22 | 0.15 | 0.08 | 0.05 | 5.93 |

**Hunker Creek**

Wetted channel width was widest in the lower elevations of Hunker Creek and decreased upstream. Wetted channel width on Hunker Creek ranged from 8.0 m at YPS-613 and YPS-621 to 2.9 m at YPS-078. Stream discharge, mean channel velocity and mean channel depth followed a similar pattern to wetted channel width, with the highest values in the lower elevation sites and a general decrease in upstream sites. The maximum stream discharge measured on Hunker Creek was 0.590 $m^3/s$ (mean channel velocity of 0.46 m/s) at YPS-612 and the minimum was 0.060 $m^3/s$ (mean channel velocity of 0.22 m/s) at YPS-078. Mean channel depth was highest at YPS-080 and YPS-544 (0.32 m at both sites) and lowest at YPS-078 (0.09 m).

**Adams Creek**

Wetted channel width varied on Adams Creek with a range of 2.3 m at YPS-626 (most upstream site) to 3.8 m at YPS-624. Mean channel depth was highest in the downstream sites YPS-623 and YPS-624 with values of 0.17 m and 0.19 m, respectively. Stream discharge was highest at YPS-622 and YPS-623 with values of 0.180 $m^3/s$ and 0.220 $m^3/s$. The higher discharge at YPS-623 compared to YPS-622 (which would be the most downstream site and in theory would have the highest discharge) is likely due to the confined nature of the stream morphology at YPS-623. Mean channel velocity followed a similar pattern with values of 0.50 m/s and 0.54 m/s for YPS-622 and YPS-623, respectively.

**Swede Creek**

Wetted channel width at YPS-386 on Swede Creek was 22.5 m. This was the widest channel sampled during the 2020 monitoring event. Mean channel depth was 0.36 m with a mean channel velocity of 0.82. Stream discharge measured at the site was 5.93 $m^3/s$.

#### *4.3.1.4 Habitat Characteristics*

Habitat characteristics are summarized below in **Table 4.5**.

**Table 4.5 Habitat Characteristics**

| Habitat Characteristics | | YPS-078 | YPS-079 | YPS-080 | YPS-544 | YPS-614 | YPS-051 | YPS-611 | YPS-612 | YPS-613 | YPS-621 | YPS-622 | YPS-623 | YPS-624 | YPS-625 | YPS-626 | YPS-386 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stream morphology | Pool | Yes | Yes | No | No | Yes | No | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| | Rapid | No | No | Yes | No | No | Yes | No | No | No | No | No | No | No | No | Yes | No |
| | Riffle | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | Run | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | Yes |
| Gradient (%) | | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Substrate Properties | General Composition | 49% pebble, 51% cobble | 84% pebble, 16% cobble | 35% pebble, 65% cobble | 86% pebble, 7& cobble, 7% gravel | 60% pebble, 50% cobble | 56% pebble, 44% cobble | 42% pebble, 57% cobble | 1% gravel, 34% pebble, 65% cobble | 6% gravel, 90% pebble, 4% cobble | 51% pebble, 49% cobble | 59% pebble,41 % cobble | 47% pebble, 53% cobble | 54% pebble, 45% cobble | 41% pebble, 58% pebble | 46% pebble, 54% cobble | 36% pebble, 63% cobble, 1%boulder |
| | Average size (cm) | 6.4 | 4.4 | 7.7 | 3.4 | 5.5 | 5.8 | 6.4 | 6.9 | 2.8 | 5.7 | 5.6 | 6.1 | 6.2 | 6.8 | 6.6 | 7.5 |
| | Average Embeddedness (%) | 25 | 25 | 25 | 50 | 25 | 25 | 25 | 25 | 25 | 0 | 25 | 0 | 25 | 0 | 0 | 50 |
| | Dominant Interstitial Material | Sand | Sand | Sand | Sand | Gravel | Gravel | Gravel | Sand | Sand | Sand | Sand | Sand | Sand | Gravel | Sand | Sand |
| Aquatic Vegetation | Macrophyte coverage (%) | 0 | 0 | 0 | 1-25 | 0 | 0 | 0 | 0 | 0 | 1-25 | 0 | 0 | 0 | 0 | 0 | 1-25 |
| | Periphyton (mm) | 0.5-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 0.5-1 | <0.5 | <0.5 | <0.5 | <0.5 | 0.5-1 | 0.5-1 | 0.5-1 | 0.5-1 | 0.5-1 |
| Riparian Features | Vegetation Types Present | Ferns/grass Shrubs Deciduous trees | Ferns/grass Shrubs Deciduous trees | Ferns/grass Shrubs Deciduous trees | Ferns/grass Deciduous trees | Ferns/grass Shrubs Deciduous trees | Ferns/grass Shrubs Deciduous trees | Ferns/grass Shrubs Deciduous trees | Ferns/grass Deciduous trees | Ferns/grass Deciduous trees | Ferns/grass Shrubs Deciduous trees | Ferns/grass Shrubs | Ferns/grass Shrubs Deciduous trees | Ferns/grass Shrubs Deciduous trees | Ferns/grass Deciduous trees | Ferns/grass Shrubs Deciduous trees | Ferns/grass Shrubs Deciduous trees Coniferous trees |
| | Dominant Vegetation Type | Shrubs | Ferns/grasses | Shrubs | Deciduous trees | Deciduous trees | Deciduous trees | Shrubs | Deciduous trees | Deciduous trees | Deciduous trees | Shrubs | Shrubs | Shrubs | Deciduous trees | Shrubs | Coniferous trees |
| | Canopy Coverage (%) | 1-25 | 1-25 | 1-25 | 1-25 | 1-25 | 1-25 | 1-25 | 1-25 | 1-25 | 1-25 | 1-25 | 1-25 | 26-50 | 26-50 | 26-50 | 1-25 |

**Hunker Creek**

Pools were identified within the stream reach for YPS-078, YPS-079, YPS-544, YPS-614, YPS-611, YPS-613 and YPS-621. Rapids were noted at YPS-051 and YPS-080 and except for YPS-613, all sites had riffle sections within their reach. Stream reaches with a run section included all sites except YPS-078. The gradient on Hunker Creek was steady at a 2-3% grade. Results of the stream substrate characterisation (100 pebble count) indicated pebble and cobble as the dominant substrates with some gravel documented at YPS-544, YPS-612, and YPS-613. Average size of substrate ranged from 3.4 cm at YPS-544 to 7.7 cm at YPS-080. Average embeddedness was 25% (1/4) at all sites except for YPS-544 (50%) and YPS-612 (0%) and the dominant interstitial material was sand and gravel. Macrophyte coverage was non-existent at all sites except for YPS-621 which had a coverage of 1-25%. Periphyton was also not present at most of the sites with only YPS-611 showing evidence of periphyton cover (1-5mm). The dominant vegetation type included shrubs, ferns/grasses and deciduous trees but was highly variable from site to site. Canopy coverage remained stable throughout Hunker Creek with all sites falling within the 1-25% range.

**Adams Creek**

Pools and riffle sections were identified within the stream reach for all sites sampled on Adams Creek. Rapids were identified at YPS-626 but at no other sites and no run sections were encountered. The gradient on Adams Creek was steady at a 3% grade. Results of the stream substrate characterisation (100 pebble count) indicated pebble and cobble as the dominant substrates. Average size of substrate ranged from 5.6 cm at YPS-622 to 6.8 cm at YPS-625. The dominant interstitial material was sand with the exception YPS-625 which was dominated by gravel. Average embeddedness was 25% (1/4) at YPS-622, YPS-624 and YPS-626 and 0% at YPS-623 and YPS-625. No macrophyte coverage was observed at any of the sites sampled on Adams Creek. A thin layer of periphyton (0.5-1mm) was observed at all sites except for YPS-622. Shrubs were the dominant riparian vegetation type at all sites apart from YPS-615 which was dominated by deciduous trees. Canopy coverage ranged from 1-25% at YPS-622 and YPS-623 and increased as sampling moved upstream with a range of 26-50% at YPS-623, YPS-624 and YPS-625.

**Swede Creek**

Riffle and run sections were observed at YPS-386 but no pools or rapids. Similar to Hunker Creek and Adams Creek, gradient was at 3% grade. Results of the stream substrate characterisation (100 pebble count) indicated pebble and cobble as the dominant substrates as well as a very small percentage of boulder. Average size of substrate was 7.5 cm, the average embeddedness was 25% (1/4) and sand made up the interstitial material. There was 1-25% macrophyte coverage within the reach and a thin layer (0.5-1mm) of periphyton. Coniferous trees were the dominant riparian vegetation type and canopy coverage was 1-25% within the reach.

### 4.3.2 Benthic Community Data

The following sections present the benthic community data calculated from each site. CABIN exports for each site sampled on Hunker Creek, Adams Creek and Swede Creek are presented in **Appendix G**.

#### *4.3.2.1 Hunker Creek*

Benthic invertebrate community metrics measured for Hunker Creek stations are provided in **Table 4.6** and **Figure 4.1** through **Figure 4.11**.

**Table 4.6 Benthic Community Metrics in Hunker Creek, 2006 to 2020**

| Watercourse Name | Site | Year | Total Abundance | Family Richness | SDI | SEI | % C | % E | % P | % T | % EPT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hunker Creek upstream of Ontario Cr. | YPS-078 | 2006 | 596 | 12 | 0.53 | 0.18 | 19 | 69 | 4 | 1 | 74 |
| | | 2008 | 555 | 15 | 0.35 | 0.1 | 80 | 10 | 5 | 0 | 15 |
| | | 2010 | 943 | 16 | 0.69 | 0.2 | 51 | 17 | 2 | 1 | 20 |
| | | 2012 | 665 | 19 | 0.75 | 0.21 | 4 | 55 | 7 | 0 | 63 |
| | | 2013 | 234 | 14 | 0.79 | 0.33 | 37 | 30 | 10 | 1 | 41 |
| | | 2016 | 294 | 19 | 0.85 | 0.35 | 21 | 34 | 3 | 2 | 38 |
| | | 2018 | 443 | 16 | 0.61 | 0.16 | 13 | 74 | 3 | 1 | 78 |
| | | 2019 | 833 | 18 | 0.81 | 0.3 | 25 | 32 | 6 | 1 | 40 |
| | | 2020 | 384 | 19 | 0.63 | 0.14 | 11 | 68 | 8 | 1 | 77 |
| Hunker Creek | YPS-611 | 2019 | 2,371 | 19 | 0.84 | 0.33 | 21 | 7 | 18 | 28 | 54 |
| | | 2020 | 1,955 | 14 | 0.74 | 0.27 | 51 | 20 | 4 | 11 | 35 |
| Hunker Creek upstream of Gold Bottom Cr. | YPS-079 | 2006 | 1,276 | 10 | 0.49 | 0.2 | 67 | 23 | 1 | 1 | 25 |
| | | 2019 | 889 | 10 | 0.41 | 0.17 | 76 | 13 | 2 | 8 | 23 |
| | | 2020 | 484 | 16 | 0.65 | 0.18 | 91 | 6 | 1 | 2 | 8 |
| Hunker Creek downstream of Gold Bottom Cr. | YPS-080 | 2006 | 852 | 12 | 0.47 | 0.16 | 15 | 72 | 4 | 1 | 76 |
| | | 2019 | 3,655 | 19 | 0.57 | 0.12 | 6 | 64 | 15 | 11 | 91 |
| | | 2020 | 315 | 21 | 0.83 | 0.29 | 51 | 16 | 1 | 24 | 41 |
| Hunker Creek | YPS-614 | 2019 | 3,027 | 13 | 0.62 | 0.2 | 7 | 60 | 20 | 4 | 84 |
| | | 2020 | 220 | 14 | 0.80 | 0.35 | 67 | 16 | 0 | 11 | 27 |

| Watercourse Name | Site | Year | Total Abundance | Family Richness | SDI | SEI | % C | % E | % P | % T | % EPT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hunker Creek downstream of Hester Creek inflow | YPS-051 | 2005 | 189 | 11 | 0.26 | 0.12 | 8 | 87 | 1 | 0 | 88 |
| | | 2006 | 445 | 13 | 0.6 | 0.19 | 20 | 60 | 1 | 1 | 62 |
| | | 2019 | 462 | 20 | 0.68 | 0.16 | 11 | 52 | 3 | 10 | 66 |
| | | 2020 | 219 | 25 | 0.89 | 0.37 | 63 | 18 | 1 | 2 | 21 |
| Hunker Creek | YPS-621 | 2019 | 1,267 | 19 | 0.73 | 0.2 | 13 | 48 | 4 | 14 | 66 |
| | | 2020 | 1,044 | 18 | 0.83 | 0.32 | 43 | 34 | 2 | 6 | 42 |
| Hunker Creek | YPS-613 | 2019 | 1,068 | 21 | 0.77 | 0.2 | 6 | 38 | 22 | 24 | 84 |
| | | 2020 | 381 | 27 | 0.77 | 0.49 | 62 | 19 | 2 | 2 | 24 |
| Hunker Creek | YPS-612 | 2019 | 2,239 | 20 | 0.68 | 0.16 | 5 | 50 | 13 | 27 | 90 |
| | | 2020 | 1,110 | 14 | 1 | 0 | 86 | 5 | 0 | 2 | 6 |
| Hunker Creek | YPS-544 | 2006 | 340 | 15 | 0.77 | 0.29 | 36 | 11 | 0 | 2 | 12 |
| | | 2013 | 40 | 6 | 0.67 | 0.51 | 31 | 49 | 0 | 10 | 59 |
| | | 2014 | 45 | 4 | 0.64 | 0.7 | 0 | 49 | 0 | 0 | 49 |
| | | 2015 | 143 | 12 | 0.73 | 0.31 | 32 | 37 | 3 | 4 | 43 |
| | | 2016 | 270 | 15 | 0.58 | 0.16 | 59 | 28 | 1 | 3 | 32 |
| | | 2017 | 242 | 15 | 0.67 | 0.2 | 48 | 30 | 2 | 6 | 38 |
| | | 2018 | 332 | 13 | 0.62 | 0.2 | 54 | 30 | 2 | 1 | 33 |
| | | 2019 | 730 | 19 | 0.75 | 0.21 | 35 | 34 | 4 | 10 | 47 |
| | | 2020 | 198 | 23 | 0.56 | 0.26 | 85 | 1 | 0 | 1 | 1 |

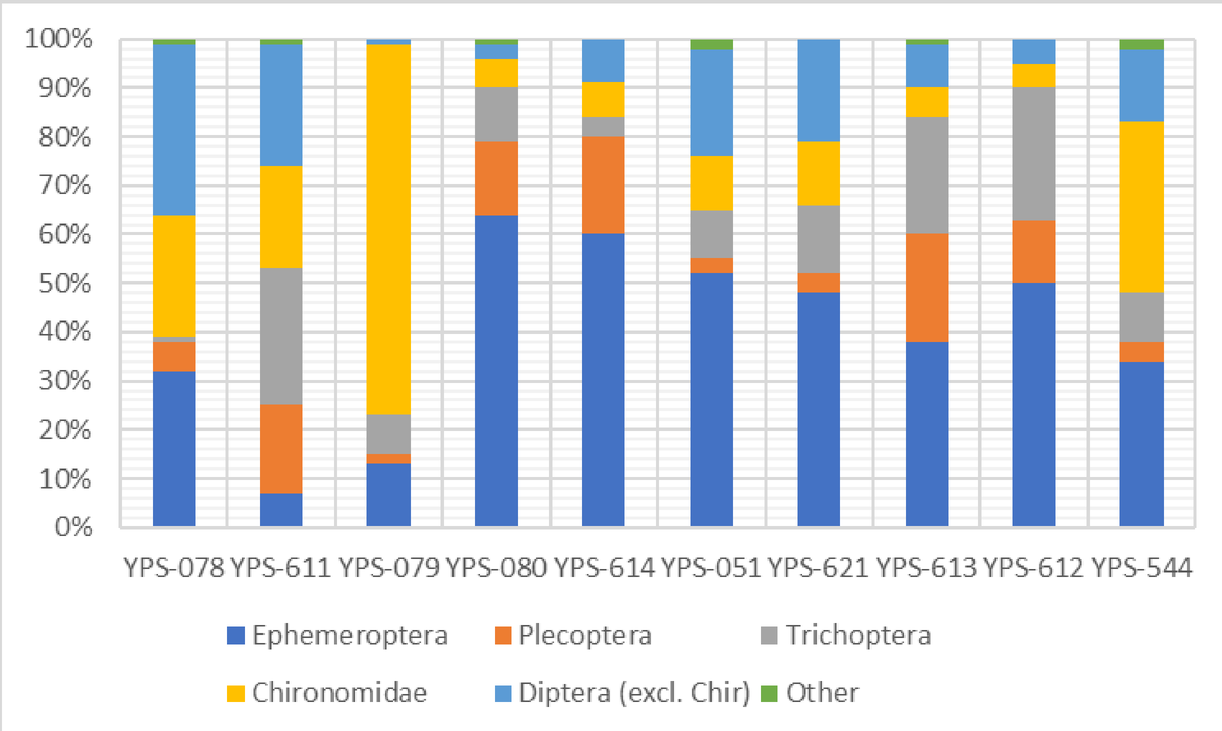


**Figure 4.1 Relative Abundance of Major Taxonomic Groups in Hunker Creek in 2019**

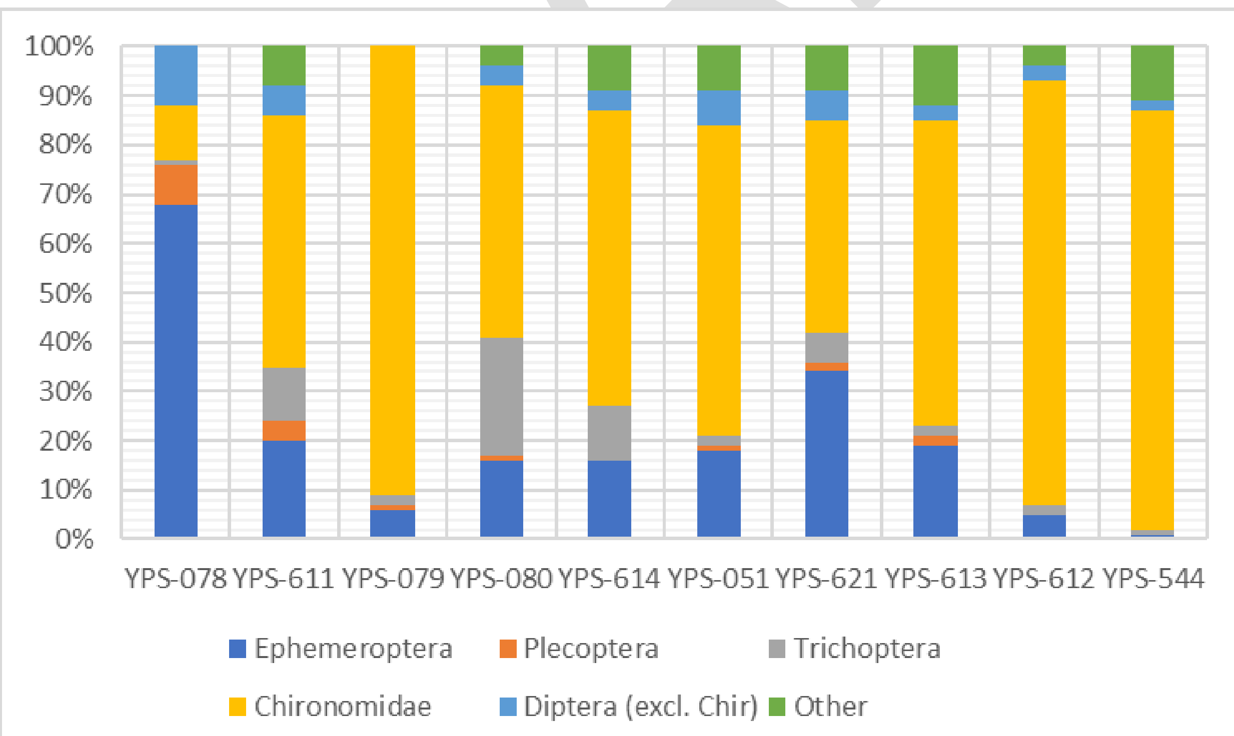


**Figure 4.2 Relative Abundance of Major Taxonomic Groups in Hunker Creek in 2020**

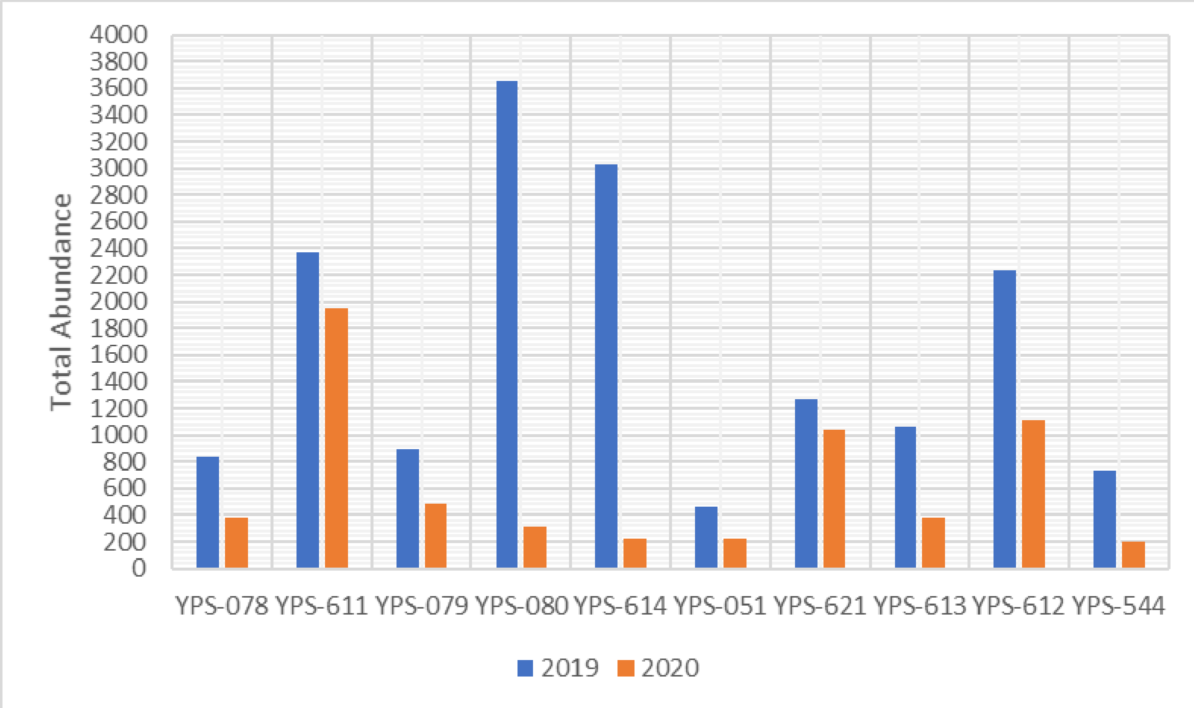


**Figure 4.3 Total Abundance of Benthic Invertebrates in Hunker Creek, 2019 and 2020**

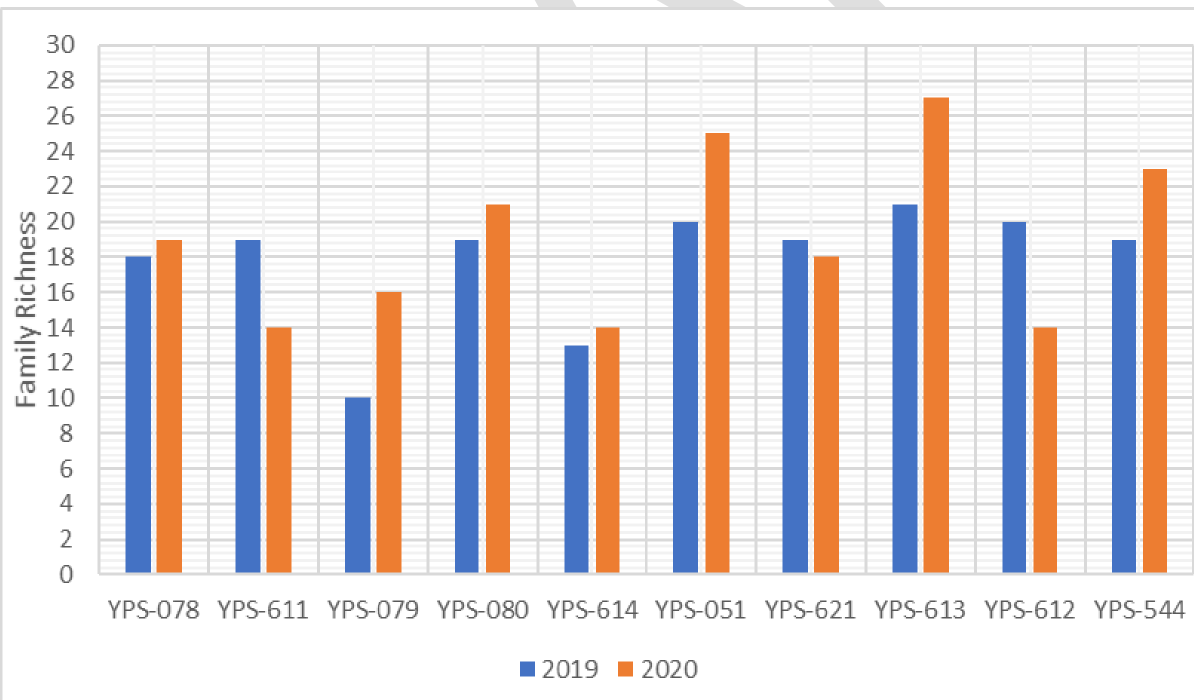


**Figure 4.4 Family Richness of Benthic Invertebrates in Hunker Creek, 2019 and 2020**

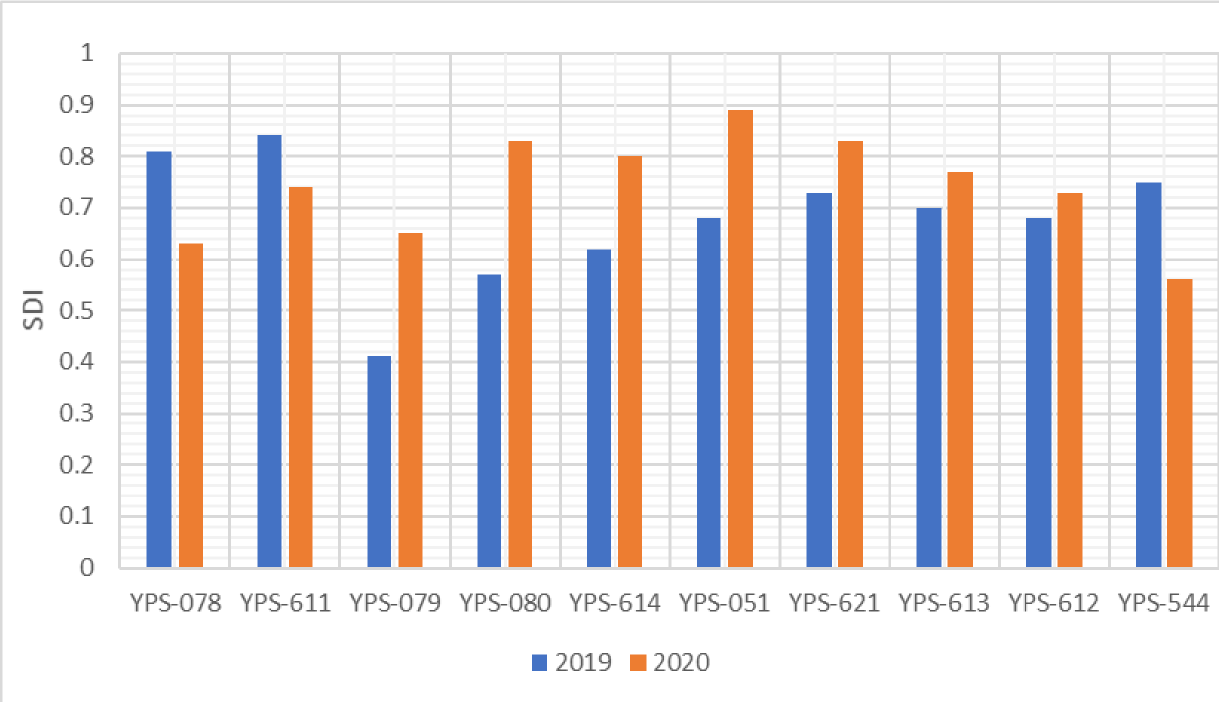


**Figure 4.5 SDI for Benthic Invertebrates in Hunker Creek, 2019 and 2020**

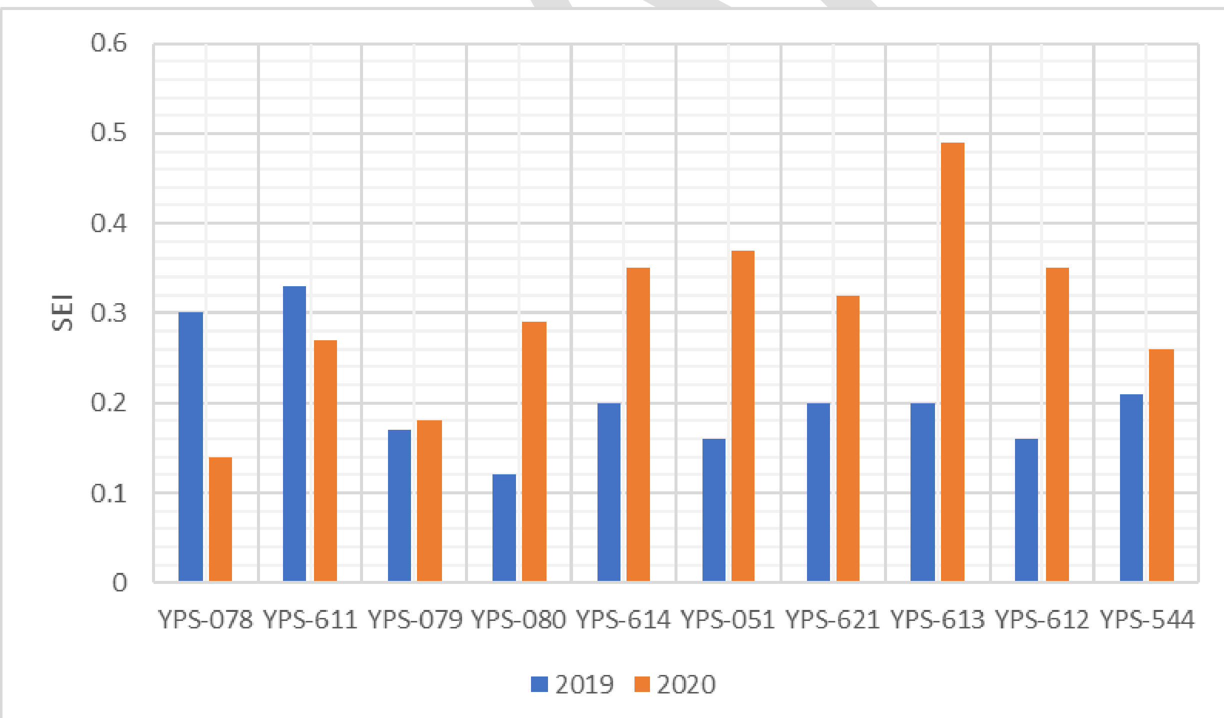


**Figure 4.6 SEI for Benthic Invertebrates in Hunker Creek, 2019 and 2020**

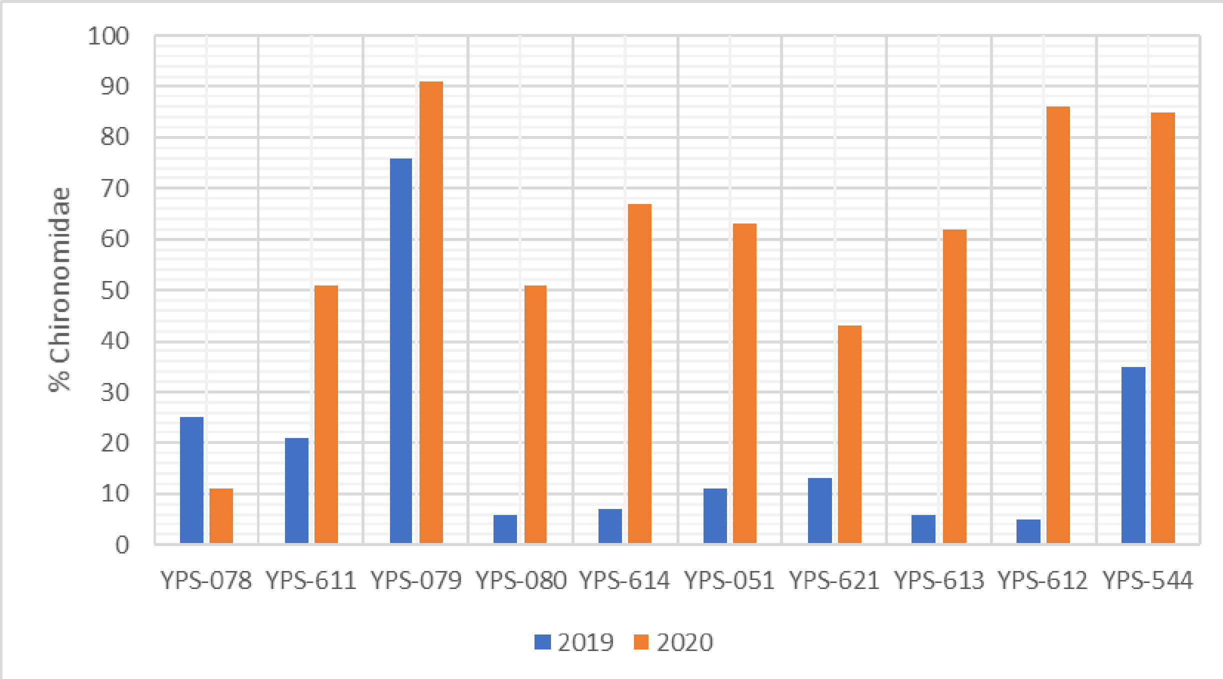


**Figure 4.7 Percent Chironomidae in Hunker Creek, 2019 and 2020**

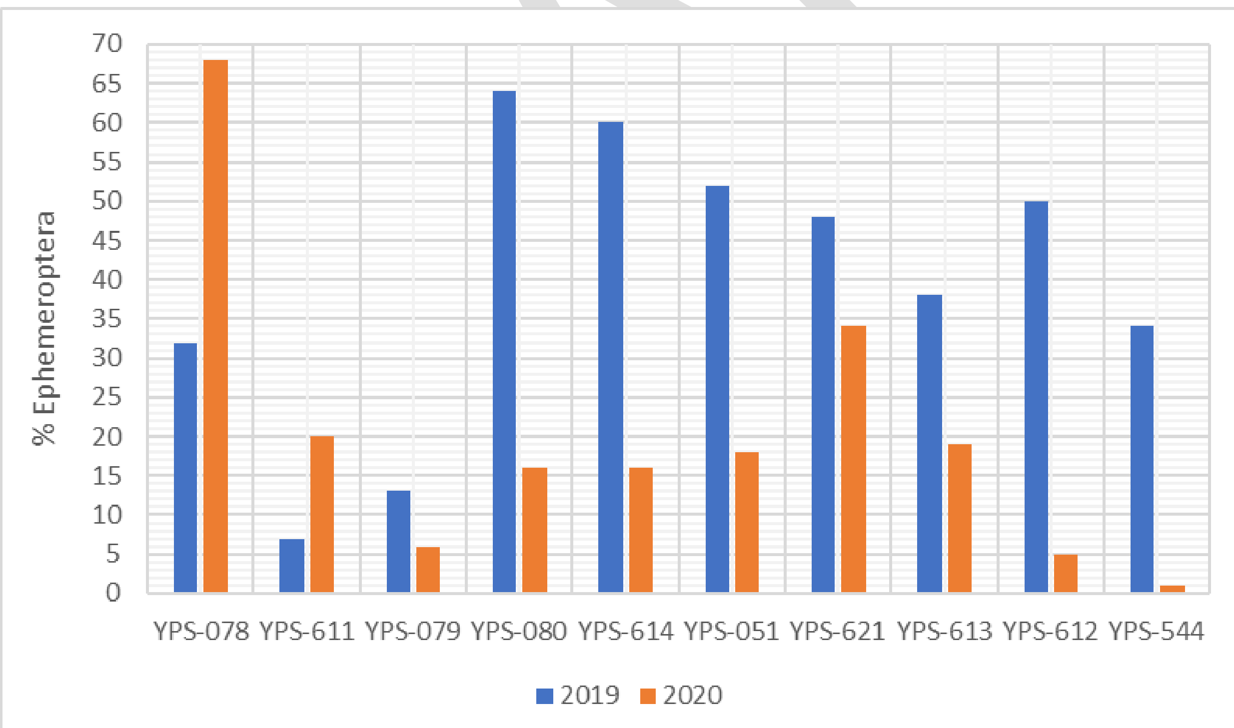


**Figure 4.8 Percent Ephemeroptera in Hunker Creek, 2019 and 2020**

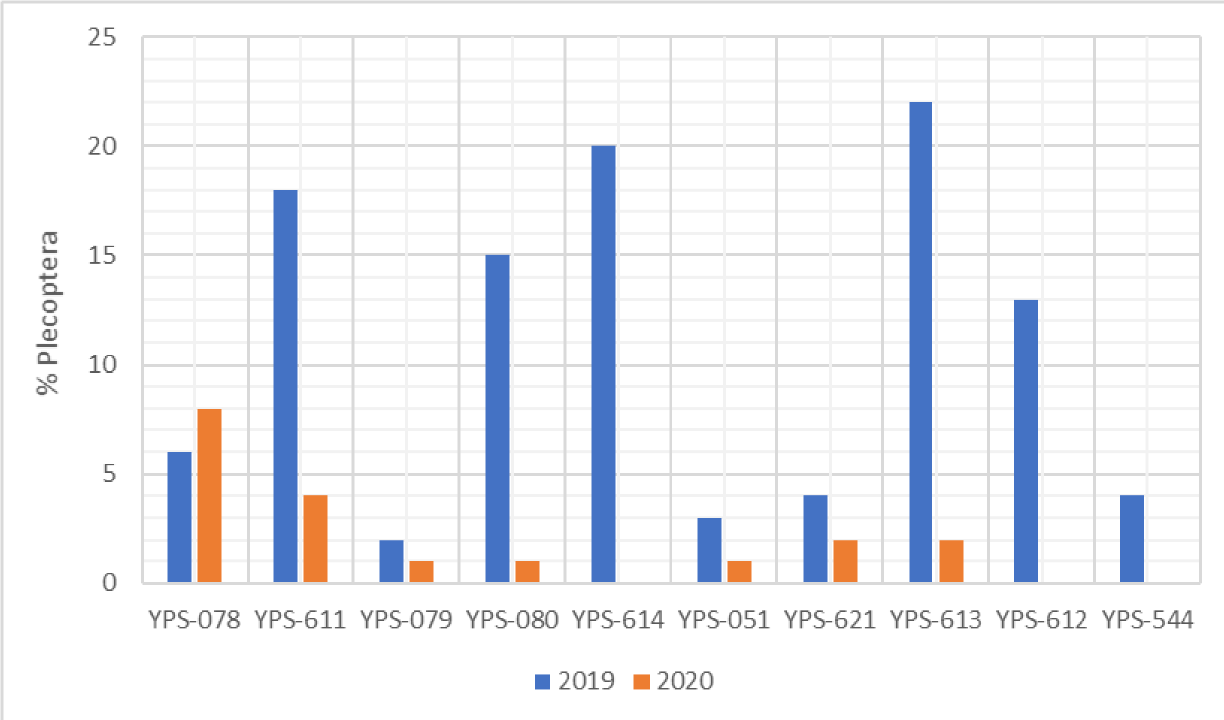


**Figure 4.9 Percent Plecoptera in Hunker Creek, 2019 and 2020**

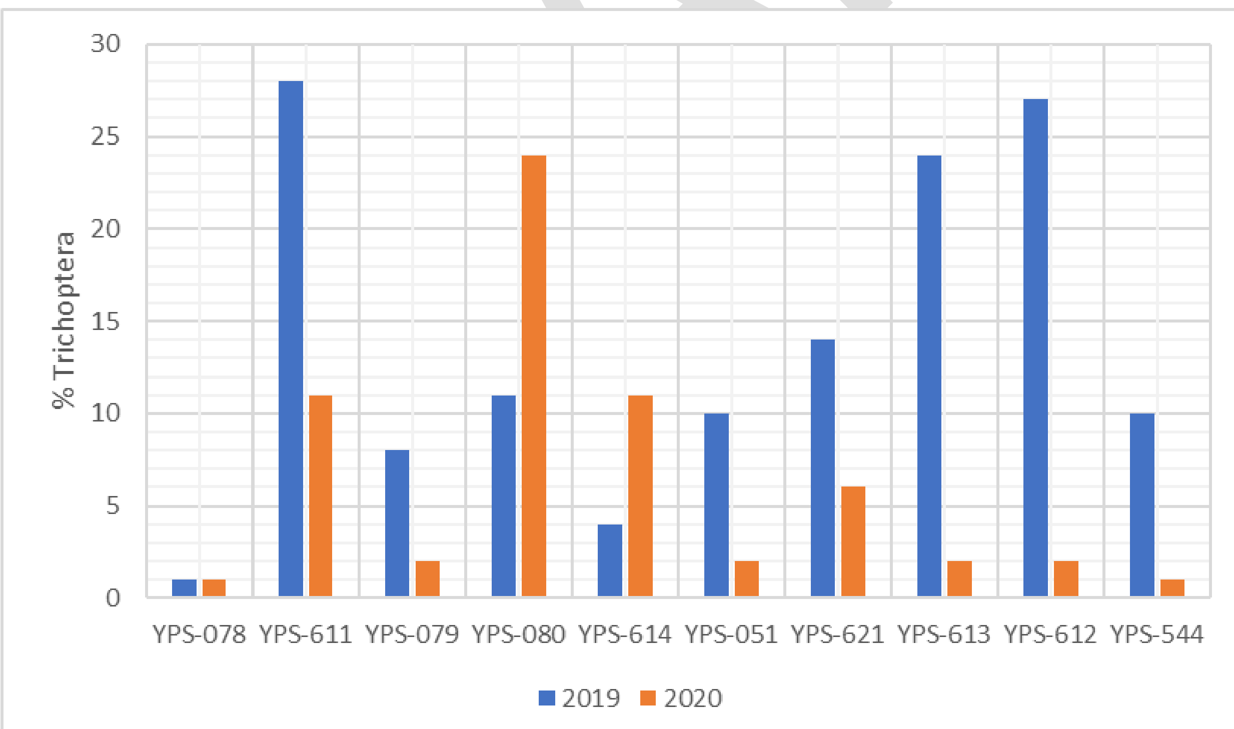


**Figure 4.10 Percent Trichoptera in Hunker Creek, 2019 and 2020**

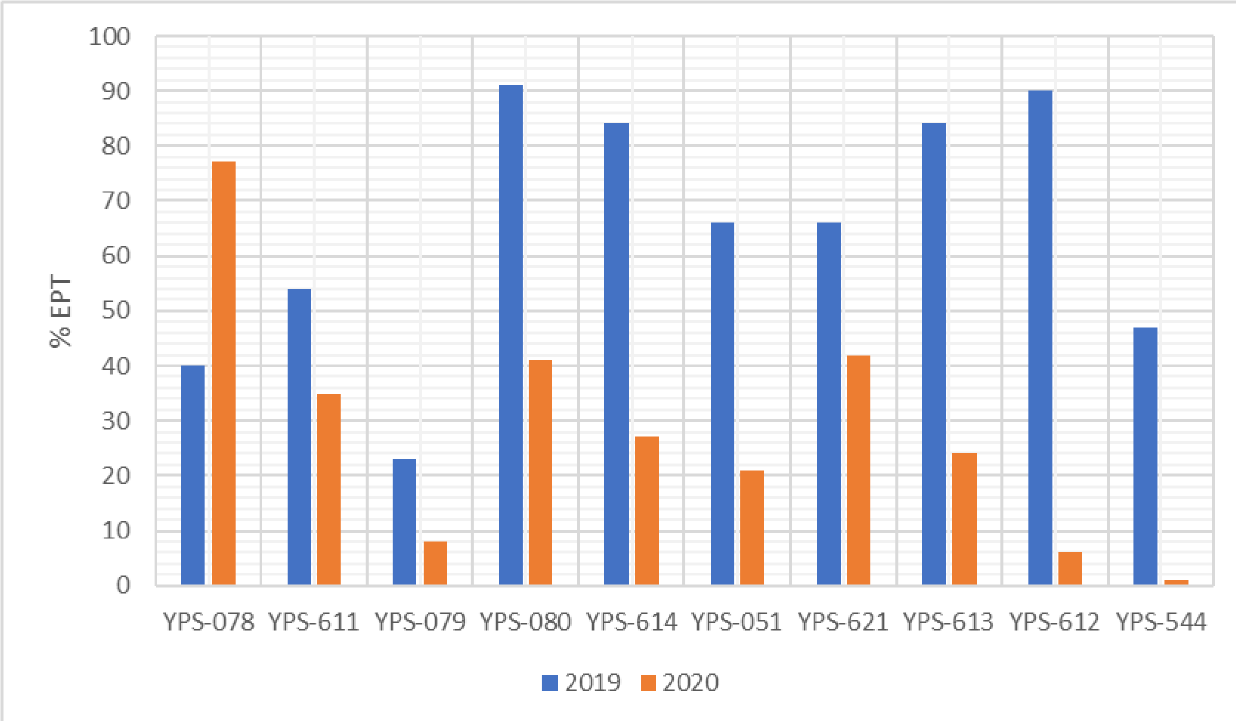


**Figure 4.11 Percent EPT in Hunker Creek, 2019 and 2020**

Total abundance at all sites was lower in 2020 in comparison with 2019 (**Figure 4.3**), especially at sites YPS-080 and YPS-614. Total abundance in 2020 ranged from 1955 at YPS-611 and 198 at YPS-544. The differences in total abundance between the two years might reflect differences in the area of streambed covered during kick-net sampling, while the time spent kick-netting should have been standardized.

Family richness (**Figure 4.4**), a simple measure of biodiversity, was higher at most Hunker Creek sites in 2020 than in 2019, except for sites YPS-611 and YPS-612. Family richness in 2020 ranged from 27 at YPS-613 to 14 at YPS-614 and YPS-611.

Simpson's Diversity Index (SDI) (**Figure 4.5**) was also higher in 2020 than 2019 at most sites, except for YPS-078, YPS-611 and YPS-544. SDI values were generally high in 2020 and ranged from 0.89 at YPS-051 to 0.56 at YPS-544. Similarly, Simpson's Evenness Index (SEI) (**Figure 4.6**) was higher in 2020 than 2019 at most sites, except for YPS-078 and YPS-611. SEI values were generally low and ranged from 0.14 at YPS-078 to 0.49 at YPS-613.

The relative abundance of chironomids (Order Diptera) (**Figure 4.7**) was much higher in 2020 than 2019 for all Hunker Creek sites, with the exception of YPS-078 (the most upstream site). This coincided with a decrease in 2020 in percentage of ephemoptera, plecoptera, trichoptera, at the majority of the sites sampled (**Figure 4.8**), except for YPS-078 which saw an increase of these taxa. The percentage of chironomids in 2020 ranged from 86% at YPS-612 to 11 at YPS-078. Percent EPT ranged from 77% at YPS-078 to 1% at YPS-544.

The differences in total stream invertebrate abundance observed at the ten Hunker Creek AHM sites between 2019 and 2020 might be accounted for by differences in sampling approaches of field personnel (i.e., a shorter overall distance travelled over the streambed in 2020 while kick-netting, or between-year differences in the degree to which the substrate was worked). Such methodological differences, however, would not account for the marked between-year differences in community composition, and particularly the much higher proportion of the community in 2020 compared with 2019 made of dipteran insects (including chironomids) and much lower proportion of EPT. Future work will involve analyses to attempt to identify any predictable trends in the benthic invertebrate data from the past 5 years using different methods than are currently employed.

No discernable trends were identified when evaluating the benthic invertebrate community metrics over a longer time frame for Hunker Creek AHM sites YPS-078 (most upstream) and YPS-544 (most downstream), based on data available from 2006 through 2020 (**Table 4.6**). The high degree of between-year variability in % EPT and % C is nonetheless striking. The coefficient of variation for other community metrics such as abundance and family richness was much lower than for % EPT and % C.

Total abundance at YPS-544 appeared to be following an upward trend from 2013 to 2019, but then decreased again in 2020, whereas abundance at YPS-078 has fluctuated non-systematically from year to year. Family richness at YPS-078 has been steady since 2006 with limited family diversity. In contrast, family richness at YPS-544 has been more variable between monitoring years, with a family richness as low as 4 in 2014 and as high as 23 in 2020. SDI values are generally high at both sites (>0.50, except at YPS-078 in 2008 (0.35)) and don't appear to following any specific trends over time. SEI, conversely, has been generally low over the years of sampling with the exception of 2013 and 2014 at YPS-544.

#### *4.3.2.2 Swede Creek*

Benthic invertebrate community metrics obtained for Swede Creek in 2009, 2016 and 2020 (YPS-386) are provided in **Table 4.7** and illustrated in **Figure 4.13** to **Figure 4.21**. The benthic community composition at YPS-386 from the three years of monitoring was summarized as a percentage of the major taxonomic orders present and is presented in **Figure 4.12**.

**Table 4.7 Benthic Community Metrics in Swede Creek**

| Watercourse Name | Site | Year | Total Abundance | Family Richness | SDI | SEI | % C | % E | % P | % T | % EPT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Swede Creek | YPS-386 | 2009 | 858 | 25 | 0.80 | 0.20 | 40 | 23 | 8 | 1 | 32 |
| | | 2016 | 1109 | 19 | 0.81 | 0.28 | 37 | 31 | 10 | 0 | 41 |
| | | 2020 | 2136 | 33 | 0.90 | 0.31 | 16 | 44 | 8 | 3 | 55 |

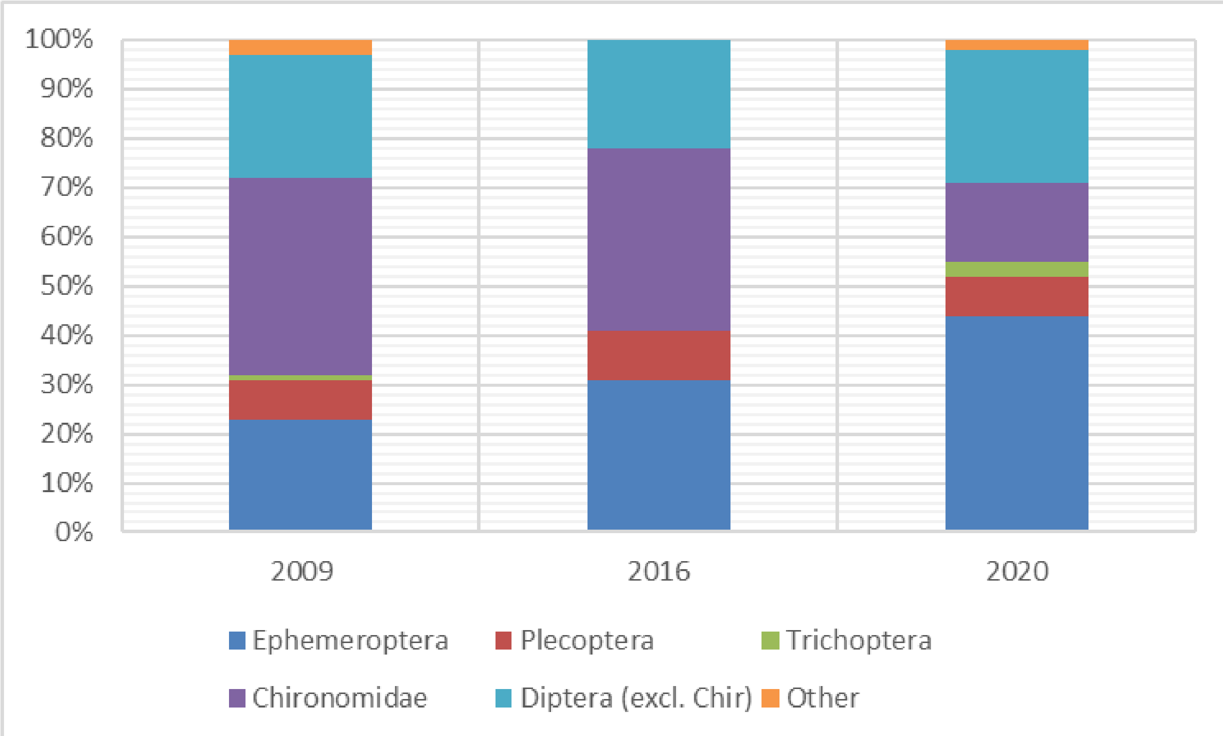


**Figure 4.12 Relative Abundance of Major Taxonomic Groups at YPS-386 in Swede Creek, 2009, 2016 and 2020**

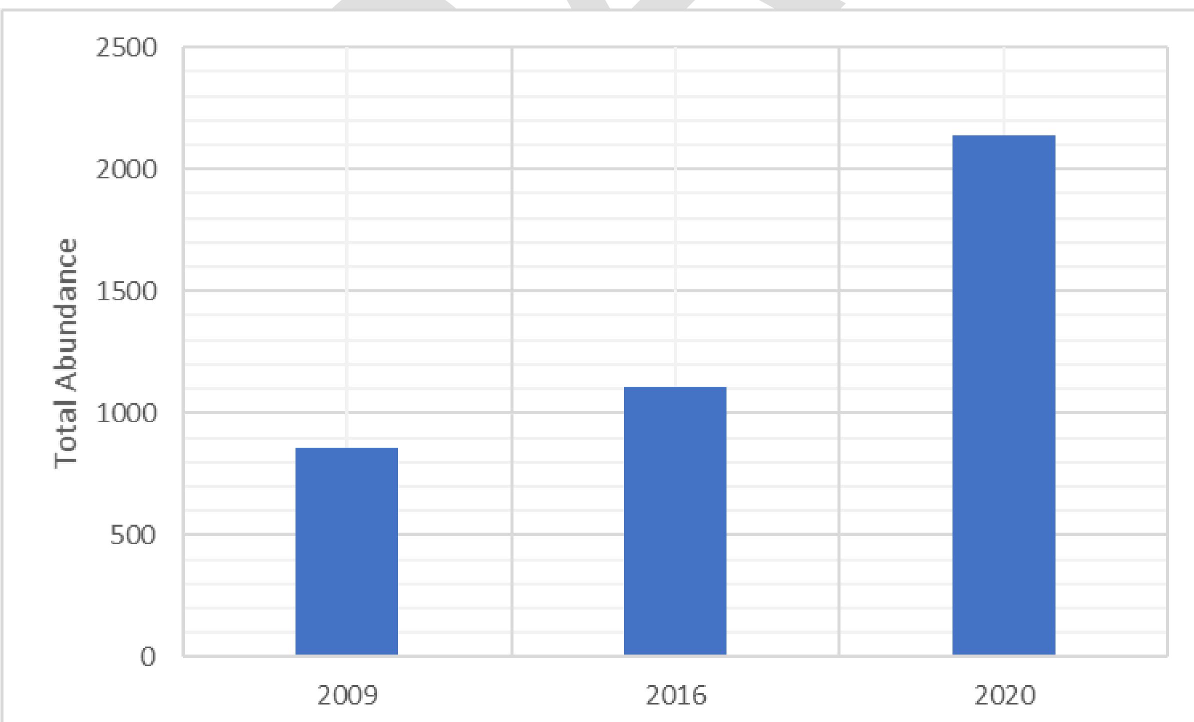


**Figure 4.13 Total Abundance of Benthic Invertebrates at YPS-386 in Swede Creek, 2009, 2016 and 2020.**

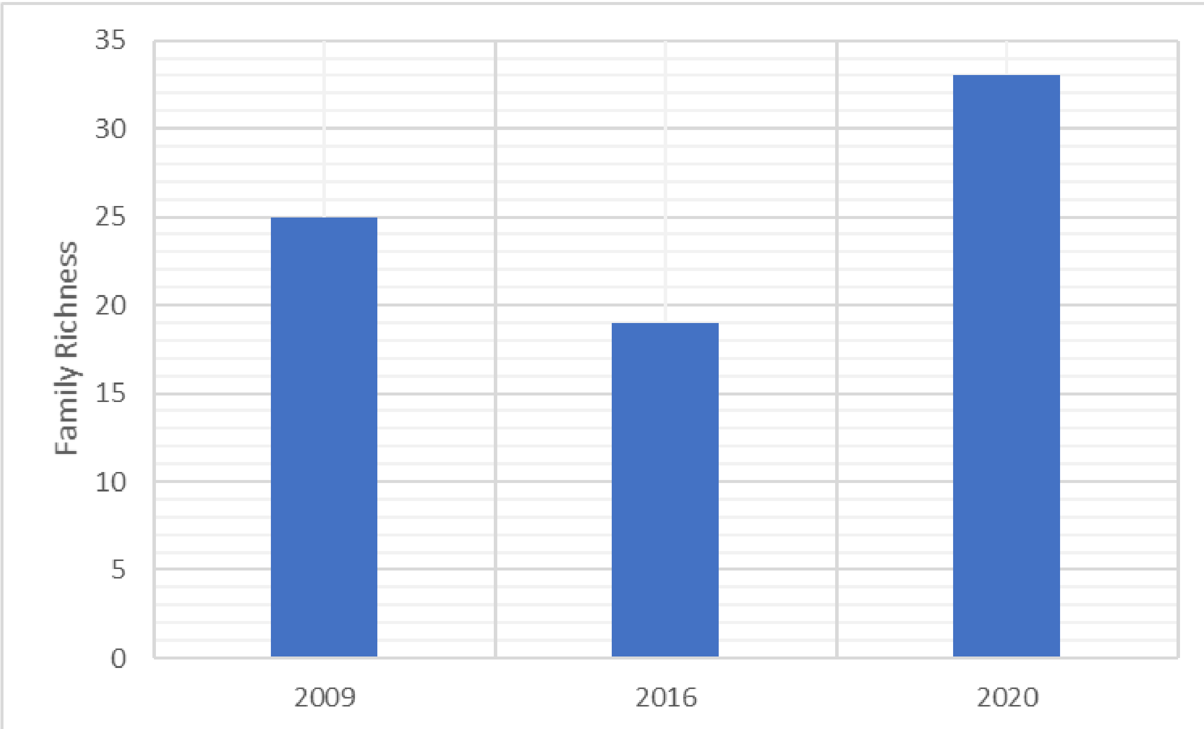


**Figure 4.14 Family Richness of Benthic Invertebrates at YPS-386 in Swede Creek, 2009, 2016 and 2020**

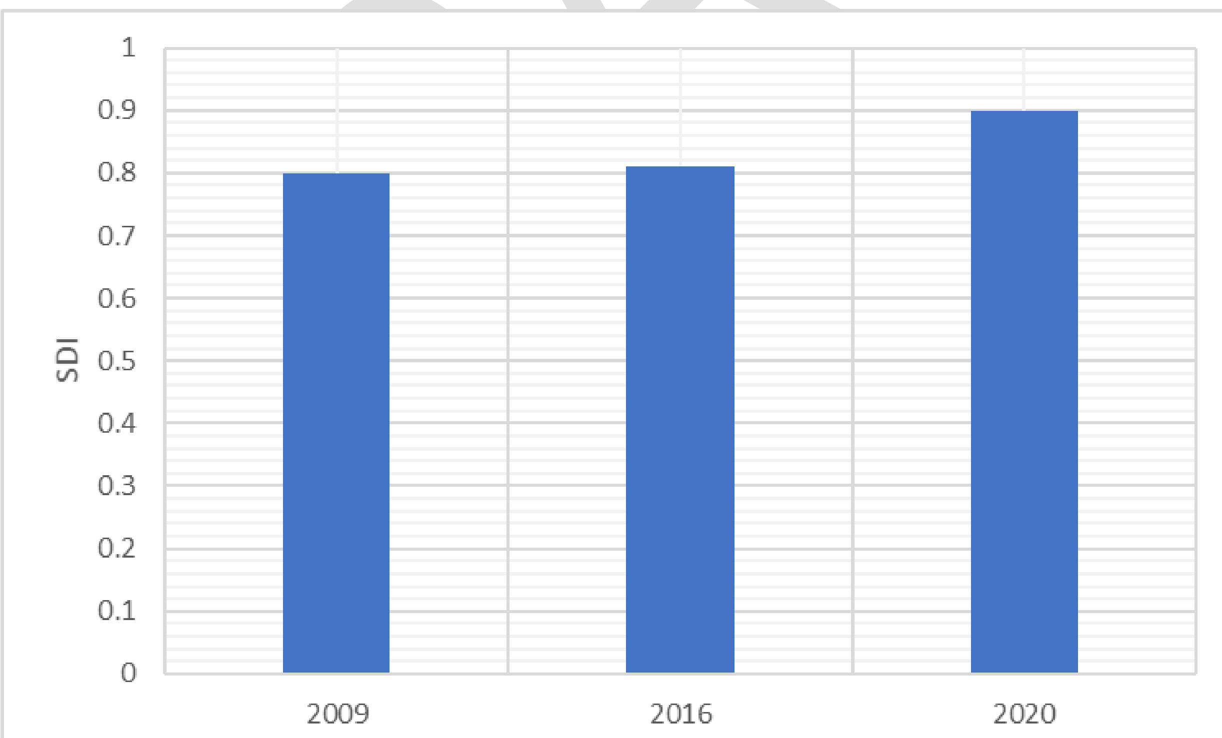


**Figure 4.15 SDI for Benthic Invertebrates at YPS-386 in Swede Creek, 2009, 2016 and 2020**

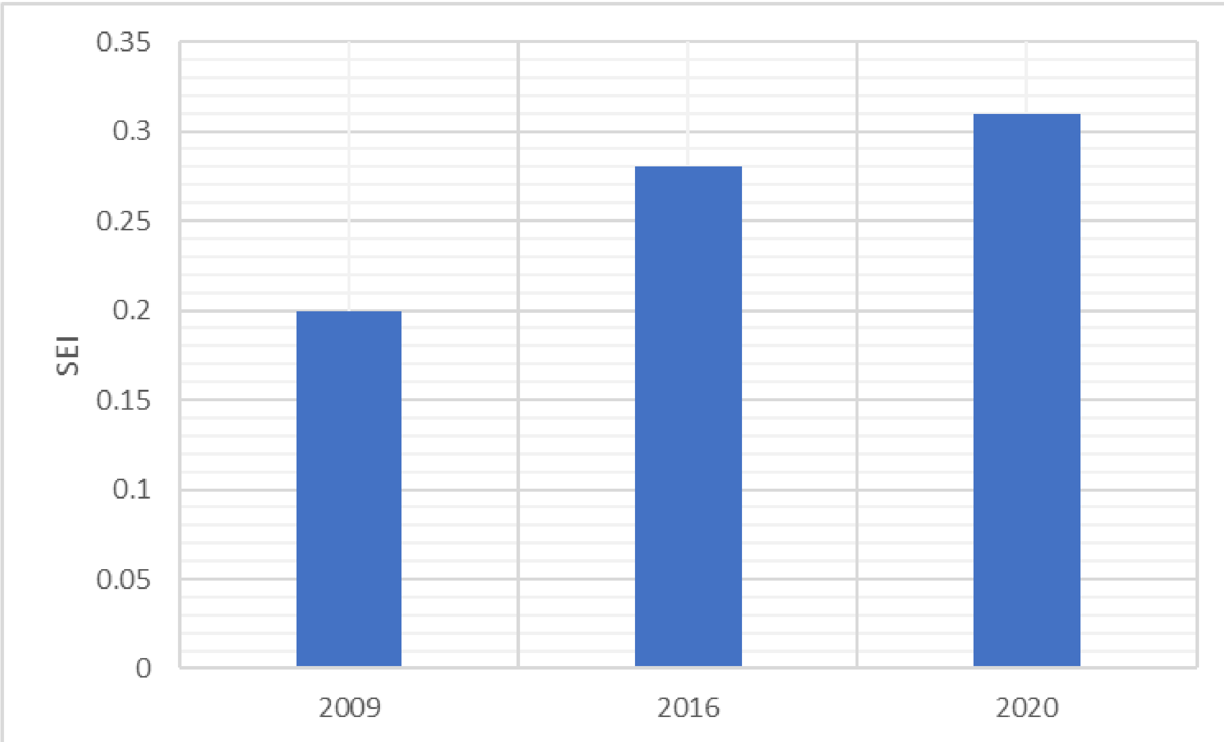


**Figure 4.16 SEI for Benthic Invertebrates at YPS-386 in Swede Creek, 2009, 2016 and 2020**

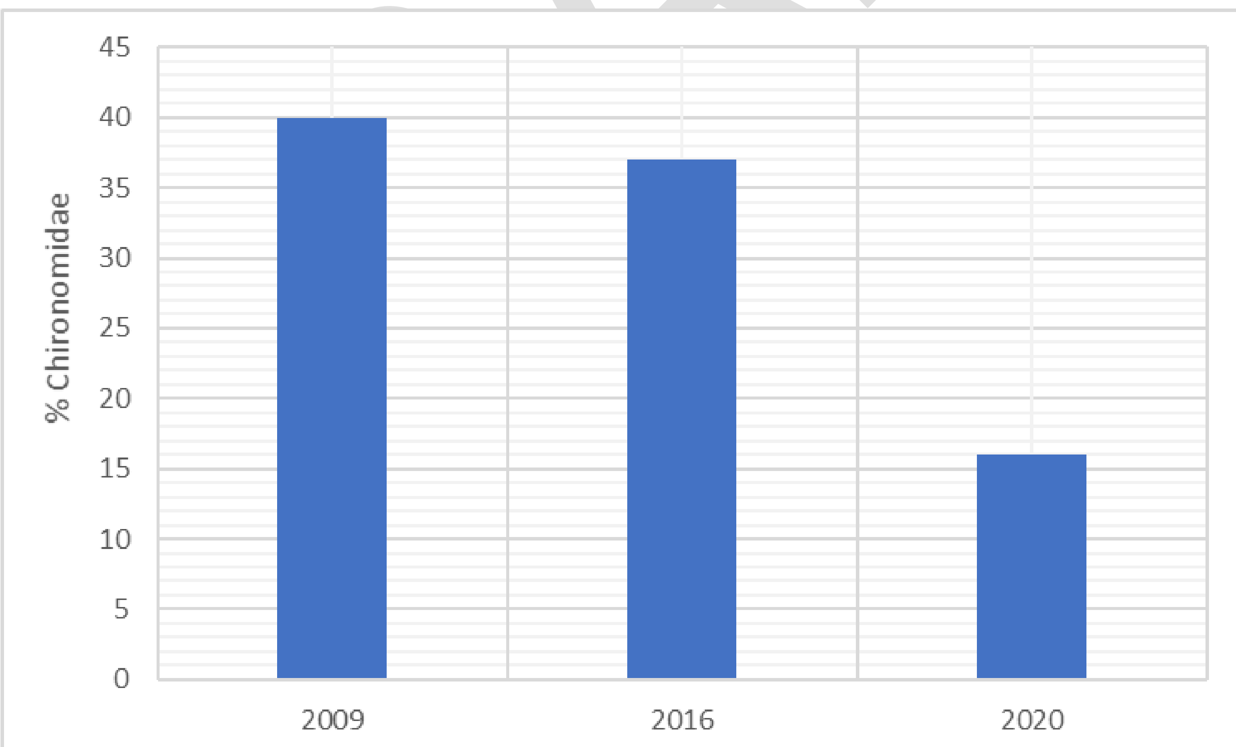


**Figure 4.17 Percent Chironomidae at YPS-386 in Swede Creek, 2009, 2016 and 2020**

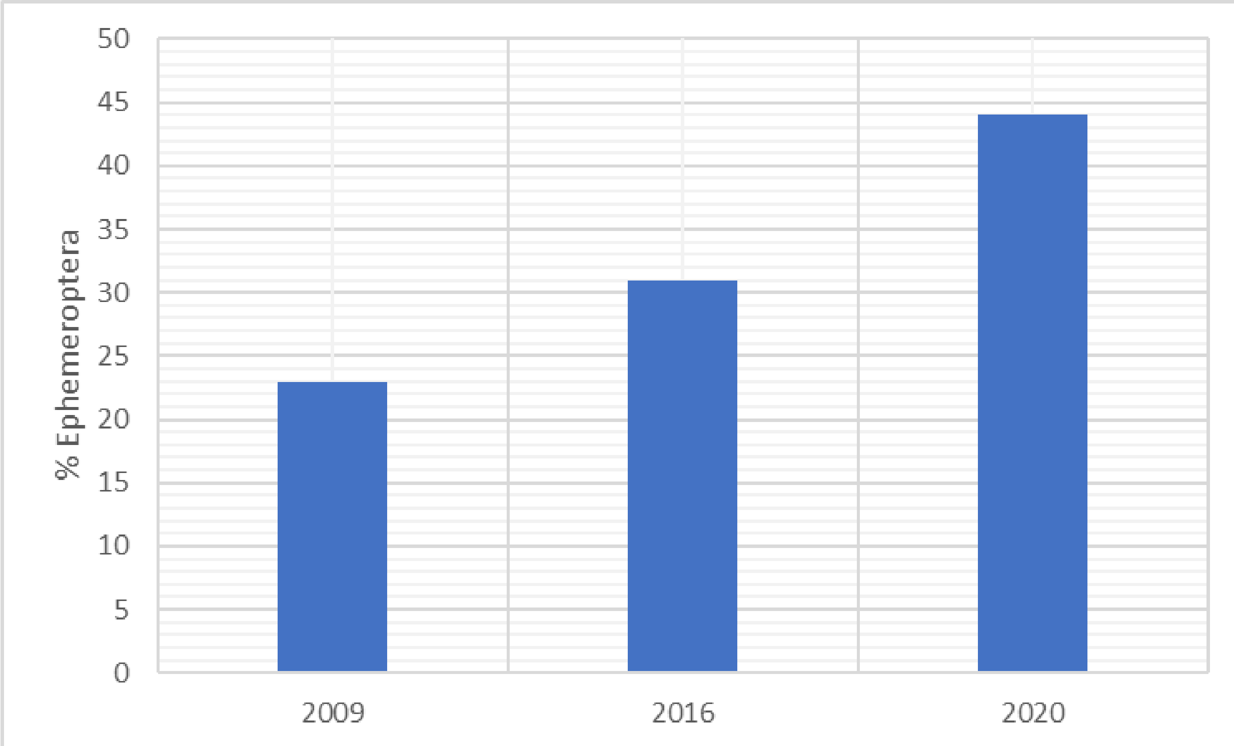


**Figure 4.18 Percent Ephemeroptera at YPS-386 in Swede Creek, 2009, 2016 and 2020**

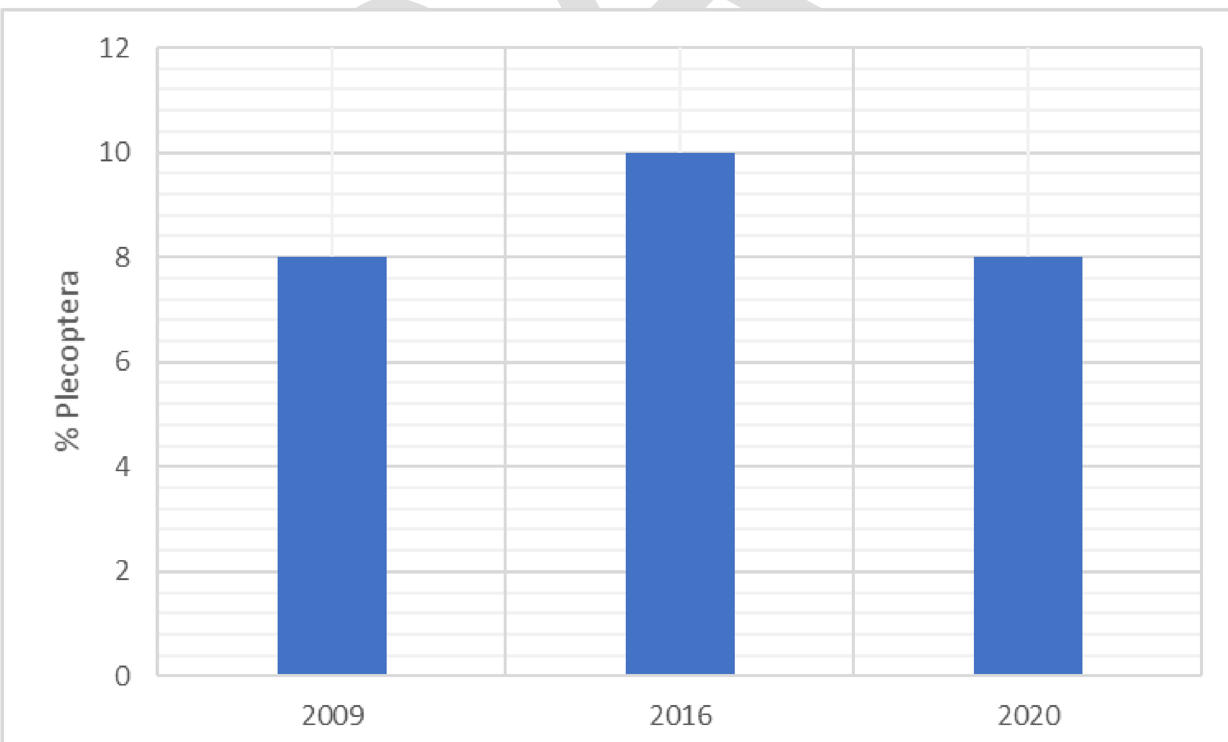


**Figure 4.19 Percent Plecoptera at YPS-386 in Swede Creek, 2009, 2016 and 2020**

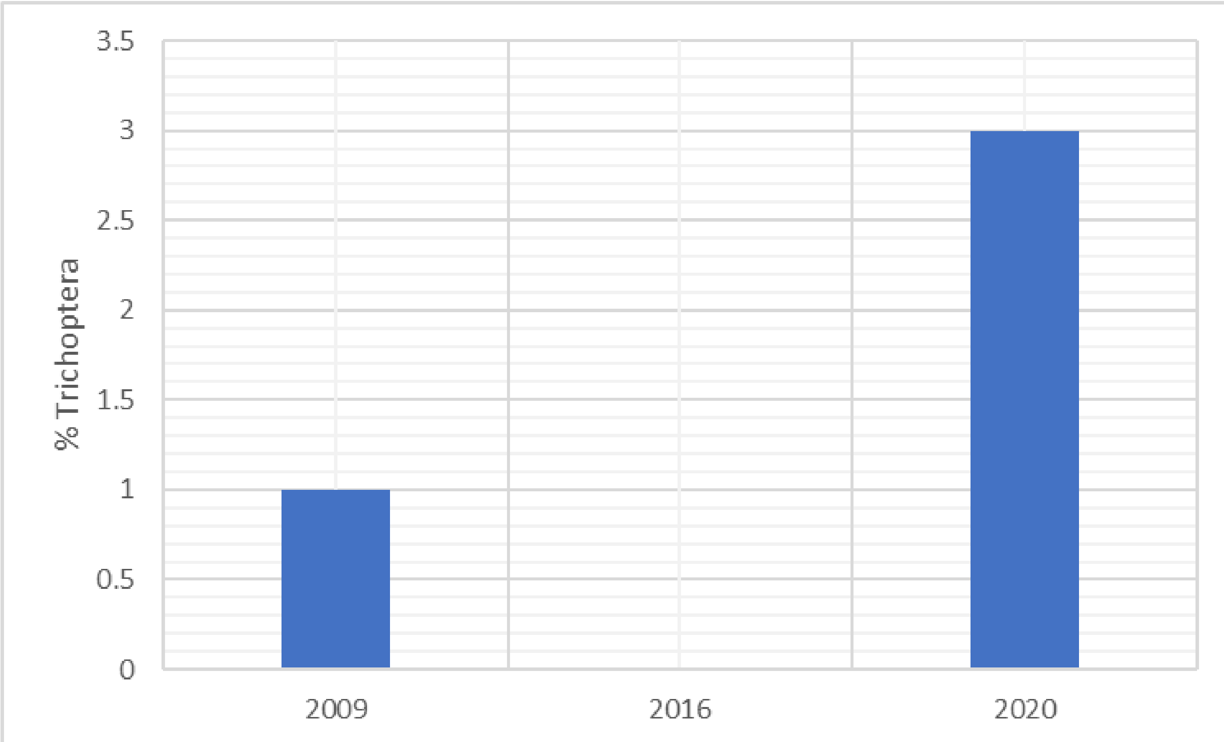


**Figure 4.20 Percent Trichoptera at YPS-386 in Swede Creek, 2009, 2016 and 2020**

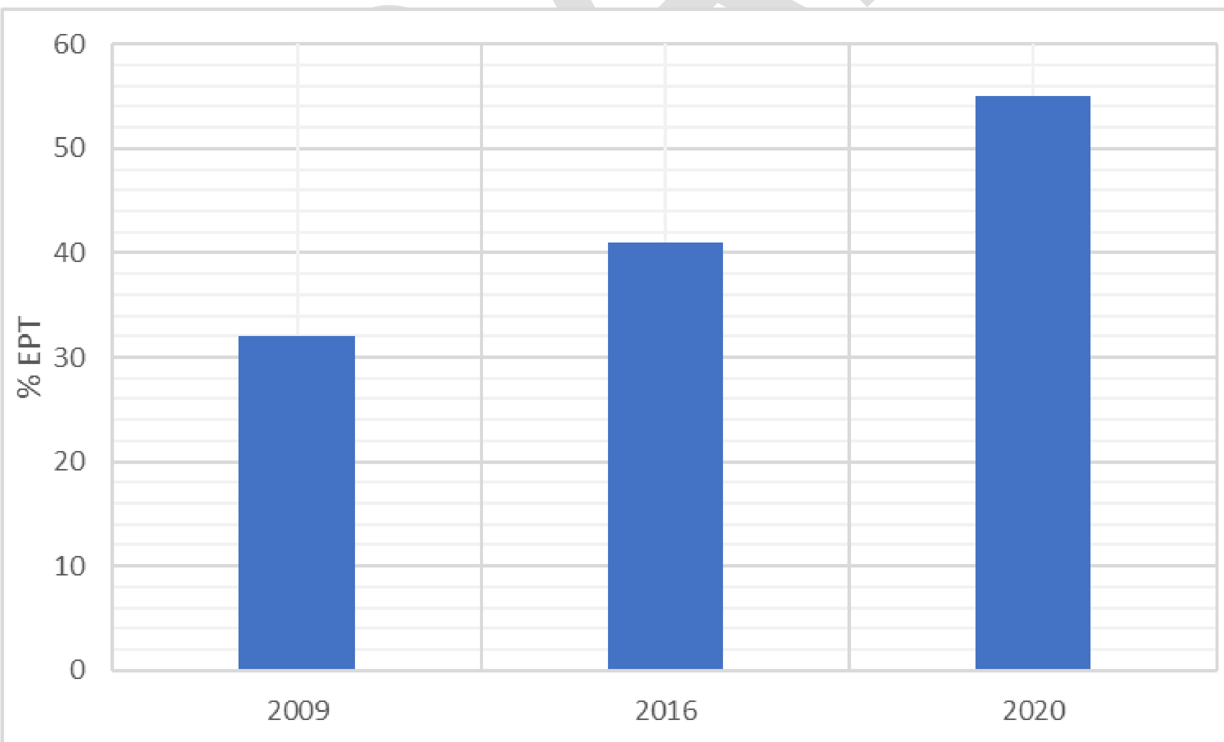


**Figure 4.21 Percent EPT at YPS-386 in Swede Creek, 2009, 2016 and 2020**

Total abundance at the site shows an increasing trend from the years of monitoring at YPS-386. Family richness decreased from 2009 to 2016 and increased from 2016 to 2020. SDI values calculated for the site are generally high with a range from 0.80 to 0.90. The SEI values (0.20 to 0.31), however, suggest that there is a high degree of dominance by one or few types of organisms. Community composition has changed since the sampling commenced in 2009. Percent *Chironomidae* has decreased since 2009, whereas % EPT has increased since 2009. This shift is observed in percent ephemeroptera but not in plecoptera, which remained steady since 2009. Similar to Adams Creek, there is very little representation from trichoptera in any of the years sampled with only one percent in 2009, no representation in 2016, and three percent in 2020.

#### *4.3.2.3 Adams Creek*

Invertebrate community metrics measured for Adams Creek stations are provided in **Table 4.8**. Community metrics are presented in **Figure 4.23** through **Figure 4.30** and relative abundance of major taxonomic groups is shown in **Figure 4.22**.

**Table 4.8 Benthic Community Metrics in Adams Creek**

| Watercourse Name | Site | Year | Total Abundance | Family Richness | SDI | SEI | % C | % E | % P | % T | % EPT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Adams Creek | YPS-622 | 2020[a] | 395 | 12 | 0.62 | 0.22 | 74 | 9 | 6 | 0 | 16 |
| Adams Creek | YPS-623 | 2020 | 282 | 14 | 0.79 | 0.34 | 57 | 21 | 10 | 0 | 31 |
| Adams Creek | YPS-624 | 2020 | 896 | 23 | 0.76 | 0.21 | 67 | 3 | 3 | 0 | 6 |
| Adams Creek | YPS-625 | 2020 | 1,640 | 10 | 0.66 | 0.30 | 82 | 4 | 2 | 0 | 6 |
| Adams Creek | YPS-626 | 2020[a] | 1,792 | 26 | 0.77 | 0.52 | 70 | 4 | 2 | 1 | 7 |
| Summary Statistics | Arithmetic Mean | | 1001 | 17 | 0.72 | 0.32 | 70 | 8 | 5 | 0 | 13 |
| | Standard Deviation | | 694 | 7 | 0.08 | 0.13 | 9 | 8 | 3 | 0 | 11 |
| | Minimum | | 282 | 10 | 0.62 | 0.21 | 57 | 3 | 2 | 0 | 6 |
| | Maximum | | 1792 | 26 | 0.79 | 0.52 | 82 | 21 | 10 | 0 | 31 |

Notes: SDI = Simpson's Diversity Index; SEI = Simpson's Evenness Index; C = Chironomidae (non-biting midges); E = Ephemeroptera (mayflies); P = Plecoptera (stoneflies); T = Trichoptera (caddisflies)

a. 2020 metric values for the sites are based on the average of three replicate samples.

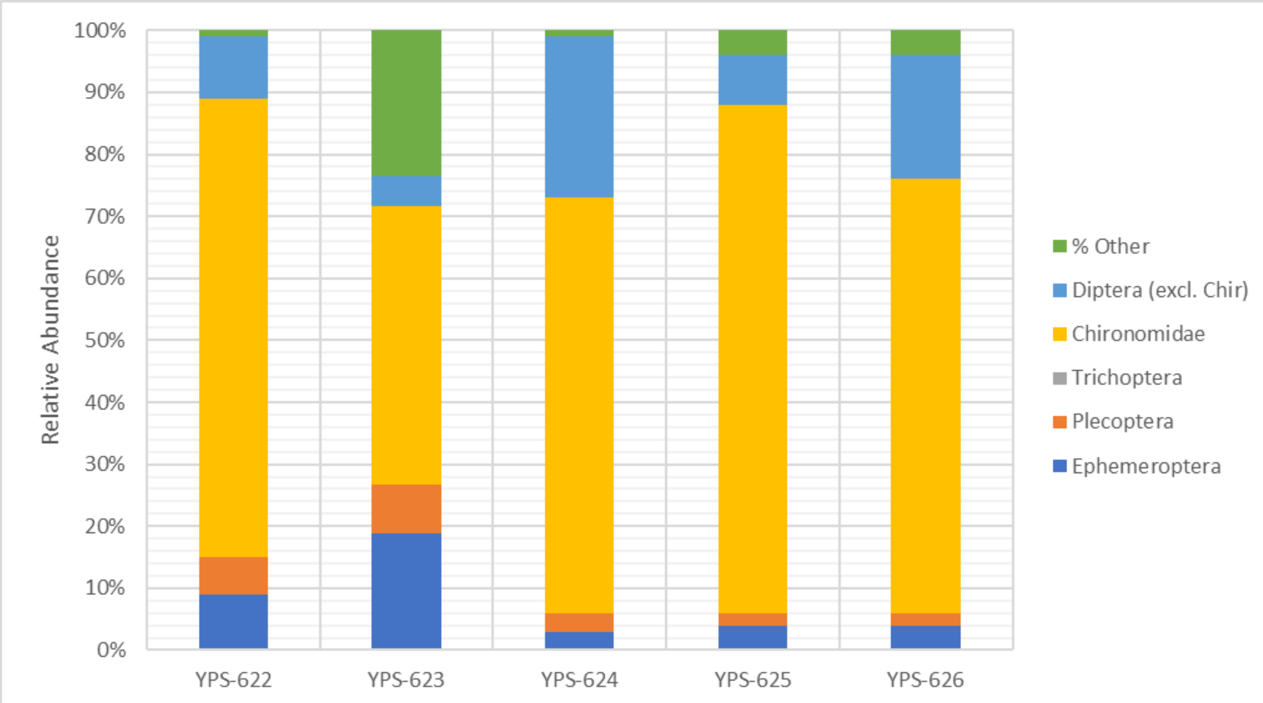


**Figure 4.22 Relative Abundance of Major Taxonomic Groups in Adams Creek**

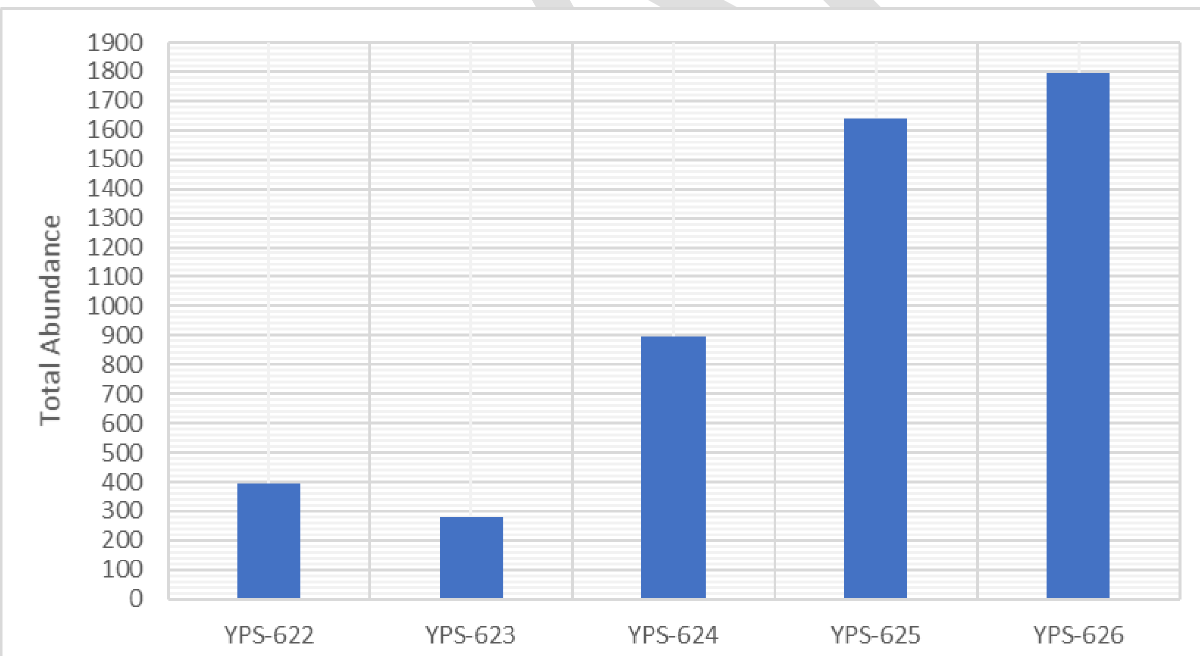


**Figure 4.23 Total Abundance of Benthic Invertebrates in Adams Creek, 2020**

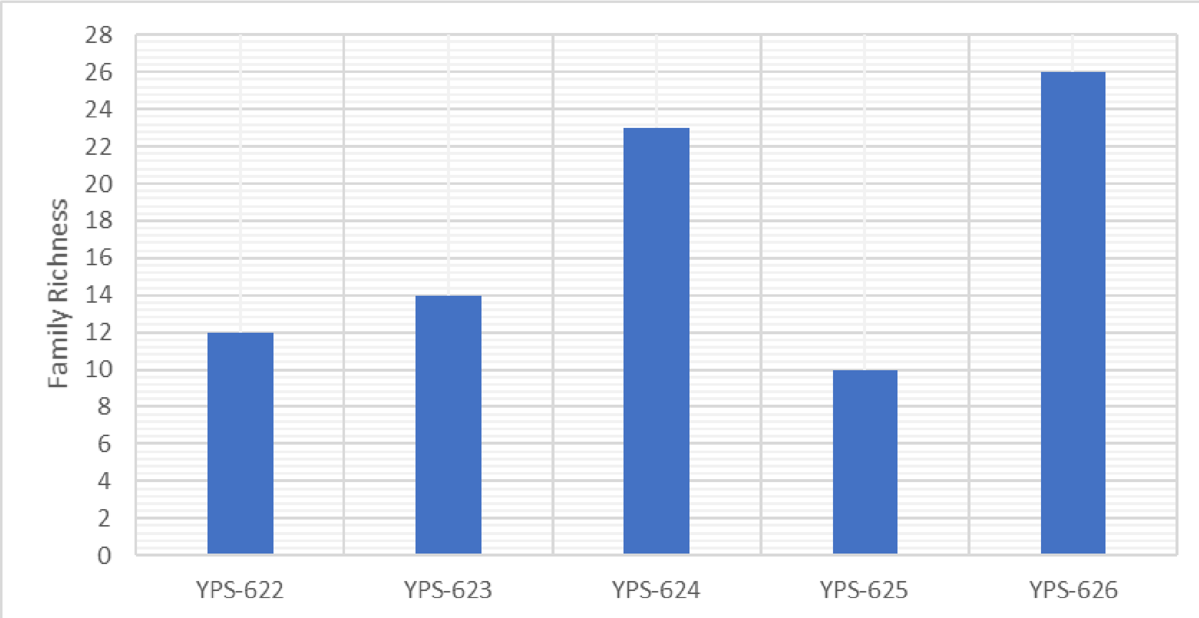


**Figure 4.24 Family Richness of benthic invertebrates in Adams Creek, 2020**

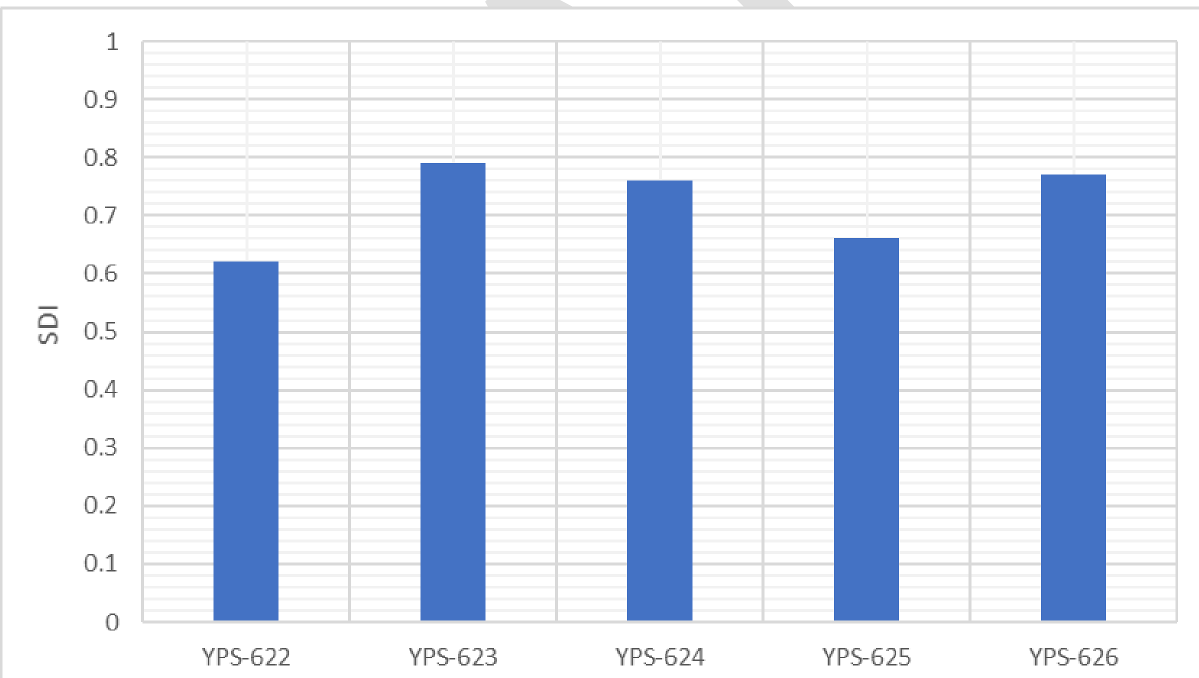


**Figure 4.25 SDI of Benthic Invertebrates in Adams Creek, 2020**

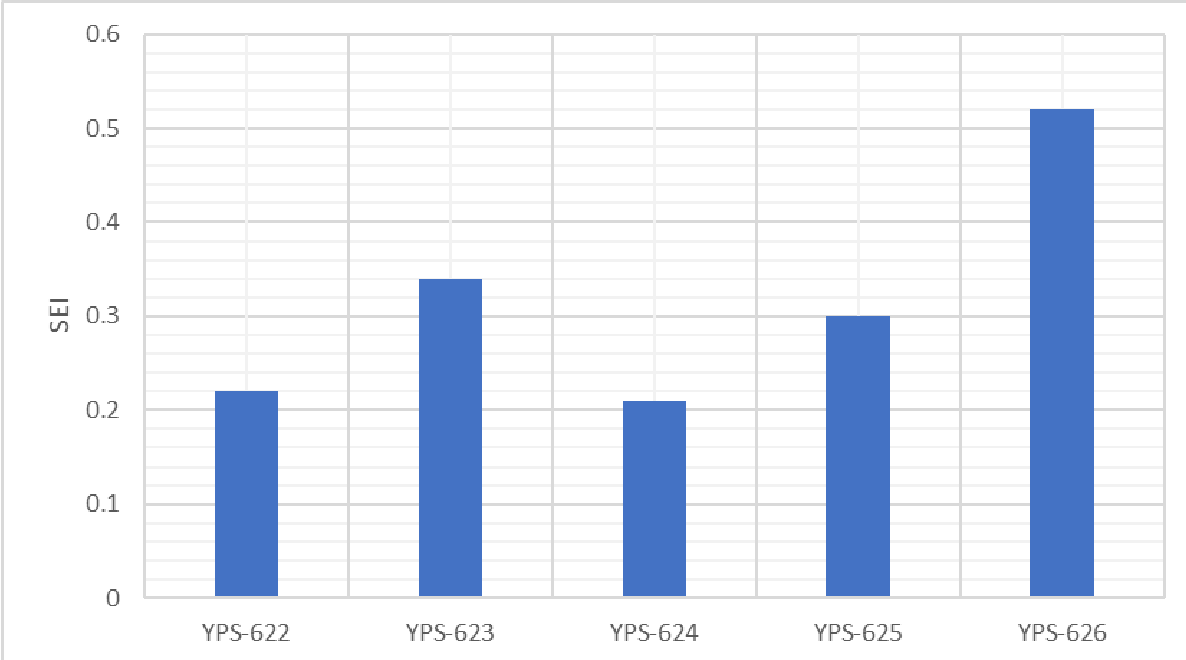


**Figure 4.26 SEI of Benthic Invertebrates in Adams Creek, 2020**

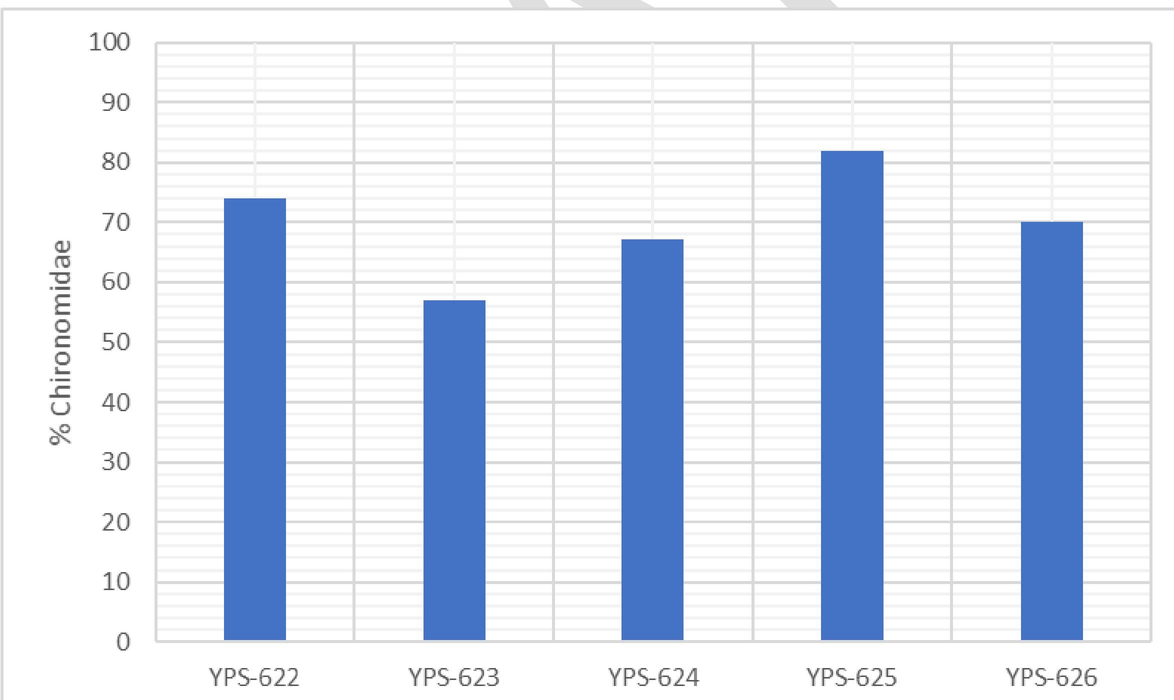


**Figure 4.27 Percent Chironomidae in Adams Creek, 2020**

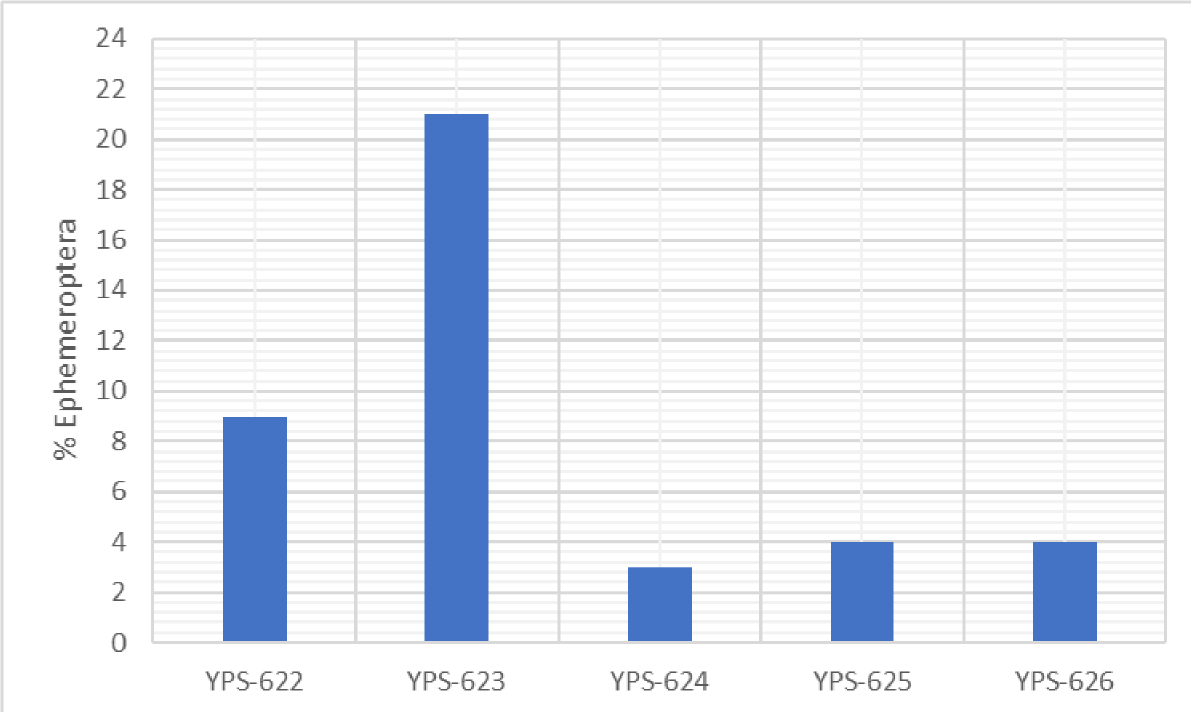


**Figure 4.28 Percent Ephemeroptera in Adams Creek, 2020**

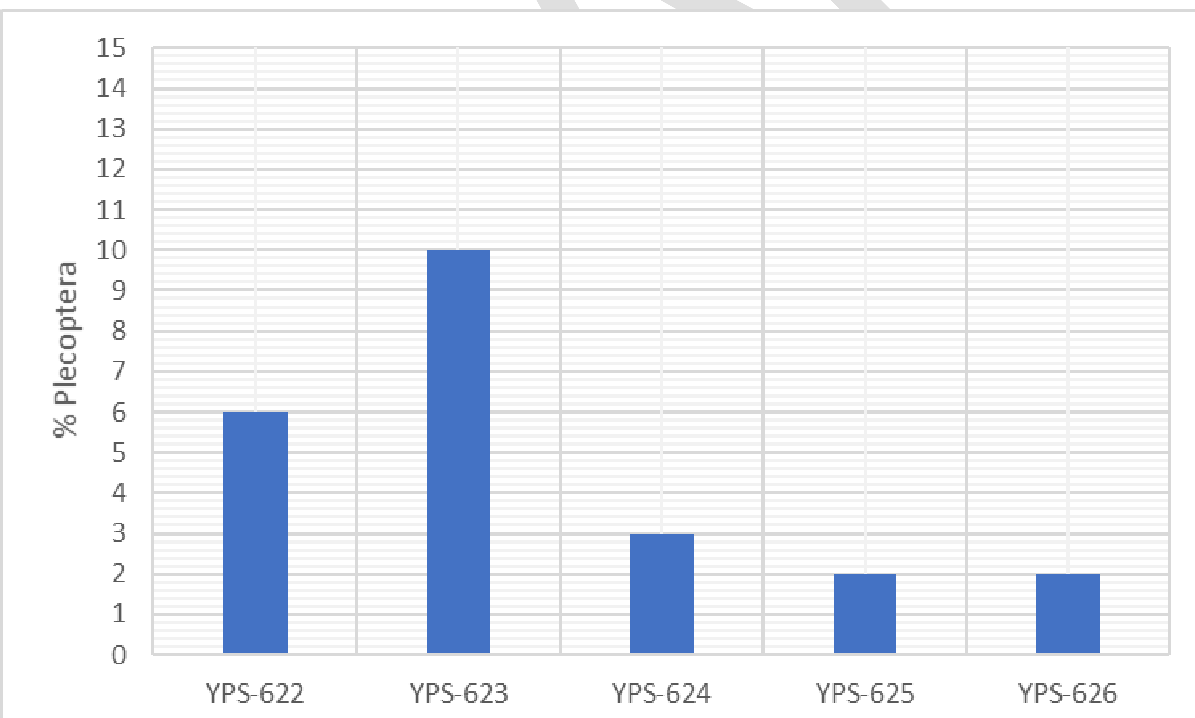


**Figure 4.29 Percent Plecoptera in Adams Creek, 2020**

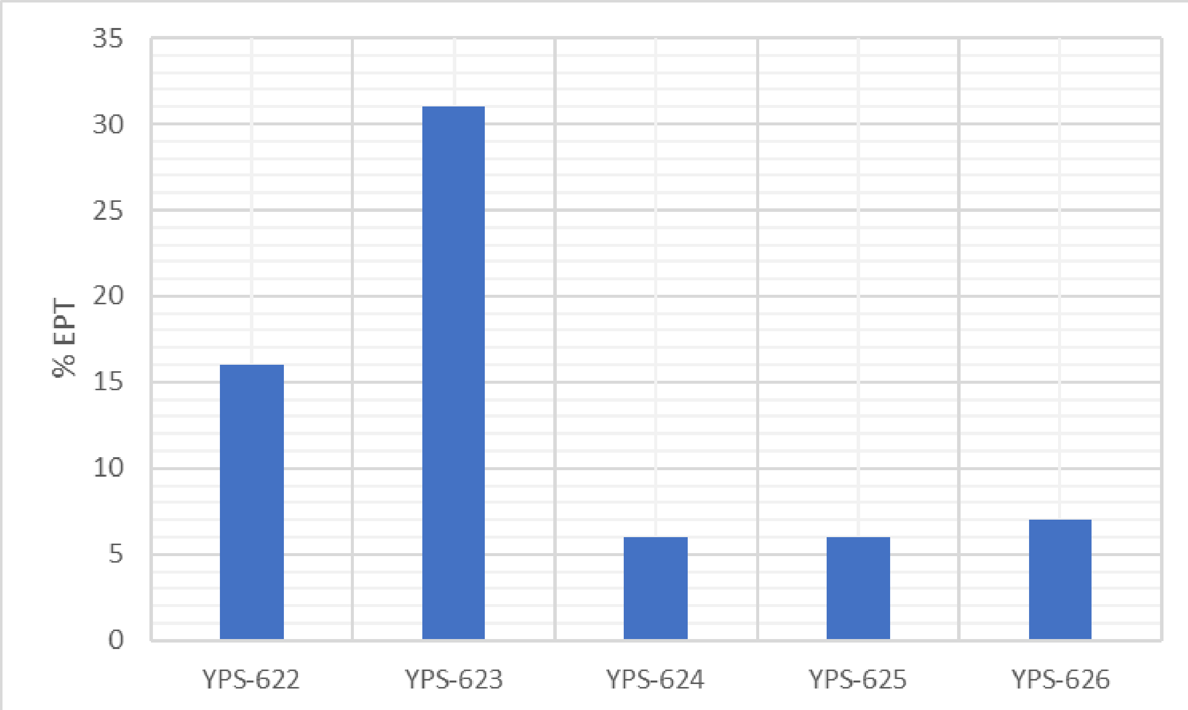


**Figure 4.30 Percent EPT in Adams Creek, 2020**

Chironomids were the dominant order in all samples collected on Adams Creek and made up over 55% of the community at each site. The high presence of chironomids combined with the low SEI values suggest that there is a high degree of dominance by one or a few organisms within this family. A further review of the benthic invertebrate data identified that there are four genus that make up the majority of the chironomids at the sites on Adams Creek, *Diamesa, Eukiefferiella, Orthoclidius complex* and *Parorthocaldius*. Interestingly, their representation within each sample increased from the lower to upper reaches of the watershed (**Table 4.9**).

**Table 4.9 Dominant Chironomid Genus representation in Adams Creek**

| Site | Percentage of chironomids identified in sample as *Diamesa*, *Eukieferiella*, *Orthocladius complex* and *Parorthocaldius.* |
|---|---|
| YPS-622 | 60% |
| YPS-623 | 66% |
| YPS-624 | 81% |
| YPS-625 | 83% |
| YPS-626 | 89% |

There was a general trend of increasing total abundance from sites YPS-622 to YPS-626 (i.e. downstream to upstream). Family richness followed a similar pattern with the exception of YPS-625 (second most upstream site, above current placer mining activity), which had the lowest family richness of all sites sampled on Adams Creek. All sites sampled had a low percentage of EPT individuals and unexpectedly, YPS-623, (the secondmost downstream site, below current placer mining activity) had the highest percentage of EPT. Interestingly, there was very little presence of trichoptera (caddisflies) of the sites sampled with only 1% representation at YPS-626 and no representation in any of the other sites sampled. A follow up with Cordillera Consulting was conducted to verify that the results met QA/QC protocols for the enumeration and that no errors had occurred in the reporting and this was confirmed. SDI values for Adams Creek were considered relatively high with values from ranging from 0.62 to 0.79.

#### *4.3.2.4 Replicates*

In order to evaluate the need to incorporate site replication into the study design, three replicates were collected at YPS-612, YPS-622 and YPS-626 in 2020 to further the work in 2019 to better characterize within-site variability in benthic invertebrate community composition. A larger data set will be utilized to improve statistical confidence in evaluating the need to incorporate site replication into the study design. This will be published in an upcoming report.

### 4.3.3 Streambed Sediment Characteristics

In-situ sediment results including both analytical and field-based data (i.e. 100 pebble count) are presented below in **Table 4.10**. The CABIN field data indicated a dominance by either cobble or pebble substrate at all sites sampled in 2020. Two Adams Creek sites (YPS-624 and YPS-625) and four Hunker Creek sites (YPS-611, YPS-613, YPS-612 and YPS-544) had a small amount of gravel (1 – 7%).

**Table 4.10 In-situ and CABIN Field Data Sediment Results, 2020**

| Watershed | Watercourse Name | Site | CABIN Field Data | | | | | | | | | Laboratory Data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bedrock (%) | Boulder (%) | Cobble (%) | Gravel (%) | Pebble (%) | Sand (%) | Silt+Clay (%) | Wolman D50 (cm) | Wolman Dg (cm) | Moisture (%) | Gravel (%) | Sand (%) | Silt (%) | Clay (%) | Texture | Total Nitrogen (%) | Total Organic Carbon (%) |
| Klondike River | Adams Creek | YPS-622 | 0 | 0 | 41 | 0 | 59 | 0 | 0 | 5.6 | 5.6 | 19.0 | 36.9 | 53.0 | 10.1 | <1.0 | Sand | <0.020 | 0.217 |
| | Adams Creek | YPS-623 | 0 | 0 | 53 | 0 | 47 | 0 | 0 | 6.4 | 6.1 | 20.2 | 16.7 | 73.0 | 10.3 | <1.0 | Sand | <0.020 | 0.152 |
| | Adams Creek | YPS-624 | 0 | 0 | 45 | 1 | 54 | 0 | 0 | 6.2 | 6.2 | 3.0 | <1.0 | 78.9 | 20.0 | 1.3 | Sand | 0.052 | 0.733 |
| | Adams Creek | YPS-625 | 0 | 0 | 58 | 1 | 41 | 0 | 0 | 6.9 | 6.8 | 26.0 | 23.7 | 47.7 | 26.6 | 2.0 | Sand | 0.091 | 4.460 |
| | Adams Creek | YPS-626 | 0 | 0 | 54 | 0 | 46 | 0 | 0 | 6.6 | 6.6 | 19.5 | 21.1 | 63.9 | 13.9 | 1.1 | Coarse sand/Fine gravel | 0.046 | 0.802 |
| | Hunker Creek upstream of Ontario Cr. | YPS-078 | 0 | 0 | 51 | 0 | 49 | 0 | 0 | 6.6 | 6.4 | 14.2 | 32.8 | 64.2 | 3.0 | <1.0 | Sand | <0.020 | 0.210 |
| | Hunker Creek | YPS-611 | 0 | 0 | 57 | 1 | 42 | 0 | 0 | 6.9 | 6.4 | 27.1 | 4.0 | 88.5 | 8.0 | <1.0 | Sand | <0.020 | 0.225 |
| | Hunker Creek upstream of Gold Bottom Cr. | YPS-079 | 0 | 0 | 16 | 0 | 84 | 0 | 0 | 4.4 | 4.4 | 21.6 | 20.5 | 63.7 | 15.8 | <1.0 | Fine Sand | <0.020 | 0.235 |
| | Hunker Creek downstream of Gold Bottom Cr. | YPS-080 | 0 | 0 | 65 | 0 | 35 | 0 | 0 | 8.4 | 7.7 | 26.2 | <1.0 | 77.9 | 22.1 | <1.0 | Fine Sand | 0.025 | 0.358 |
| | Hunker Creek | YPS-614 | 0 | 0 | 40 | 0 | 60 | 0 | 0 | 5.6 | 5.5 | 39.2 | <1.0 | 27.7 | 69.1 | 2.8 | Sand | 0.142 | 2.440 |
| | Hunker Creek downstream of Hester Creek inflow | YPS-051 | 0 | 0 | 44 | 0 | 56 | 0 | 0 | 5.9 | 5.8 | 44.3 | <1.0 | 70.7 | 27.2 | 1.4 | Fine Sand | 0.045 | 0.701 |
| | Hunker Creek | YPS-621 | 0 | 0 | 49 | 0 | 51 | 0 | 0 | 6.3 | 5.7 | 44.3 | 16.7 | 25.2 | 54.9 | 3.2 | Fine Sand | 0.173 | 3.170 |
| | Hunker Creek | YPS-613 | 0 | 0 | 4 | 6 | 90 | 0 | 0 | 2.6 | 2.8 | 36.2 | <1.0 | 26.2 | 68.8 | 4.6 | Fine Sand | 0.143 | 2.170 |
| | Hunker Creek | YPS-612 | 0 | 0 | 65 | 1 | 34 | 0 | 0 | 7.5 | 6.9 | 28.0 | <1.0 | 72.7 | 25.1 | 2.0 | Sand | 0.068 | 1.020 |
| | Hunker Creek | YPS-544 | 0 | 0 | 7 | 7 | 86 | 0 | 0 | 3.6 | 3.4 | 28.7 | <1.0 | 83.0 | 15.9 | 1.1 | Coarse Sand | 0.020 | 0.385 |
| Yukon River | Swede Creek | YPS-386 | 0 | 1 | 63 | 0 | 36 | 0 | 0 | 7.8 | 7.5 | 42.0 | 4.7 | 48.9 | 42.5 | 3.9 | Fine Sand | 0.162 | 3.040 |

Only Swede Creek (YPS-386) had any indication of boulders in the substrate. No sand or silt+clay was counted at any of the sites sampled. Wolman D50 (cm) was generally consistent throughout Adams Creek ranging from 5.6 cm to 6.6 cm. Greater variability was noted in Hunker Creek with values ranging from 2.6 cm to 8.4 cm. A similar pattern as observed for Wolman Dg (cm) with a range of 5.6 cm to 6.8 cm in Adams Creek and 2.8 cm to 7.5 cm in Hunker Creek. Swede Creek had a Wolman D50 and Wolman Dg of 7.8 cm and 7.5 cm, respectively.

Texture of in-situ sediment was consistently characterized as sand or fine sand at all sites on Adams Creek, Hunker Creek and Swede Creek. The percent gravel, sand, silt and clay reflect this, with sand being the dominant texture in all Adams Creek sites, Swede Creek and in seven of the ten sites sampled on Hunker Creek. Silt was the dominant texture at YPS-614, YPS-621, and YPS-613 on Hunker Creek and made up 42.5% of the sample at YPS-386 on Swede Creek. Percent gravel on Adams Creek ranged from a non-detection at YPS-624 to 36.9% at YPS-622. Percent gravel on Hunker Creek was slightly less, with a range of non-detection (YPS-080, YPS-614, YPS-051, YPS-613, YPS-612, YPS-544) to 32.8% at YPS-078. A small amount of gravel (4.7%) was found in Swede Creek at YPS-386. Percent clay was very little, with no more than 5% at all sites sampled in 2020.

Very little total nitrogen was observed in Adams Creek and ranged from non-detection at YPS-622 and YPS-623 to 0.091% at YPS-624. Similar results were observed in Hunker Creek with a range of non-detection (YPS-078, YPS-611, YPS-079) to 0.173% at YPS-621. Total organic carbon was also low at each of the sites sampled on Adams Creek with values ranging from 0.217% at YPS-622 to 4.46% YPS-624. Hunker Creek exhibited similar results with values ranging from 0.210% at YPS-078 to 3.17% at YPS-621. Swede Creek also exhibited very low levels of total nitrogen and total organic carbon with a value of 0.162% and 3.04%, respectively.

## 4.4 Discussion

### 4.4.1 Reproducibility of AHM Data and Interannual Comparison

Monitoring of the same ten sites on Hunker Creek in 2019 and 2020 provided some insights regarding data comparability between subsequent years of monitoring. Based on the benthic invertebrate community metrics obtained based on CABIN wadable stream protocols, we observed a reasonable agreement in overall abundance estimates per kick-net sample between 2020 and 2019 for 8 of 10 sampling locations. Two of the ten stations (YPS-080 and YPS-614) exhibited a substantially lower benthic invertebrate abundance in 2020 in comparison with the previous year. This could be a result of impacts to benthic community health in 2020 from placer mining or other environmental changes. Alternatively, this might reflect changes in the exact sampling locations or methods; however, this appears less likely based on the attention paid to methodological consistency.

For 8 of the 10 stations with similar abundance for the two years, there was a statistically significant linear regression of the 2020 abundance data on the 2019 data (n = 8, $r^2$ = 0.91, **Figure 4.31**). Note that sample data from YPS-080 and YPS-614 were excluded in the calculation of the regression relationship.

Approximately 91% of the variability in abundance between stations in 2020 could be explained by the co-variation with the 2019 abundance data, for those monitoring stations other than YPS-080 and YPS-614.

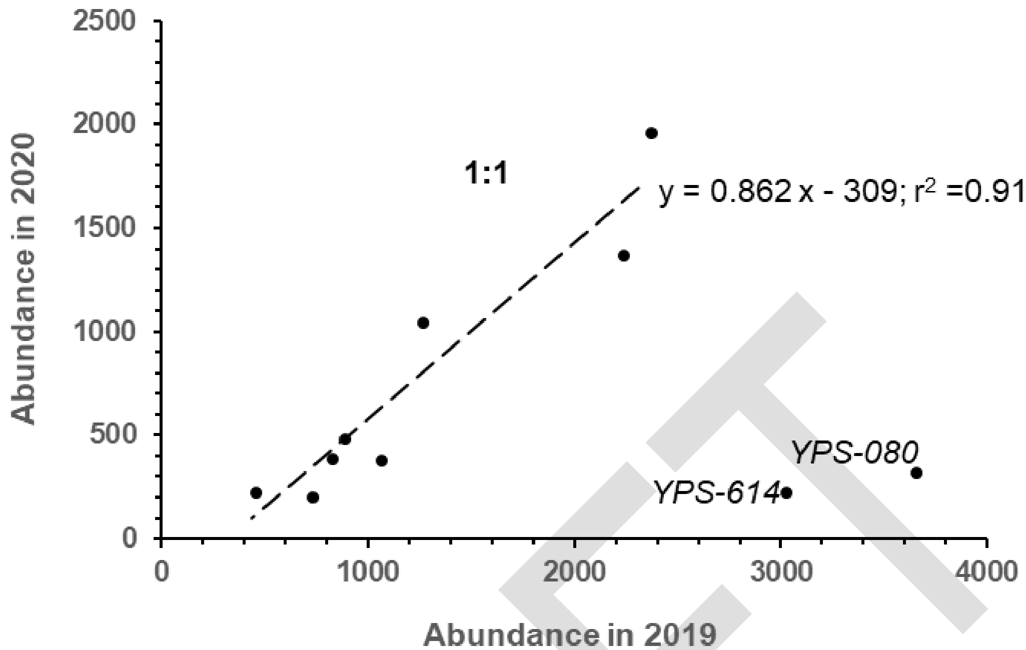


**Figure 4.31 Total Invertebrate Abundance in 2019 and 2020 in Hunker Creek**

Note that there was a lower abundance across all eight sites in 2020 in comparison with 2019, which might be related either to a general interannual variability in productivity in relation to interannual climate variability and/or the period of field sampling relative to benthic invertebrate egg deposition, larval development, and hatching / emergence.

There was little consistency from 2019 to 2020 in the other benthic invertebrate metrics for the ten Hunker Creek stations, including Family Richness, % EPT and % C. There was no statistically significant relationship ($\alpha = 0.05$) between the 2019 and 2020 data for these indicators.

Of note is that the proportion of total invertebrate abundance contributed by chironomids was much higher in 2020 compared with 2019 (9 of 10 monitoring sites) and the proportion contributed by all EPT was much lower in 2020. The one anomaly to this pattern was site YPS-078. Possible explanations for such a shift include a systemic variation between years (e.g. in association with changes in weather), altered timing of field work between the two years, or issues associated with laboratory sorting, enumeration and taxonomy of the kick net samples.

There were also no statistically significant relationships between the 2019 and 2020 results for measures of streambed substrate texture and chemistry, including total nitrogen, total organic carbon content, or percent fines (silts plus clays). This is probably a reflection of challenges in achieving consistent and adequately representative sampling of substrate given the spatial and other complexities of streambed conditions. The interannual, between-sampler variability in measures of substrate characteristics suggest that these measures might not be good indicators of change resulting from placer activities and might not allow the exploration of the underlying stream conditions as covariates of aquatic ecosystem health.

### 4.4.2 Benthic Invertebrate Community Characteristics and Relationship with In-situ sediment on Adams Creek and Hunker Creek

Placer mining involves the mining of alluvial (stream and river) gold deposits that are located within historical or active floodplains of running waters. One potential impact of placer mining is increased sediment loads and suspended sediment concentrations (total suspended solids: TSS) in fish-bearing waters. This can occur directly through the discharge to the local water course of site water that contains high TSS, and indirectly as a result of the alteration of land forms and flood plains, disturbance of riparian vegetation and soils, and destabilization of soil and shoreline deposits, making the local landscape far more prone to erosion and entrainment of soil particles in runoff from snowmelt and rainfall. In addition, alteration of landforms and flood plains (e.g. stream diversions) can lead to the loss of aquatic habitat and in some cases fish stranding.

There is an extensive body of science that clearly demonstrates the potential for adverse effects of increased TSS on various life stages of Pacific salmon, other fish, and other aquatic organisms such as benthic invertebrates and periphyton that are important food sources for higher consumers. Elevated TSS can reduce fish olfaction and impair migratory movements, clog respiratory and feeding structures, and reduce light penetration. Of particular importance for many Yukon streams is the potential for increased settlement of suspended sediments in streambed areas that would otherwise support the deposition and development of salmonid eggs and foraging of juveniles. Increased sedimentation rates can result in smothering and reduced oxygen availability.

Two types of observations are used within the AHM to capture substrate conditions in the stream reach, with a focus on detecting the influences of increased levels of TSS. Increased flux of TSS from active and recent placer works to the receiving environment could result in adverse effects on aquatic life based on (i) effects in the water column such as altered feeding / foraging abilities, or clogging of respiratory and feeding structures; and (ii) effects to substrate-associated biota including accumulation in substrate interstices in gravel and cobble (riffle section and other) stream beds, increased embeddedness of cobbles and reduced surface area for colonization, smothering, oxygen depression, and locally altered current regime. The first type of data collected is the substrate characterization metrics collected under the CABIN protocol, including percent of substrate comprised of bedrock, boulders, gravel, pebble and finer textured materials, and median effective diameter of individual substrate elements. The second type of data collected is the texture and chemistry (including total N and total organic carbon) of finer textured sediment (sands through clays). This material generally occurs in streambeds with a spatially variable distribution, based on settlement in microenvironments that are not prone to scour (for example, within the voids between cobble and gravel, or in eddies and pools below or adjacent to riffle sections). This second set of data is derived from collection of a sediment sample that is analyzed using standardized laboratory test methods for texture and chemical characteristics.

An important hypothesis that underlies the AHM is that increased TSS from human activities will result in accumulations of sediments smaller than gravels and occlude stream flow pathways within the streambed near its ecologically-active surface. In this context, it is important to note that the two types of stream substrate characterization data tend to provide very different information regarding the relative influence of recently settled fines on the stream substrate and biota that live there.

In 2020, AHM sites included Swede Creek (one site), Adams Creek (five sites) and Hunker Creek (ten sites, as discussed above). We began with an evaluation of the predictive value of local streambed conditions for explaining between-site variations in benthic invertebrate metrics, including total abundance per kick-net sample, taxon richness, % EPT and % Chironomidae.

For Hunker Creek in 2019, the abundance of benthic invertebrates significantly co-varied with the fines content of sediment samples (silt-clay fraction; <63 µm) collected concurrently with kick-net sampling (generally in depositional areas adjacent to the riffle substrate in the mainstream channel). No similar relationship was observed for the five Adams Creek stations sampled in 2020. The reason for positive co-variation between total abundance and percent fines content is unclear.

For the Hunker Creek 2020 data, there was also a positive relationship between taxon richness and the ratio of pebbles to cobbles in the streambed substrate, based on CABIN protocol substrate characterization methods. There was no statistically significant relationship between taxon richness and pebble to cobble ratio for the Hunker Creek 2019 AHM data nor Adams Creek 2020 AHM data. There is a plausible explanation for increased biodiversity of the stream invertebrate community in streambeds with a higher proportion of gravel to cobble, since the total surface area of substrate per square meter of streambed will be higher for gravels than cobbles. This, in turn could support greater periphyton and bacterial biofilm per unit area, and greater food availability. While such a relationship was not observed in Hunker Creek in 2019, the stream invertebrate community composition was different between the two years, as discussed in **Section 4.1.1**, with greater % EPT in 2019.

The remaining benthic community metrics for the Hunker Creek 2019 and 2020 monitoring and Adams Creek 2020 monitoring including taxon richness, abundance and percent composition of EPT, or abundance and percent composition of Chironomidae did not significantly co-vary with any quantitative measure of substrate quality, based either on the standard CABIN substrate characterization approaches or accessory sediment sampling and laboratory determinations of total organic carbon or grain size (**Table 4.11**).

**Table 4.11 Summary of Linear Regression Results for in-situ Sediment and Benthic Community Metric Variables.**

| Variables | Hunker Creek - 2019 | | Hunker Creek - 2020 | | Adams Creek - 2020 | |
|---|---|---|---|---|---|---|
| | *$r^2$* | *p value* | *$r^2$* | *p value* | *$r^2$* | *p value* |
| **Abundance vs Percent Fines** | **0.51** | **0.02** | 0.05 | 0.53 | 0.44 | 0.22 |
| Abundance vs Pebble/Cobble | 0.08 | 0.41 | 0.10 | 0.36 | 0.38 | 0.27 |
| Abundance vs %TOC | 0.33 | 0.08 | 0.0004 | 0.95 | 0.40 | 0.25 |
| Richness vs Percent Fines | 0.04 | 0.58 | 0.03 | 0.62 | 0.01 | 0.87 |
| **Richness vs Pebble:Cobble ratio** | 0.04 | 0.58 | **0.42** | **0.04** | 0.00005 | 0.99 |
| Richness vs %TOC | 0.003 | 0.87 | 0.0001 | 0.97 | 0.17 | 0.49 |
| %EPT vs Percent Fines | 0.24 | 0.16 | 0.02 | 0.71 | 0.49 | 0.19 |
| %EPT vs Pebble/Cobble | 0.09 | 0.39 | 0.11 | 0.35 | 0.003 | 0.92 |
| %EPT vs %TOC | 0.35 | 0.06 | 0.0005 | 0.95 | 0.25 | 0.39 |
| %C vs Percent Fines | 0.08 | 0.42 | 0.01 | 0.76 | 0.42 | 0.23 |
| %C vs Pebble/Cobble | 0.08 | 0.43 | 0.07 | 0.45 | 0.01 | 0.90 |
| %C vs %TOC | 0.21 | 0.19 | 0.003 | 0.88 | 0.57 | 0.14 |

The collection of an accessory sediment sample in areas adjacent to the riffle section where kick-net sampling is carried out is not expected to reflect the sediment depositional regime, including altered flow and dissolve oxygen levels or TSS scouring regime in the microhabitats where the stream invertebrates obtained via kick-net sampling reside. The absence of a relationship between substrate characteristics obtained from this accessory sampling and stream invertebrate community metrics, therefore, is not surprising. With regard to the CABIN protocols for evaluation of substrate characteristics, it is hypothesized that the greatest impact of elevated stream TSS on either stream invertebrate productivity, biodiversity, and function or spawning redds of migratory fish would be altered rates of sediment settling and entrapment in voids between stones, cobble and gravel, resulting in greater embeddedness of larger substrate components in sandy, silty, clay sediments, as well as lower flows within the streambed substrate at and below the open stream channel. Measures of substrate embeddedness are included in the CABIN protocols and these data are available for the 2019 and 2020 AHM data; however, the methods provide a very imprecise estimate of TSS sedimentation rates and the associated changes in water quality within the streambed.

### 4.4.3 Benthic Invertebrate Community Characteristics and Relationship with Turbidity and Discharge on Adams Creek and Hunker Creek

To further the understanding of benthic community metrics and their relationship with quantifiable environmental variables, an assessment of turbidity and discharge was conducted. The aim was to identify whether any relationship existed between benthic community metrics and turbidity and discharge. Similar to **Section 5.3**, we began with an evaluation of the predictive value of local turbidity and discharge conditions for explaining between site variations in benthic invertebrate metrics, including total abundance per kick-net sample, family richness, % EPT and % C.

The streambed invertebrate community metrics across all Hunker Creek sites sampled in 2020 (abundance, richness, SDI, SEI, %EPT, % C) did not vary in relation to either stream discharge or the observed local turbidity (**Table 4.12**). In contrast, total invertebrate abundance decreased significantly with increasing turbidity and increasing stream flow in Adams Creek (**Figure 4.31** and **Figure 4.32**, respectively). Percent EPT showed the opposite pattern: there was a statistically significant increase in % EPT with increasing turbidity and increasing stream flow in Adams Creek (**Figure 4.33** and **Figure 4.34**, respectively). It should be noted that the probability value for the linear regression of turbidity on total abundance (p=0.20), turbidity on % EPT (p=0.23) and discharge on % EPT (0.10) was higher than the Type 1 error cut-off of 0.05.

### Table 4.12 Summary of Linear Regression Results for Turbidity and Discharge vs Benthic Community Metric Variables.

| Variables | Hunker Creek | | Adams Creek | | Variables | Hunker Creek | | Adams Creek | |
|---|---|---|---|---|---|---|---|---|---|
| | $r^2$ | *p value* | $r^2$ | *p value* | | $r^2$ | *p value* | $r^2$ | *p value* |
| **Abundance vs Turbidity** | 0.16 | 0.25 | 0.57 | 0.20 | Abundance vs Discharge | 0.02 | 0.66 | **0.97** | **0.001** |
| Richness vs Turbidity | 0.11 | 0.34 | 0.33 | 0.31 | Richness vs Discharge | 0.03 | 0.62 | 0.15 | 0.52 |
| %EPT vs Turbidity | 0.04 | 0.57 | 0.61 | 0.23 | %EPT vs Discharge | 0.02 | 0.67 | 0.67 | 0.10 |
| %C vs Turbidity | 0.0005 | 0.95 | 0.51 | 0.17 | %C vs Discharge | 0.02 | 0.74 | 0.40 | 0.25 |

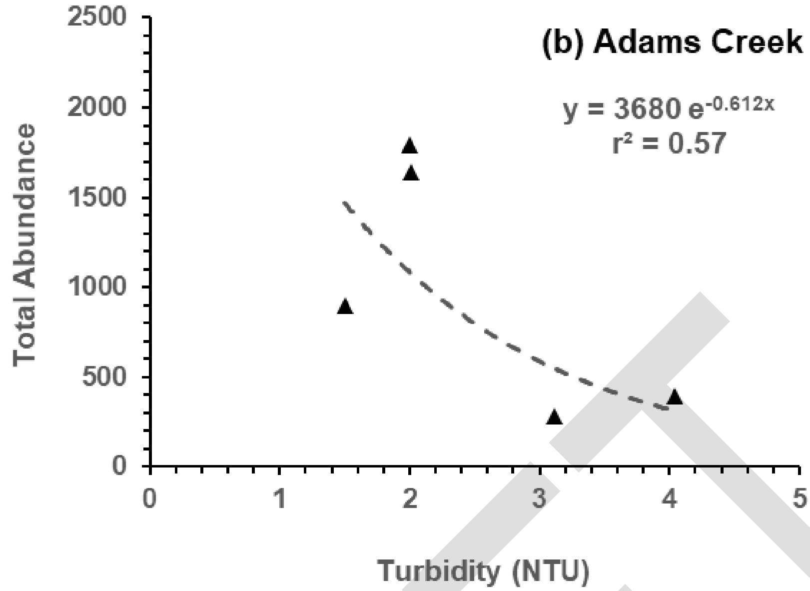


**Figure 4.32 Total Abundance vs Turbidity in Adams Creek**

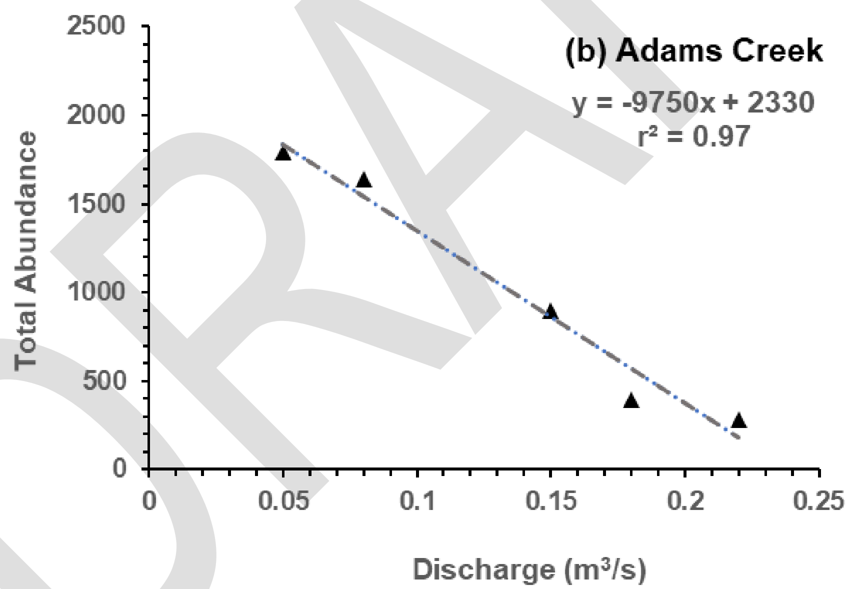


**Figure 4.33 Total Abundance vs Discharge in Adams Creek**

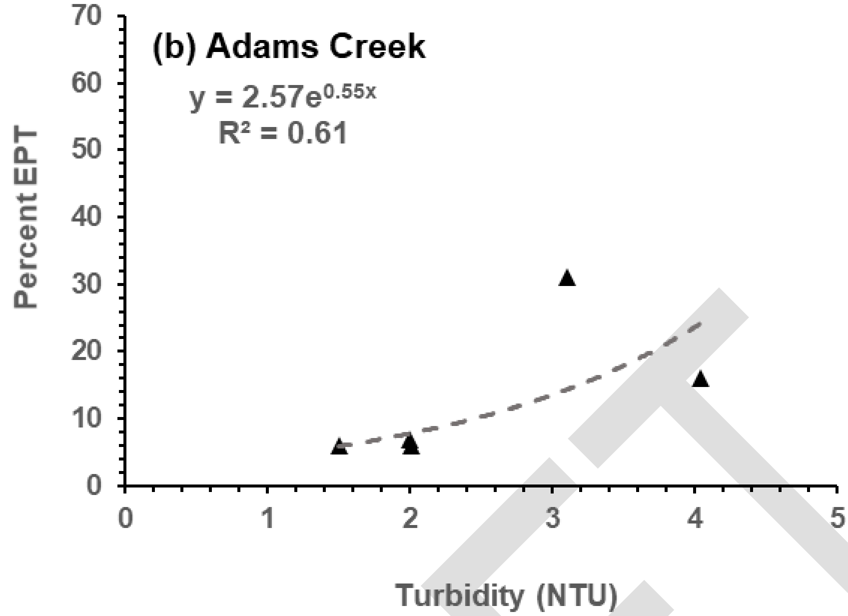


**Figure 4.34 Percent EPT vs Turbidity in Adams Creek**

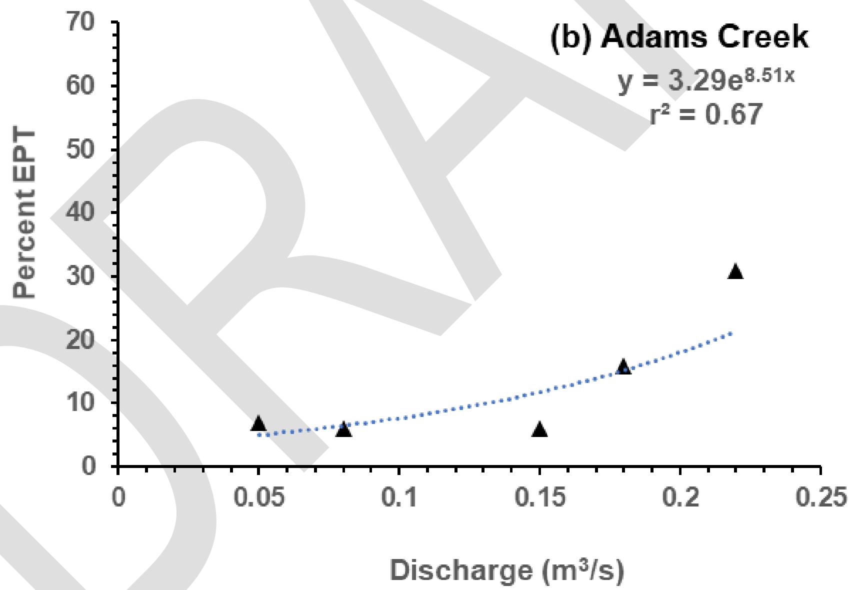


**Figure 4.35 Percent EPT vs Discharge in Adams Creek**

Most benthic invertebrate species have specific requirements for the substrate they live in and tend to avoid areas that fail to meet these requirements. EPT taxa, which provide the most productive and available food for fish, are particularly affected by fine sediment accumulation. For example, several species of crawling mayfly larvae will avoid finer, less stable substrates as they cannot grip them effectively, and enter the drift. In contrast, Chironomidae, Oligochaeta and Sphaeridae are typically associated with fine sediment, because they can burrow into the sediment (Jones et al. 2012).

It was hypothesized that the most downstream sites (YPS-622 and YPS-623), which are below active placer mining activity would have the lowest % EPT of the sites sampled in Adams Creek. This is based on the assumption that downstream areas accumulate sediment loads from upstream areas, commensurate with the sediment residence time while entrained in water and as transiently-deposited bed sediments. Stream flow (discharge) estimates for a given monitoring site are a useful measure of integrated influence of upstream and tributary inputs, both for surface water discharge, and other inputs to catchments, including sediment.

While stream discharge was a statistically significant co-variate of decreased stream invertebrate abundance on Adams Creek, % EPT positively co-varied with stream discharge on Adams Creek, contrary to expectations.

The exact cause of this relationship is unknown currently. A possible explanation is that substrate composition and reduced interstitial space at YPS-626 (the most upstream site, above all mining influence) was less conducive for colonization by EPT taxa. The substrate at YPS-626 (comprised of 46% pebble and 54% cobble) was heavily embedded (average of 50% during 100-pebble count) and was difficult to dislodge during the kick-net sampling. Conversely, the substrate at YPS-622 (most downstream site, below all mining influence) was not nearly as embedded (average of 25% during 100-pebble count) and was easily moved during the kick-net sampling.

The decrease in total abundance from increasing discharge and turbidity is possibly a result of benthic invertebrate drift in the watershed. Hynes (1960) noted that transport and suspension of sand and silt ecosystems increases turbidity, resulting in light-limited primary productivity. When settling, inorganic particles fill in the interstices between large substrate particles, resulting in direct smothering or loss of habitat. As a result, benthic invertebrates may leave a community via drift due to changes in food resources or physical habitat.

#### 4.4.4 Swede Creek

Results of the biological metrics calculated at YPS-386 as well as the habitat characterization (**Section 4.3.1** and **4.3.2**) in Swede Creek may provide an indication of a site that is in a relatively undisturbed aquatic ecological condition. YPS-386 had a high % EPT (55%) and the highest family richness (33) of all sites sampled in 2020. There was no evidence of historical or current mining within one kilometre of the sampling site. It appears the creek is within its original channel and has not been diverted in its recent history. The riparian area for the reach assessed contained large, old white spruce trees that in northern climates take multiple decades to grow (**See Appendix C – Photolog**). This indicates that it is unlikely that any placer or other anthropogenic activity has occurred in this area. Even though the majority of Swede Creek and some of its tributaries have been staked for placer or are already under a placer lease, there was little evidence of any historical or current mining within the reach assessed that. This was further supported by the low turbidity recorded at the site (1.8 NTU), little evidence of sedimentation on the substrate, and a thin layer of periphyton.

# 5.0 CONCLUSION AND RECOMMENDATIONS

The AHM results provide information about the effectiveness of the FHMS for protecting fish and fish habitat. The key questions it addresses is (i) whether there are stream systems and watersheds exposed to placer mining where aquatic health is not being maintained in an ecologically undisturbed condition, (ii) if sites in higher sensitivity habitats are ecologically undisturbed, and (iii) whether the ecological status of sites historically impacted by placer mining are improving over time.

Consistent with the 2018 and 2019 AH monitoring findings, we cannot draw conclusions in 2020 as to whether sites are in ecologically impaired as a result of placer mining, or if sites that were historically influenced by placer mining activity have recovered over time. The current methodology does not yet assess in-stream conditions in a way that allows for evaluation of a direct causal relationship between placer mining activity and aquatic health. As identified in previous reviews, there are challenges with the accurate measurement of natural variables and human-related influences that need to be accounted for when assessing whether the impacts are a result of placer mining activity or natural fluctuations.

Cormier et al. (2006) discuss the use of sediment transport curves, which plot the relationship between TSS loads (mass of suspended sediment transported per unit time) and stream discharge, to establish an understanding of baseline sediment transport processes in a water course, and subsequently to detect an upward shift in sediment loading and downstream transport. The 2020 AH monitoring on Adams Creek, Hunker Creek, and Swede Creek do not support an appreciation of how sediment loads have changed relative to discharge rate from the headwaters to the mouth over the last several decades (although the larger WQOM data will support a retrospective analysis about how sediment transport curves have evolved over time for several watersheds of interest).

A snap shot of the comparative TSS load in 2020, expressed in **Figure 5.1** as turbidity, for a similar set of discharge rates nonetheless suggests profound differences between the two small watersheds (Hunker Creek, Adams Creek) that were the focus of monitoring.

In particular, it is clear that TSS concentrations are much higher on average in Hunker Creek than in Adams Creek for a given stream flow (discharge). The log-linear relationship between turbidity and stream flow illustrates that the turbidity in Hunker Creek was more than an order of magnitude higher than in Adams Creek, based on the 2020 monitoring results from the headwater areas (left hand site of the plot shown in Figure 5.1) to the confluence with the Klondike River or Bonanza Creek, respectively. Thus, the 2020 TSS data acquired during WQO and AH monitoring suggest substantial differences in the two water courses in terms of the introduction and conveyance of suspended sediments. As discussed in **Section 3.3.1**, monitoring data for Swede Creek should also reflect stream conditions in a subwatershed that is less influenced by TSS inputs from human activities.

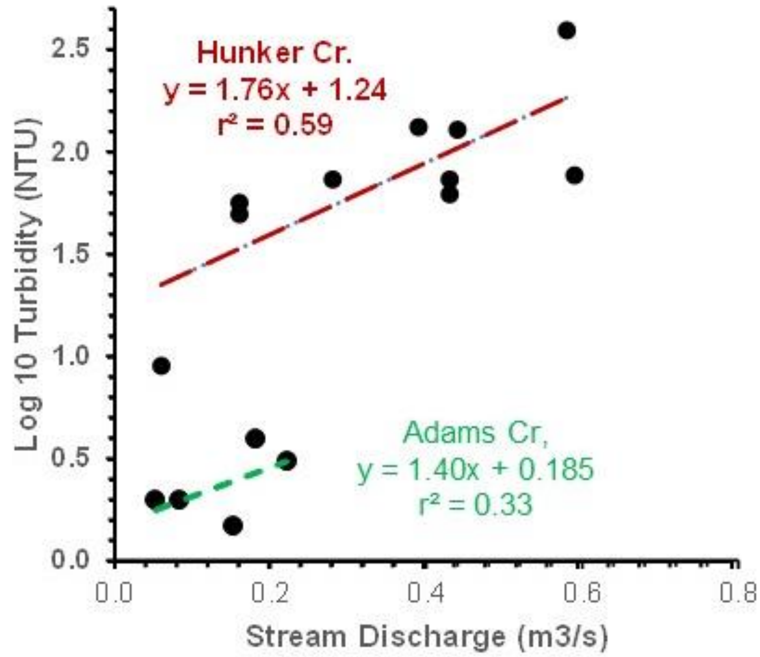


**Figure 5.1 Turbidity-stream discharge relationships for Adams Creek, a relatively pristine catchment, and Hunker Creek, which is heavily influenced by placer mining**

Given the differences in TSS concentrations in water samples from the Hunker Creek and Adams Creek monitoring sites in 2020, we expected to find clearly discernible differences between these watersheds in total stream invertebrate abundances, biodiversity measured as family or taxon richness or as Simpson's diversity and Simpson's evenness indices, and other stream ecological health metrics. This was not observed, as discussed in Section 4. In addition, there were few discernible upstream-downstream trends in the various aquatic health indicators.

In addition to the lack of discernible differences in stream invertebrate community health between Hunker Creek and Adams Creek based on the 2020 AHM data, it is important to note the relatively poor agreement in community metrics such as family richness, % EPT and % C for Hunker Creek AHM sites between 2020 and 2019 (**Section 4.3**) and very high degree of interannual variability for several Hunker Creek sites across multiple monitoring years (**Table 4.6**).

The 2020 AHM benthic invertebrate data for both Hunker Creek and Adams Creek show that the numerically dominant families include dipteran insects, with very low abundance of ephemeroptera in Adams Creek and very low abundances of plectoptera and trichoptera in both streams (**Table 5.1**). In addition, the numerically dominant dipteran families differed in 2020 between Adams Creek and Hunker Creek.

The stream invertebrate community composition for the 2020 AHM program was consistent with a summary by Oswood (1989) of stream invertebrate community composition in interior Alaska streams. Oswood notes that dipteran species dominate Alaskan streams, with trichopterans being generally scarce. Dominant dipteran families include, in order of dominance, Chironomidae, Simulidae, Tipulidae, and Empididae. According to Oswooe (1989), Simulidae exihibit significantly greater proportional representation in small rivers whereas Empididae favour larger river habits.

**Table 5.1 Numerically dominant stream invertebrate taxa in 2020 for Adams Creek and Hunker Creek**

| | Percent Abundance | |
|---|---|---|
| | Hunker Creek | Adams Creek |
| Order Diptera | | |
| Chironomidae other than Subfamily Orthocladiinae | 5% | 42% |
| Subfamily Orthcladiinae | **55%** | 18% |
| Family Simulidae | 0.0% | 12% |
| Family Empididae | 0.3% | 1.2% |
| Order Ephemeroptera | 14% | 1% |
| Order Lumbriculidae | 1.9% | 5.5% |
| Order Plecoptera | 0.3% | 0.5% |
| Order Trichoptera | 0.3% | 0.0% |

The habitat preferences of the two dominant dipteran families/subfamilies (Simulidae, Orthocladiinae) in Hunker and Adams Creek clearly differ, based on upstream – downstream patterns of abundance (**Figure 5.2**). The upstream – downstream gradient is this figure is represented by TSS flux, which scales in relation to stream discharge and increases from the upper to lower watershed.

The dominance of stream invertebrate communities by taxa other than ephemeroptera, plecopteran or trichopteran (EPT), and distributions of specific dipteran taxa in relation to stream habitat preferences may vary across other Yukon streams in addition to those monitored under the AHM monitoring program in 2020. A better understanding of community compositional differences across watersheds, and along natural gradients from headwater areas to valley bottom confluences with mainstem flows will be useful for re-evaluation of AHM metrics and approaches that reflect ecological responses to anthropogenically-increased suspended sediment loads and inventories.

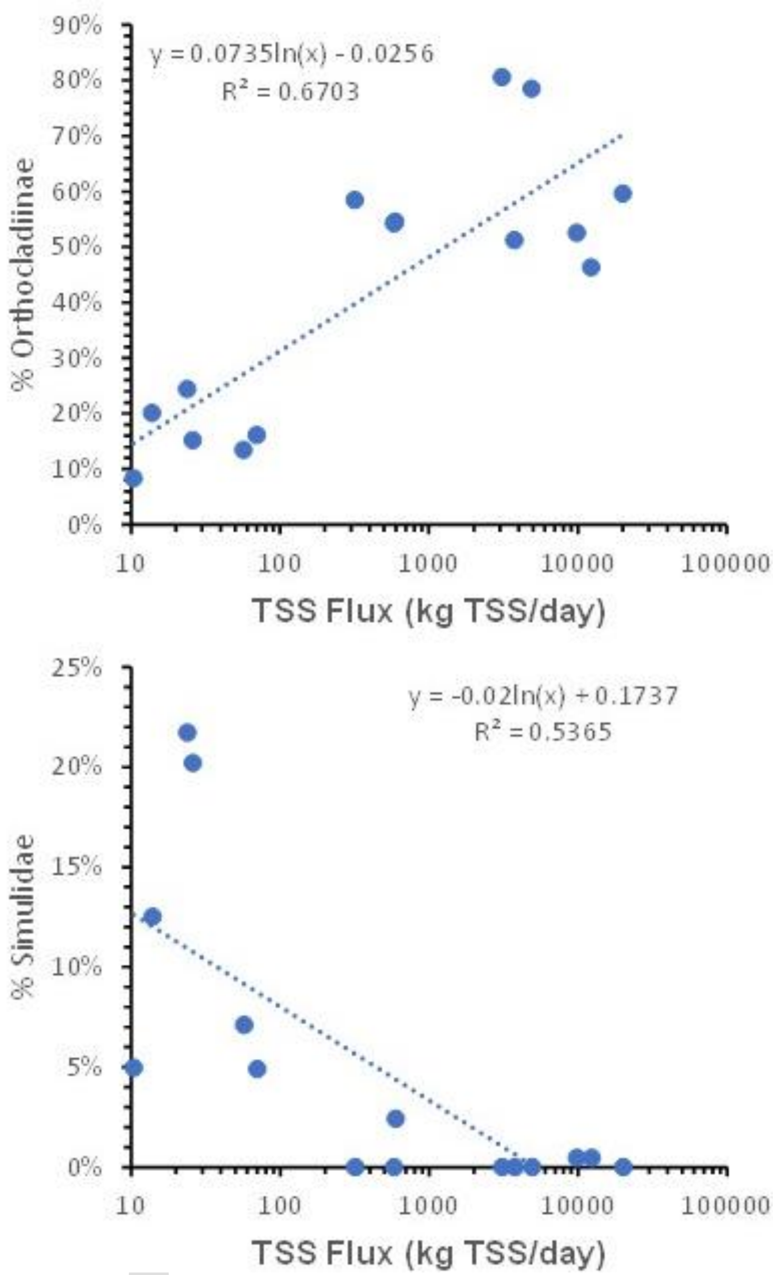


**Figure 5.2** **Overall stream invertebrate abundance as Orthocladiinae or Simulidae as a function of daily TSS transport in for all Adams Creek and Hunker Creek monitoring sites**

To improve the AHM and to move towards achieving the overall goal described above, Hemmera suggests five modifications to the AHM and WQOM protocols..

**1. Change In-situ Sediment Sampling Methodology**

As mentioned in **Section 4.4.2**, the collection of an accessory sediment sample in areas adjacent to the riffle section where kick-net sampling is carried out is not expected to reflect the sediment depositional regime, including altered flow and dissolve oxygen levels or TSS scouring regime in the microhabitats where the stream invertebrates obtained via kick-net sampling reside. It will be important, therefore, to move the AHM approach that can more consistently show not just water column TSS but increased sediment deposition in riffle substrates. The two suggested ways of achieving this goal is utilizing either a McNeil corer or sediment traps. Both methodologies are summarized below, for a detailed methodology, as well as the advantages and disadvantages of both the McNeil sampler and sediment traps please refer to the *Guidelines for Monitoring Fine Sediment Deposition in Streams* (RISC, 2002).

The McNeil corer is a device that is commonly used for assessing the composition of spawning gravel and collecting information on fine sediment addition from industrial activity. It was introduced as an alternative to the visual estimation of streambed surface composition and the collection of substrates samples with a shovel. It is seen as a significant improvement over the previous methods because it was designed to collect fine particles. The McNeil corer has been used as a fisheries habitat tool and an impact assessment technique for monitoring natural or man-made changes in streambed composition. A schematic and photo of the McNeil Corer is provided in **Figure 5.3** and **Figure 5.4**, respectively.

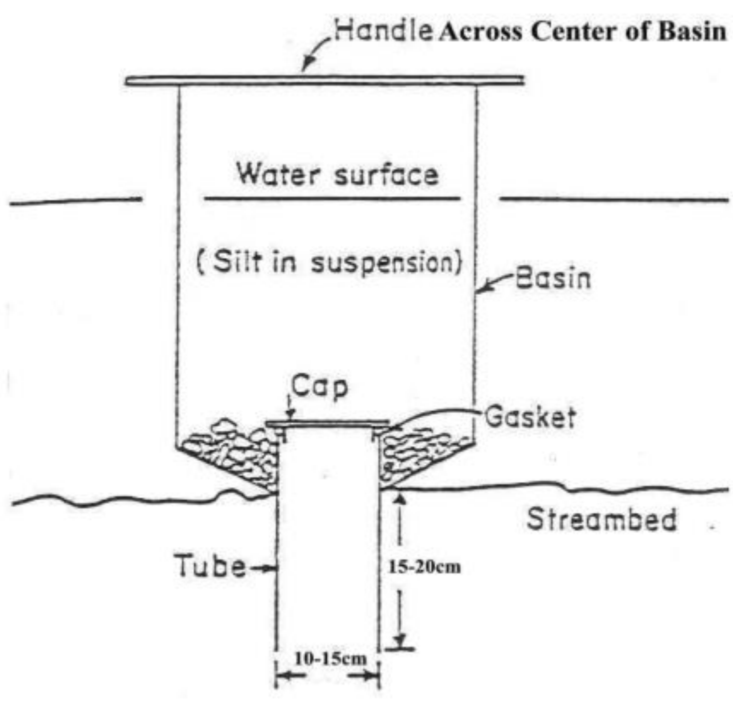


**Figure 5.3 McNeil Sediment Sampler.**

**Figure 5.4 McNeil core design, 1 liter bottle for scale**

Another alternative to the current in-situ sediment sampling is sediment traps. Sediment traps are devices that collect particles as they either pass over, deposit on, or infiltrate through the sample media. There are two basic designs including gravel buckets and infiltration bags that capture a specific type of depositing sediment. Gravel buckets collect sediment that deposits and moves vertically into the streambed. This includes bedload that moves across the substrate in saltating or sliding mode as well as suspended matter that deposits from the water column. Infiltration bags collect sediment that deposits on and moves vertically into the streambed as well as that which moves horizontally through the streambed. Both gravel buckets and infiltration bags can use natural or artificial (reference) gravel as their sample media. The choice of media depends upon the program's objective. If the objective is to determine changes in streambed composition, then natural gravels may be the most appropriate choice. If the objective is to assess the addition of depositing sediment from a selected activity, artificial gravels that are selected to maximize trapping efficiency may be most appropriate.

**2. Further refinement to descriptors used to capture the intensity of assessed placer mining activities**

It is recommended that the Placer Mining Development assessment be modified to attempt to quantify TSS input from placer mining directly from water discharging from settling ponds. TSS levels within a watercourse can be influenced by several environmental factors such as stream discharge, substrate composition and surface runoff. Apart from surface runoff, the program currently involves quantifying stream discharge and substrate composition. By quantifying the amount of TSS being deposited from a settling pond, we can gain an understanding of how much of that input is contributing relative to the overall natural TSS flux from natural variability. A possible methodology may include measuring TSS and discharge directly out the outlet of a settling pond and then measuring TSS and discharge at multiple locations within a particular watercourse to determine the influence of the settling pond to the creek overall.

It should be noted that the current methodology of assessing placer mining development is of high value and should be utilized to continue to track if there is any placer activity occurring above a site and if so the general degree of placer mining activity.

**3. Investigate the proliferation of certain Chironomidae taxa**

There appears to be a proliferation of certain taxa (e.g. *Orthocladius* complex) that are present in the results for Hunker Creek and Adams Creek. It is suggested that time be spent in further reporting or analyses identifying if these taxa are present during the duration of the monitoring that has been conducted (i.e. are they present over time?) as well as the life history of these taxa to try and identify if their presence/behaviour has any indication of aquatic health.

**4. Add the collection of periphyton to AHM Program**

Periphyton colonization was very limited at the sites sampled in 2020. The nutritional quality of periphyton can decline as the proportion of inorganic material in the layer increases. Further declines in periphyton quality may also occur because of turbidity on algal growth as suspended sediment reduces light penetration to the riverbed resulting in less algal growth. By looking at periphyton composition (i.e. taxonomy) and density (i.e. amount of periphyton present in a specified area), we can look at primary productivity and an important food source for benthic invertebrates and subsequently fish. This could supplement the work already being done with relative ease given the limited labour required for periphyton sampling.

**5. Implementation of ISCO Samplers for Focal Studies**

The current WQOM protocol currently provides an outline of the use and benefits of different sampling techniques, noting that the study objectives and fluctuations in the system should be considered when selecting a sampling method: grab, composite, or continuous (i.e., ISCO) (YG 2016).

We do not propose any major changes to the current WQOM program at this time, but that deployment of ISCO samplers should be prioritized to focal studies, especially those with the objective to evaluate TSS conditions downstream of current placer activities. The objectives of the focal studies should be carefully considered when implementing the ISCO samplers. For instance, If the objective of a focal study is to determine If TSS exceedances are due to placer activity or natural variability, an ISCO sampler could be installed upstream and downstream of the placer operations, with automated sample collection to be timed every few hours to investigate range of TSS levels through the day. If placer operations were suspected to be out of compliance and/or contributing a significant sediment load to the stream, the TSS levels may be predicted to be higher in the downstream station during normal working hours (i.e., 10:00 to 16:00) relative to the upstream station. Alternatively, if upstream and downstream stations routinely exceed following rain events or during the night when sluicing and other placer activity is not likely to occur, then the TSS exceedance could be attributed to natural causes.

While ISCO samplers are a valuable tool for investigative purposes, grab samples are still a reasonable sample collection method in many cases, especially for sites without road access and/or in higher stream reaches. Analysis of the 14-year dataset (2008-2020) evaluated the statistical distribution of grab versus ISCO samples and concluded that data collected from either method is considered comparable and useful for data interpretation and analysis (Hemmera 2021 in draft).

## 6.0 CLOSURE

We sincerely appreciate the opportunity to have assisted you with this project and if there are any questions, please do not hesitate to contact the undersigned by phone at 604.669.0424.

Report prepared by:
**Hemmera Envirochem Inc.**

***DRAFT***

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Report reviewed by:
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***DRAFT***

Doug Bright,
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250-920-9489
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# 7.0 REFERENCES

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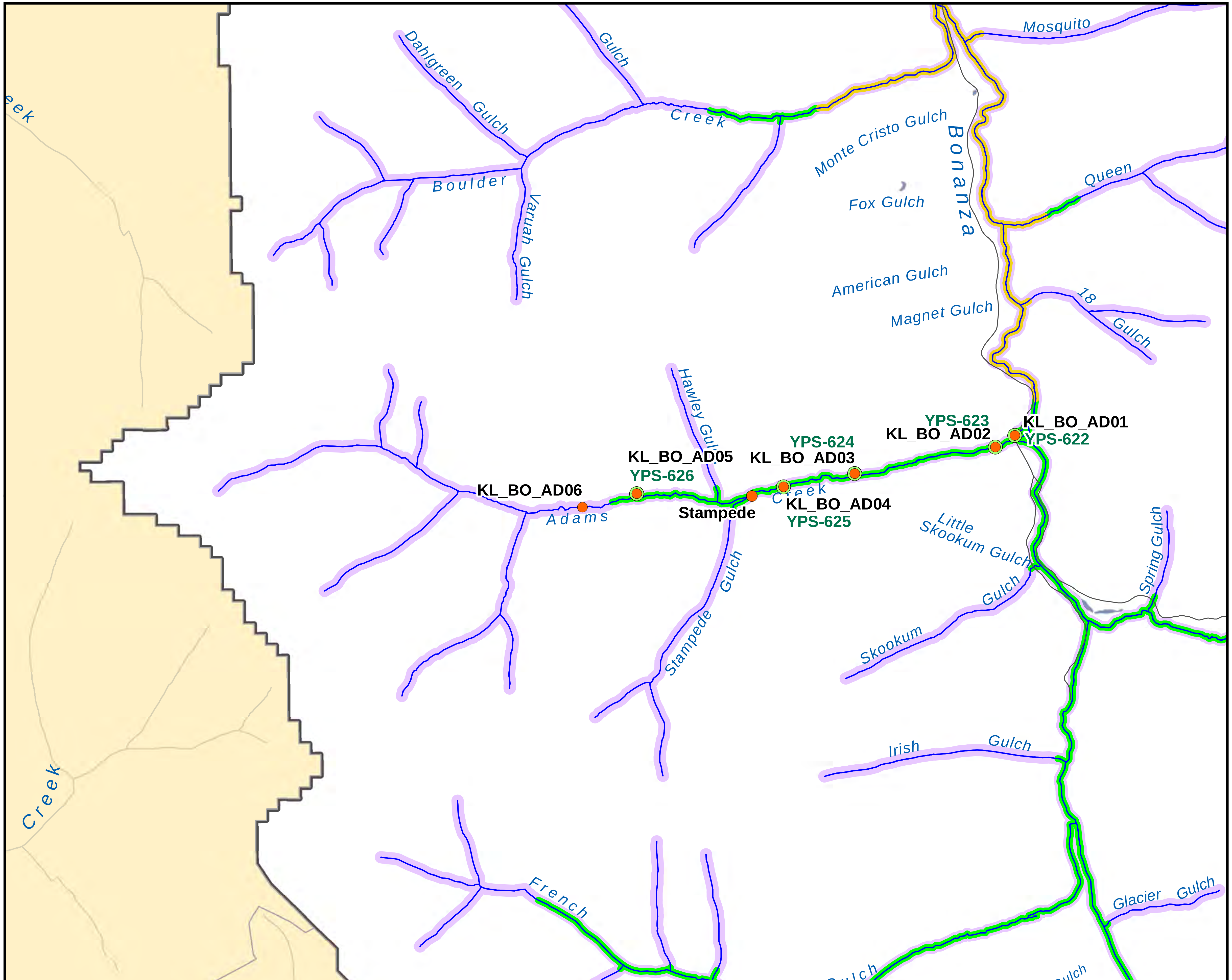
Yukon Placer Aquatic Health Working Group (YPAHWG). 2016. Yukon Placer Mining Industry Water Quality Objectives Monitoring Protocol.

# APPENDIX A

## Figures

# Adams Creek Water Quality and Aquatic Health Sampling Sites 2020




**CMI Water Quality Sampling Sites 2020**

Sample Site

**Aquatic Health Monitoring Sites 2020**

Test

**Roads**

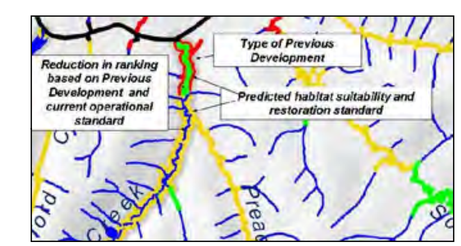
Local Road

**Stream Reach Classification**

Water Quality
Low Suitability
Moderate-Low Suitability
Moderate-Moderate Suitability
Moderate-High Suitability
High Suitability
Areas of Special Consideration (Ecological)
Areas of Special Consideration (Cultural)

**Development**

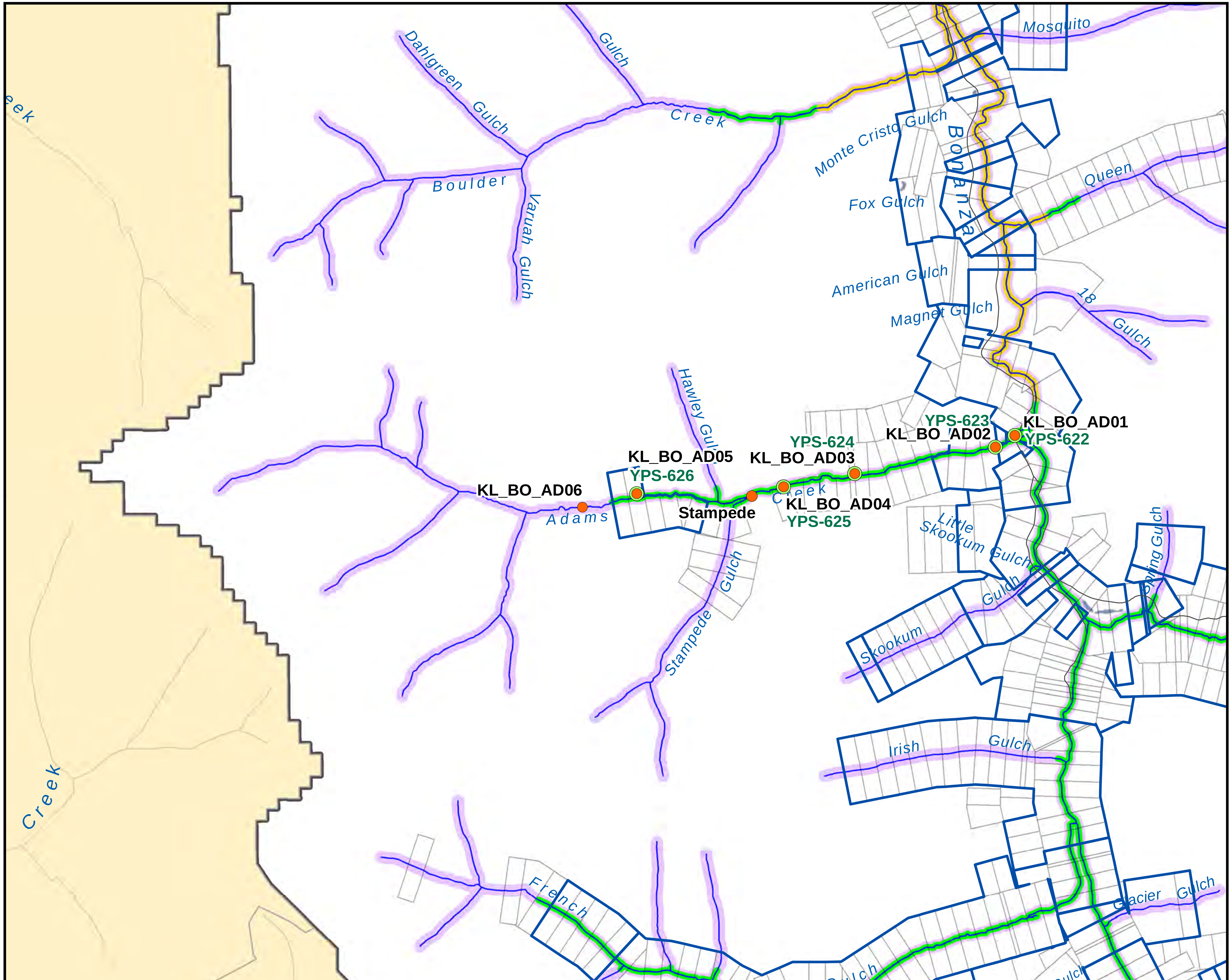
Current
Historical
Extensive




0 1 2 km

N

Yukon




# Adams Creek Water Quality and Aquatic Health Sampling Sites 2020 and Placer Mining Claims and Land Use Permits

**CMI Water Quality Sampling Sites 2020**

Sample Site

**Aquatic Health Monitoring Sites 2020**

Test

**Roads**

Local Road

**Placer Land Use Permits**

Class 4

**Placer Claims**

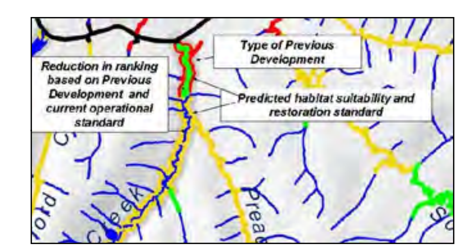
Active and Pending

**Stream Reach Classification**

Water Quality
Low Suitability
Moderate-Low Suitability
Moderate-Moderate Suitability
Moderate-High Suitability
High Suitability
Areas of Special Consideration (Ecological)
Areas of Special Consideration (Cultural)

**Development**

Current
Historical
Extensive

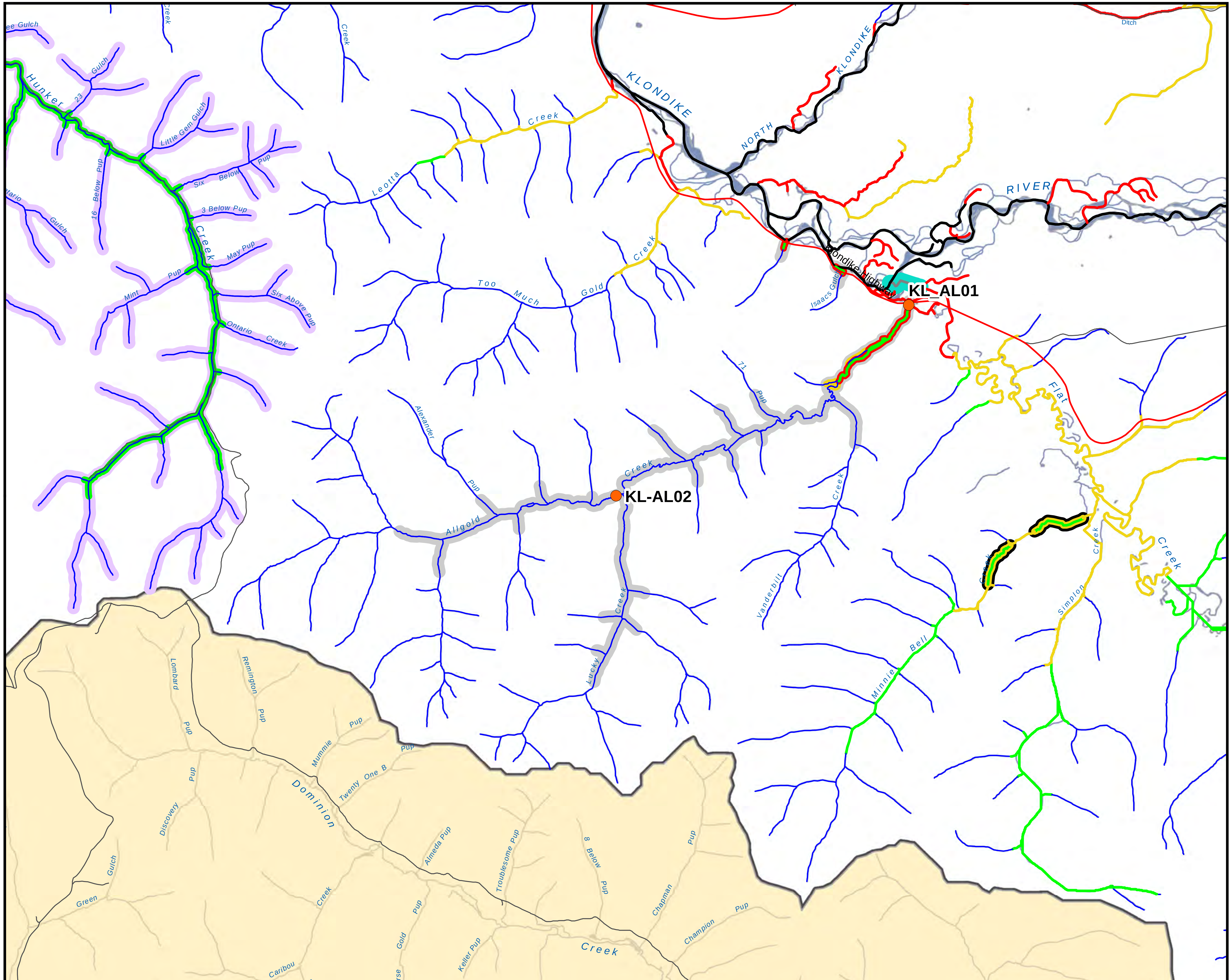



0 1 2 km

N

Yukon

# All Gold Creek Water Quality Sampling Sites 2020




**CMI Water Quality Sampling Sites 2020**

- Sample Site

**Roads**

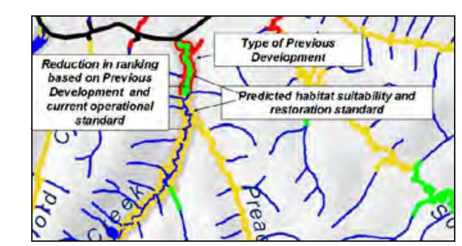
- Highway
- Local Road

**Stream Reach Classification**

- Water Quality
- Low Suitability
- Moderate-Low Suitability
- Moderate-Moderate Suitability
- Moderate-High Suitability
- High Suitability
- Areas of Special Consideration (Ecological)
- Areas of Special Consideration (Cultural)

**Development**

- Current
- Historical
- Extensive

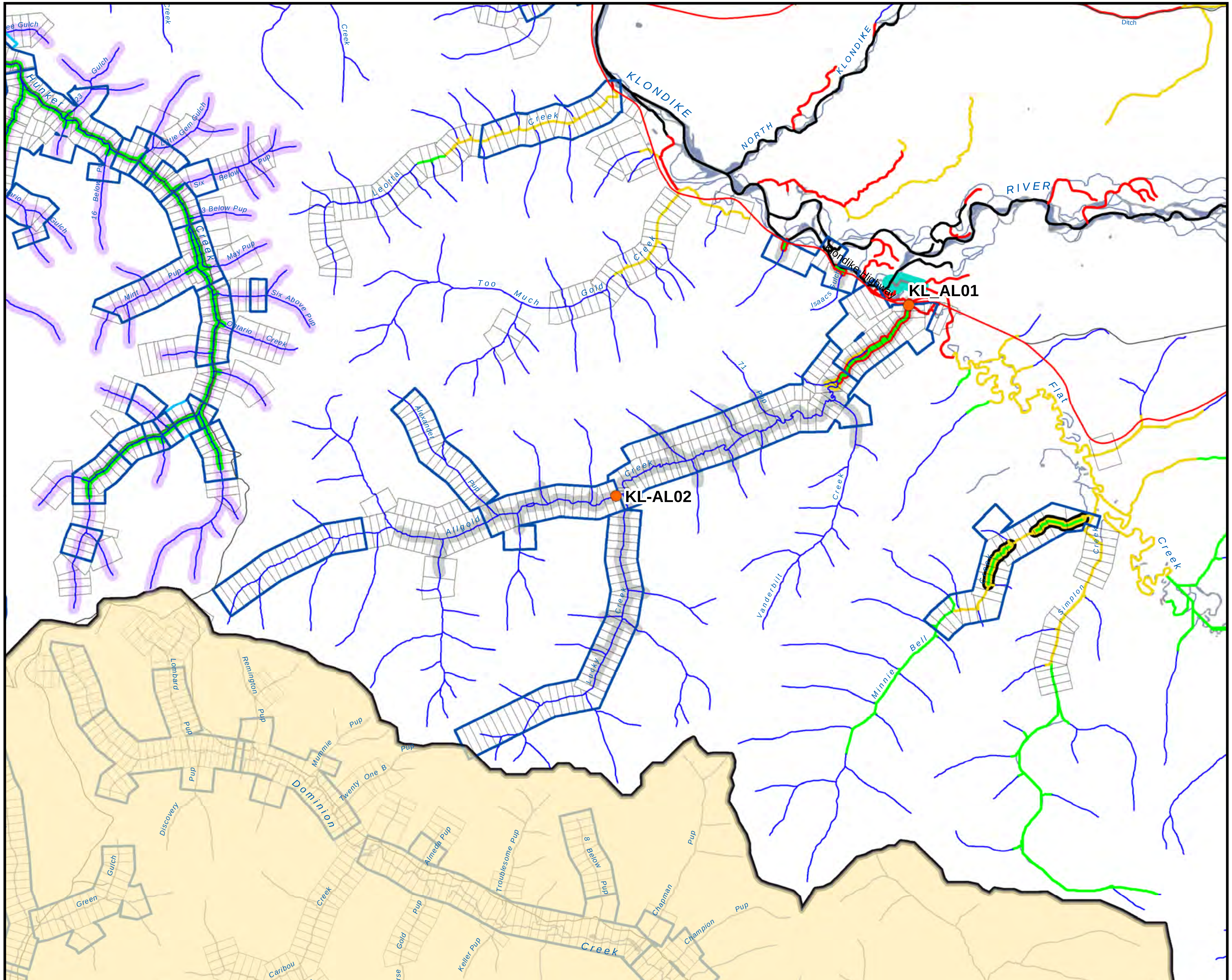



0 1 2 4 km

N

Yukon

# All Gold Creek Water Quality Sampling Sites 2020 and Placer Mining Claims and Land Use Permits




**CMI Water Quality Sampling Sites 2020**

- Sample Site

**Roads**

- Highway
- Local Road

**Placer Land Use Permits**

- Class 3
- Class 4

**Placer Claims**

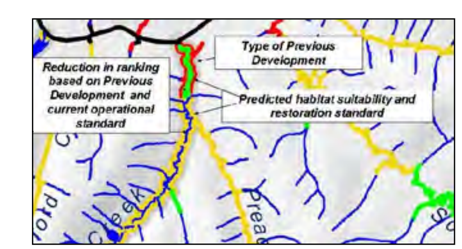
- Active and Pending

**Stream Reach Classification**

- Water Quality
- Low Suitability
- Moderate-Low Suitability
- Moderate-Moderate Suitability
- Moderate-High Suitability
- High Suitability
- Areas of Special Consideration (Ecological)
- Areas of Special Consideration (Cultural)

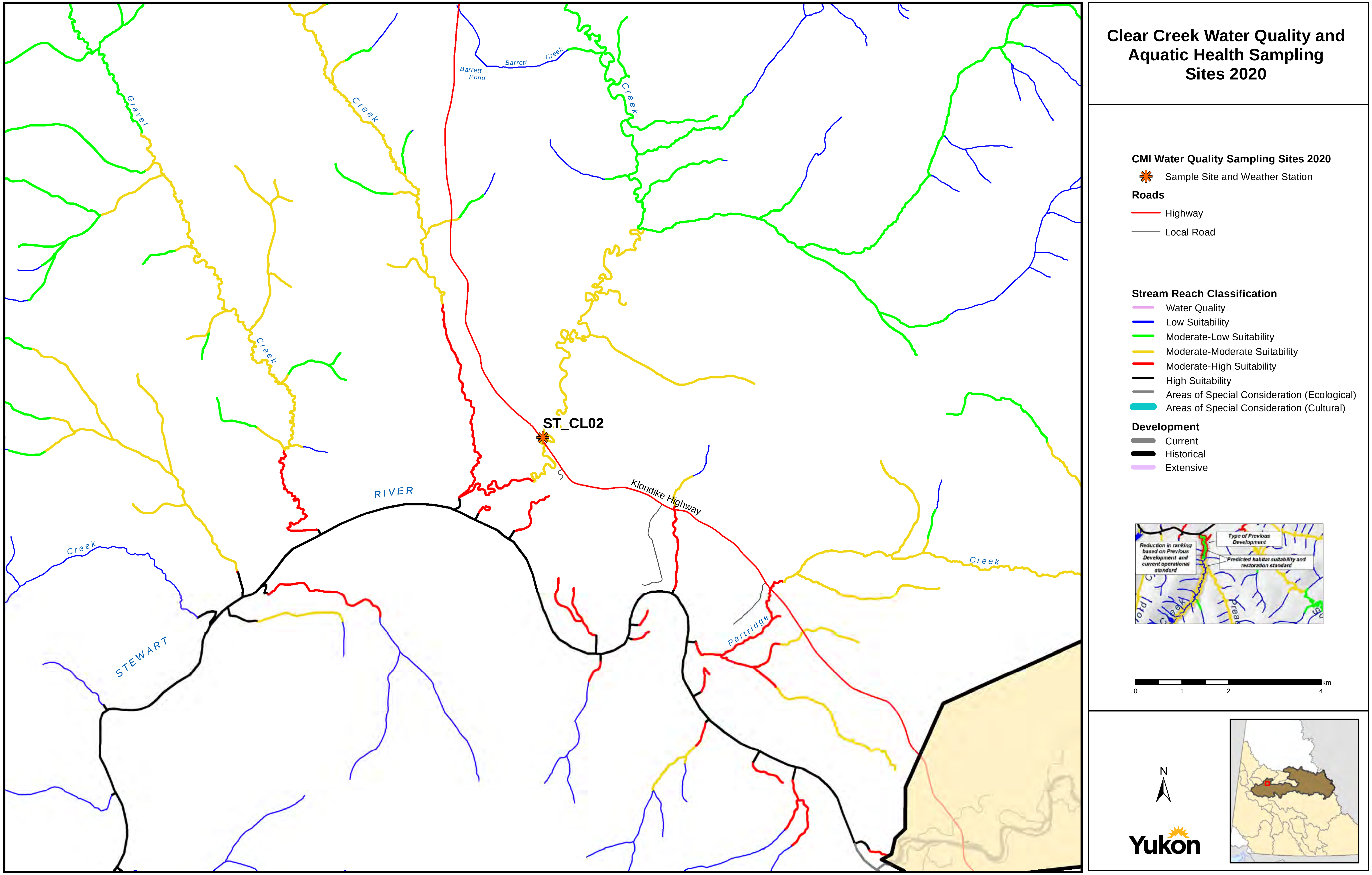
**Development**

- Current
- Historical
- Extensive



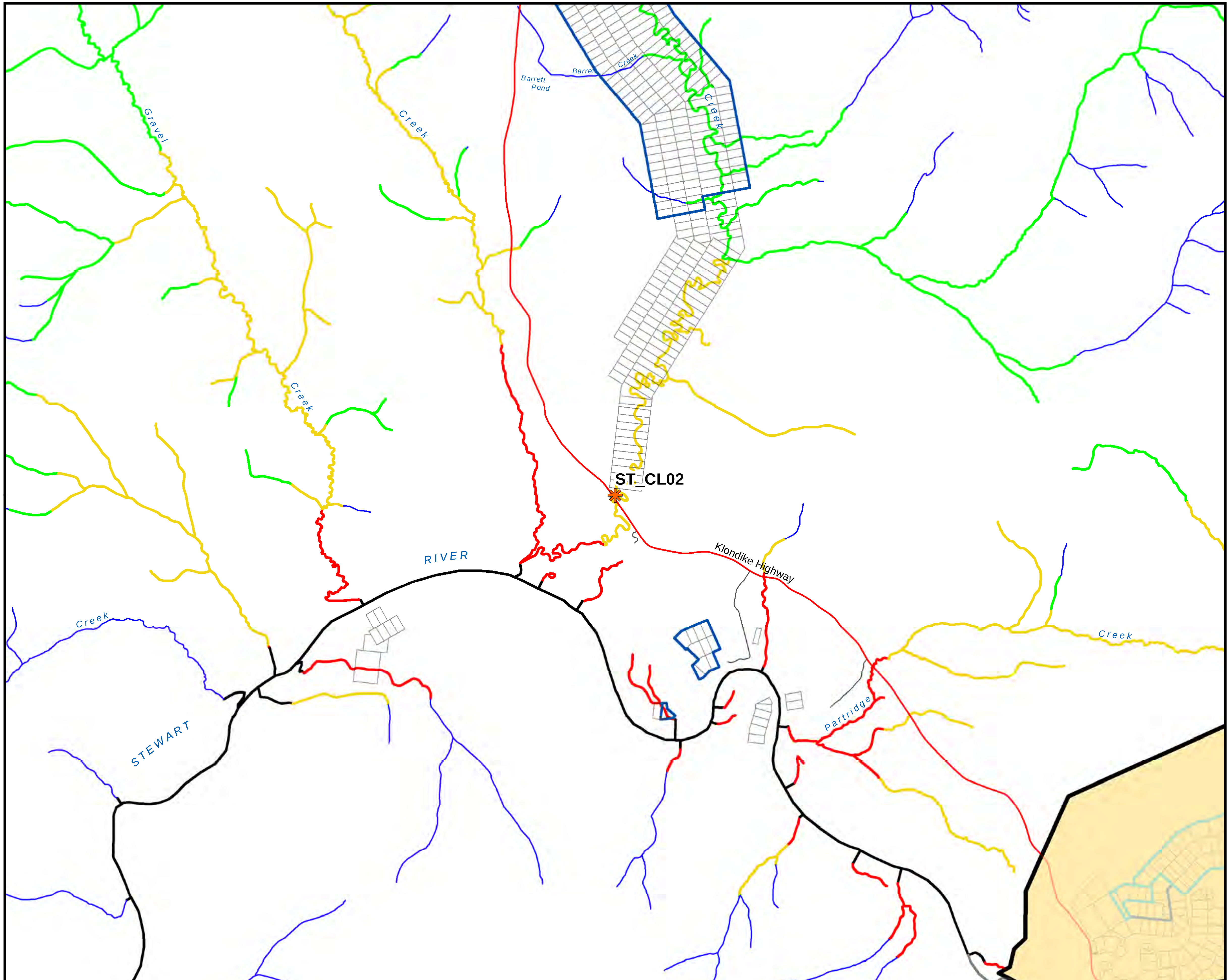



Yukon



Clear Creek Water Quality and Aquatic Health Sampling Sites 2020
CMI Water Quality Sampling Sites 2020
Sample Site and Weather Station
Roads
Highway
Local Road
Stream Reach Classification
Water Quality
Low Suitability
Moderate-Low Suitability
Moderate-Moderate Suitability
Moderate-High Suitability
High Suitability
Areas of Special Consideration (Ecological)
Areas of Special Consideration (Cultural)
Development
Current
Historical
Extensive
Type of Previous Development
Reduction in ranking based on Previous Development and current operational standard
Predicted habitat suitability and restoration standard
0
1
2
4
km
N
Yukon
ST_CL02
Gravel
Creek
Barrett Pond
Barrett Creek
Creek
Creek
RIVER
Klondike Highway
Creek
STEWART
Partridge
Creek

# Clear Creek Water Quality and Aquatic Health Sampling Sites 2020 and Placer Mining Claims and Land Use Permits




**CMI Water Quality Sampling Sites 2020**

Sample Site and Weather Station

**Roads**

Highway

Local Road

**Placer Land Use Permits**

Class 3

Class 4

**Placer Claims**

Active and Pending

**Stream Reach Classification**

Water Quality

Low Suitability

Moderate-Low Suitability

Moderate-Moderate Suitability

Moderate-High Suitability

High Suitability

Areas of Special Consideration (Ecological)

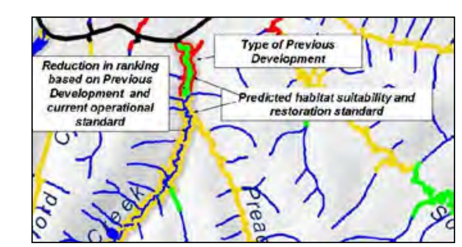
Areas of Special Consideration (Cultural)

**Development**

Current

Historical

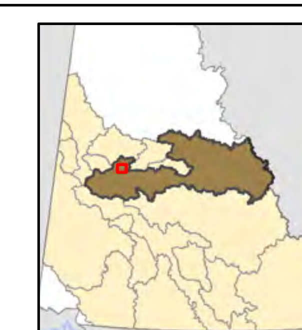
Extensive



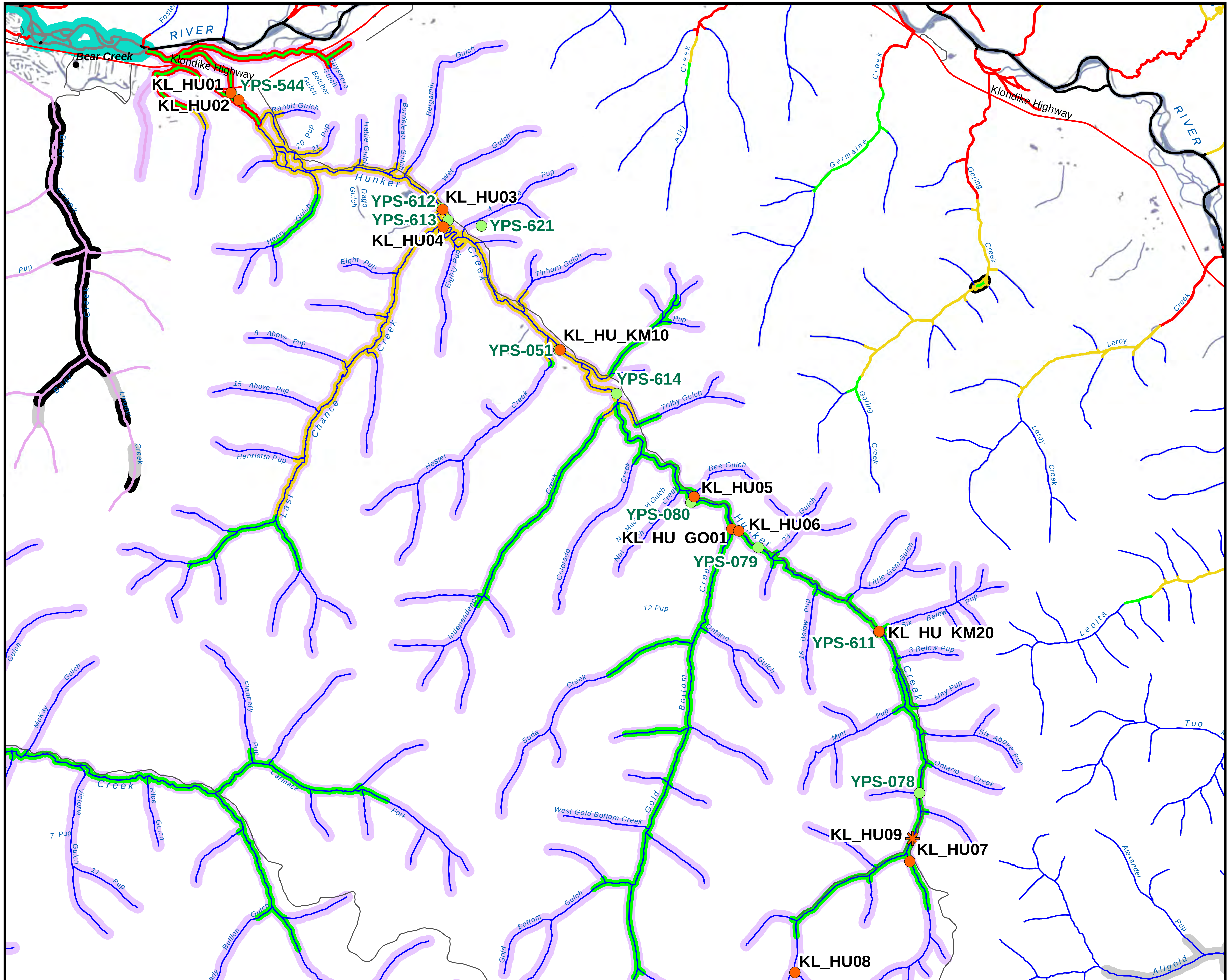

0 1 2 4 km

N

Yukon



# Hunker Creek Water Quality and Aquatic Health Sampling Sites 2020



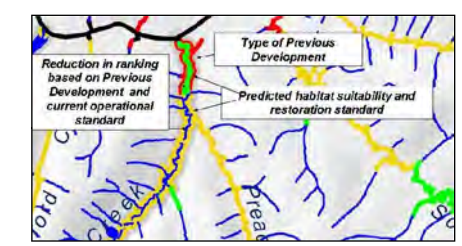

## CMI Water Quality Sampling Sites 2020
- Sample Site
- Sample Site and Weather Station

## Aquatic Health Monitoring Sites 2019
- Test

## Roads
- Highway
- Local Road

## Stream Reach Classification
- Water Quality
- Low Suitability
- Moderate-Low Suitability
- Moderate-Moderate Suitability
- Moderate-High Suitability
- High Suitability
- Areas of Special Consideration (Ecological)
- Areas of Special Consideration (Cultural)

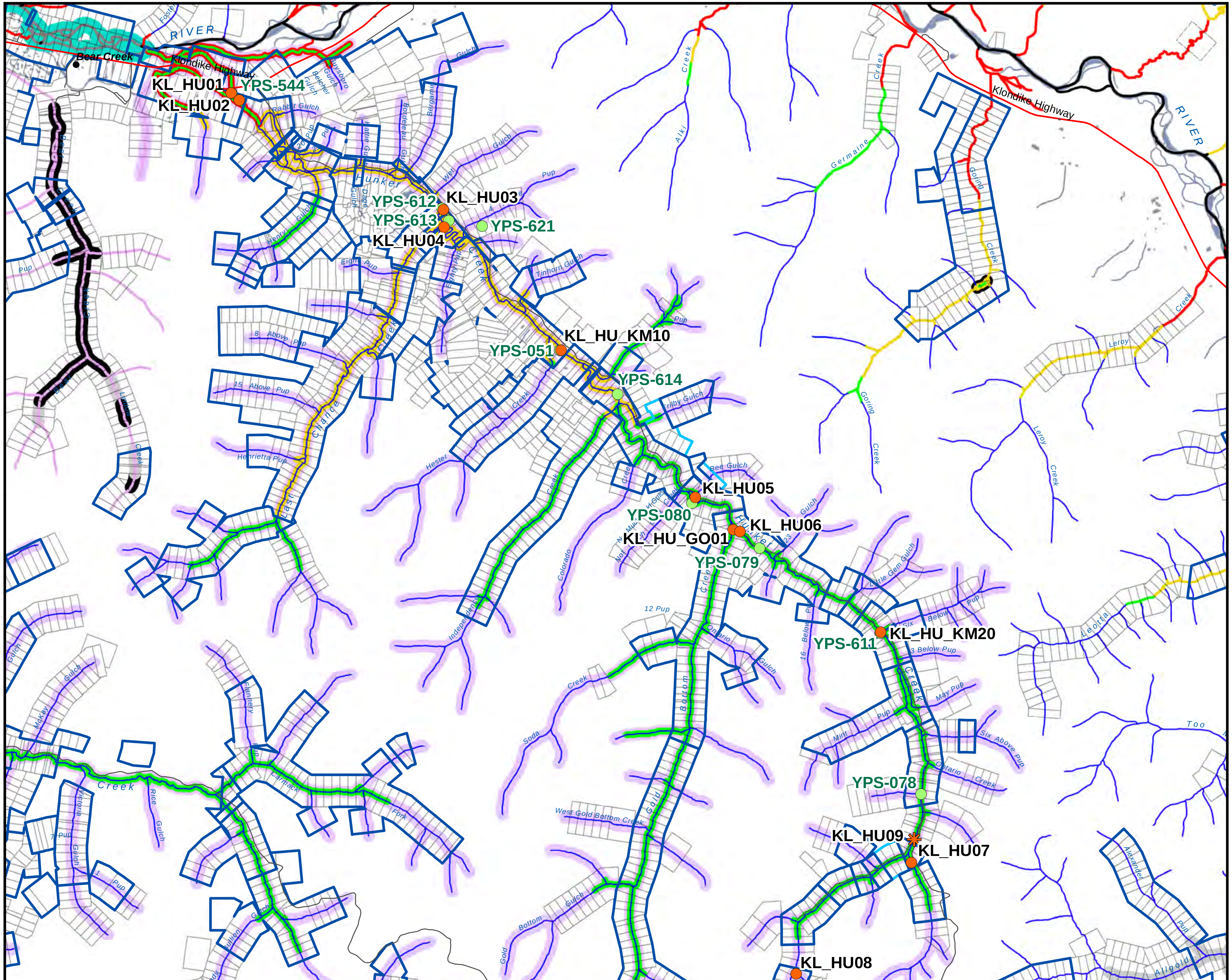
## Development
- Current
- Historical
- Extensive




0 1 2 4 km

N

Yukon




# Hunker Creek Water Quality and Aquatic Health Sampling Sites 2020 and Placer Mining Claims and Land Use Permits

**CMI Water Quality Sampling Sites 2020**

Sample Site

Sample Site and Weather Station

**Aquatic Health Monitoring Sites 2019**

Test

**Roads**

Highway

Local Road

**Placer Land Use Permits**

Class 3

Class 4

**Placer Claims**

Active and Pending

Expired

**Stream Reach Classification**

Water Quality

Low Suitability

Moderate-Low Suitability

Moderate-Moderate Suitability

Moderate-High Suitability

High Suitability

Areas of Special Consideration (Ecological)

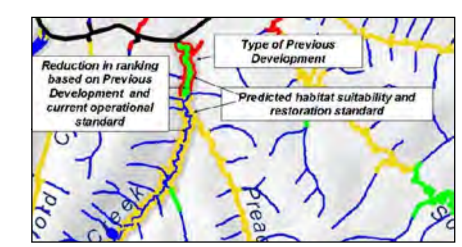
Areas of Special Consideration (Cultural)

**Development**

Current

Historical

Extensive

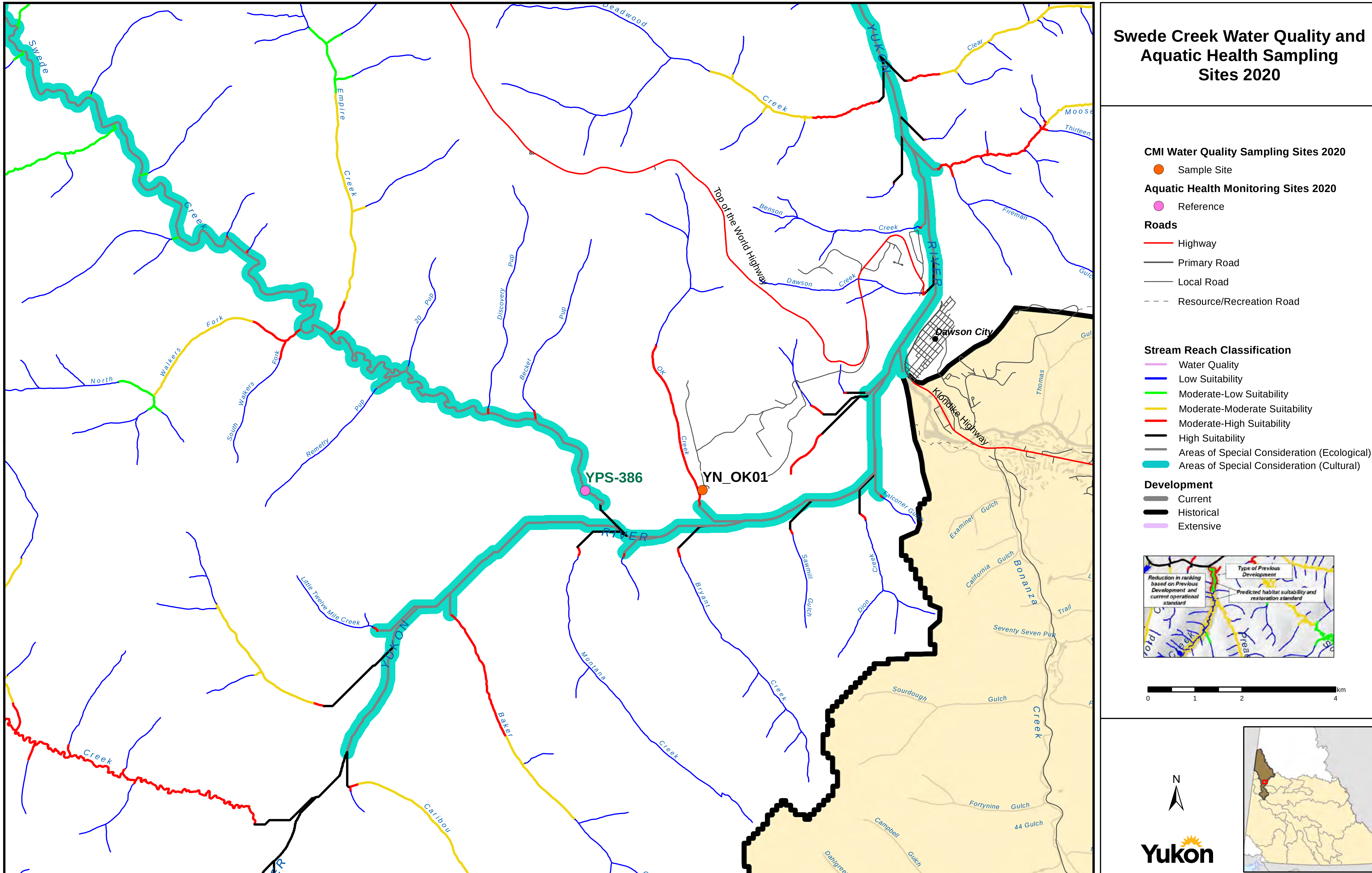



0 1 2 4 km

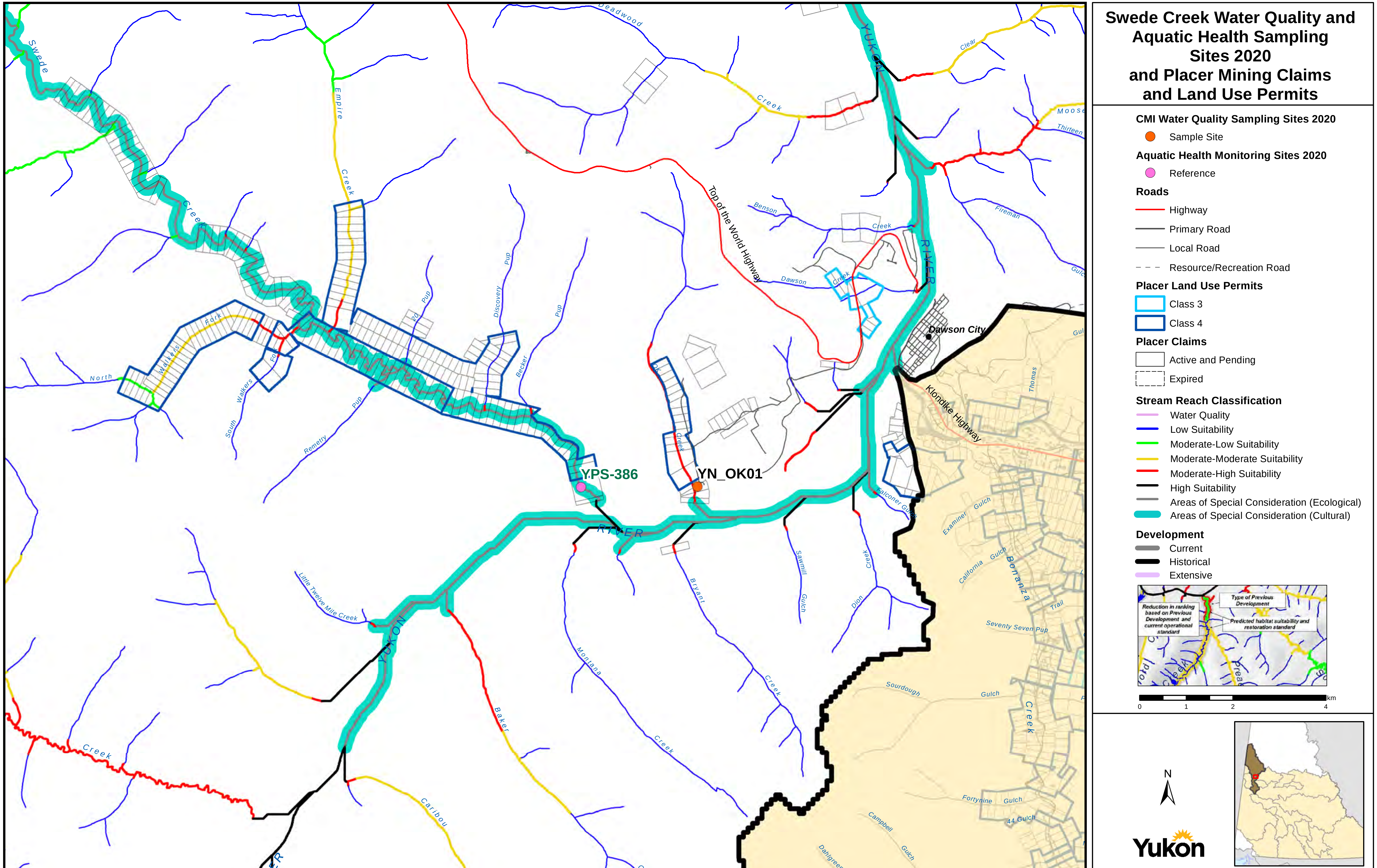
N

Yukon

# Swede Creek Water Quality and Aquatic Health Sampling Sites 2020



# Swede Creek Water Quality and Aquatic Health Sampling Sites 2020 and Placer Mining Claims and Land Use Permits



# APPENDIX B

## Field Forms

Sampling Date (D/M/Y): 30-Jul-20

Site Code: ~~YPS~~-386

## PRIMARY SITE DATA

**CABIN Study name:** Yukon-AHM

**River/Stream name:** Swede Creek

**Basin:** Yukon River

☒ Test ☐ Reference

**Site Location Description:**
Drive through John Mitchell's place and then walk down to creek and follow creek U/S till at site.

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or | **GPS Altitude (masl or fasl)** | 333 |
| ***Latitude:** | 64°01'31.0" | Stream Order (1:50,000): | 4 |
| ***Longitude:** | 139°34'26.5" | Ecoregion: | Taiga Cordillera |

(*use decimal degrees)

**Photos taken:**
☑ Field sheet ☑ Upstream ☑ Downstream ☑ Across channel ☑ Dry substrate ☑ Aquatic substrate ~~☐ Aerial substrate~~

## REACH DATA *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):
   ☐ hydraulic jump ☒ riffle ☐ rapids ☒ straight run ☐ pool/back eddy
2. **Canopy Coverage** (check one):
   ☐ 0% ☒ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%
3. **Macrophyte Coverage** (check one):
   ☐ 0% ☒ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%
4. **Riparian Zone** (check those present):
   ☒ 1 - ferns/grasses ☒ 2 - shrubs ☒ 3 - deciduous trees ☒ 4 - coniferous trees
5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):
   ☐ 1 – Not slippery, no colour (<0.5mm)
   ☒ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## WATER CHEMISTRY

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 23 | **Water T (C)** | 8.9 | **Cond.** | 153.9 | **DO (mg/L)** | 9.82 |
| **pH** | 7.40 | **Turbidity** | 1.80 | **sp Cond. (us\cm)** | 200.7 | **DO %** | 84.7 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other
1L Nalgene
120mL TOC

Sampling Date (D/M/Y): 30-July-20 Site Code: YRS-386

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.4 | | 26 | 12.0 | | 51 | 7.0 | | 76 | 7.1 | |
| 2 | 25.5 | | 27 | 13.5 | | 52 | 8.9 | | 77 | 7.8 | |
| 3 | 4.4 | | 28 | 4.3 | | 53 | 15.5 | | 78 | 7.6 | |
| 4 | 10.7 | | 29 | 3.5 | | 54 | 6.2 | | 79 | 5.4 | |
| 5 | 12.3 | | 30 | 8.4 | 0 | 55 | 3.4 | | 80 | 5.7 | 0 |
| 6 | 8.6 | | 31 | 4.2 | | 56 | 6.9 | | 81 | 12.6 | |
| 7 | 5.5 | | 32 | 2.8 | | 57 | 8.1 | | 82 | 8.3 | |
| 8 | 9.4 | | 33 | 10.6 | | 58 | 10.7 | | 83 | 6.3 | |
| 9 | 12.9 | | 34 | 13.9 | | 59 | 4.6 | | 84 | 5.2 | |
| 10 | 7.2 | 1/4 | 35 | 6.8 | | 60 | 5.2 | | 85 | 4.8 | |
| 11 | 3.8 | | 36 | 8.9 | | 61 | 9.4 | 1/4 | 86 | 9.4 | |
| 12 | 2.9 | | 37 | 3.2 | | 62 | 6.2 | | 87 | 8.9 | |
| 13 | 3.6 | | 38 | 5.7 | | 63 | 7.9 | | 88 | 12.4 | |
| 14 | 4.6 | | 39 | 7.9 | | 64 | 6.1 | | 89 | 6.4 | |
| 15 | 11.4 | | 40 | 8.6 | 1/4 | 65 | 6.5 | | 90 | 5.1 | 1/4 |
| 16 | 10.8 | | 41 | 12.2 | | 66 | 18.9 | | 91 | 4.3 | |
| 17 | 7.6 | | 42 | 6.2 | | 67 | 10.2 | | 92 | 6.5 | |
| 18 | 3.3 | | 43 | 2.9 | | 68 | 7.5 | | 93 | 13.8 | |
| 19 | 3.1 | | 44 | 8.4 | | 69 | 15.8 | | 94 | 10.6 | |
| 20 | 8.8 | 1/2 | 45 | 8.5 | | 70 | 9.9 | 0 | 95 | 6.8 | |
| 21 | 10.8 | | 46 | 4.6 | | 71 | 4.9 | | 96 | 7.4 | |
| 22 | 7.3 | | 47 | 4.1 | | 72 | 9.3 | | 97 | 4.6 | |
| 23 | 9.1 | | 48 | 5.5 | | 73 | 10.4 | | 98 | 5.8 | |
| 24 | 11.2 | | 49 | 7.7 | | 74 | 9.6 | | 99 | 8.8 | |
| 25 | 9.1 | | 50 | 5.7 | 0 | 75 | 8.2 | | 100 | 9.1 | 1/4 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☒ 2 - (sand) 0.1 – 0.2 cm
- ☐ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 30-July-20    Site Code: YPS-386

3. **Sediment Samples Collected:** ☒ (300-500g)

Depth of easily penetrable sediments (cm): 5    Depth of sediment sampled (cm): 0-5

Sediment texture and colour: Dark brown, fine sand, silty

**Check those present:** ☒ woody debris (twiglets) some  ☒ Leaf litter trace  ☐ macrophytes  ☐ biofilms  ☐ periphyton  
☐ odour  ☐ oily sheen  ☐ invertebrates

**Comments:** Collected from right bank above wetted depth, below high water depth

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacPhail | | |
| Time of Day: | 17:05 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | | | |
| Typical depth (in kick area) | ~40cm | | |

## *CHANNEL DATA*

**1. Channel**

| | | | |
|---|---|---|---|
| Slope/Gradient (%) | 3 | Flow Stage: ☒ Low/ ☐ Moderate/ ☐ High/ ☐ Flood | |
| Bankfull Width (m) | 24.3 | Wetted Stream Width (m) | 22.5 |
| Bankfull Wetted Depth (distance between water level and top of bank) (cm) | | | 74 |
| **Location in site** *(note where in sample site taken i.e. d/s of kick area)* | | | U/s of Kick |

**2. Channel Transect** starting from right bank

| Velocity/Depth | 1 | 2 | 3 | 4 | 5 | AVG |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 3.75 | 8 | 12 | 16 | 20 | |
| Depth (cm) | 32 | 40 | 37 | 39 | 30 | 35.6 |
| Velocity (m/s) | 0.9 | 1.0 | 0.9 | 0.8 | 0.5 | 0.82 |

Notes: At previously established site. Site appears undisturbed, creek is in good shape, clear water.

Discharge 1.152 | 1.600 | 1.332 | 1.248 | 0.60 |

Total - 5.932

Sampling Date (D/M/Y): 30-Jul-20 Site Code: YPS-A5

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon-AHM
**River/Stream name:** Adams Creek
**Basin:** Klondike River
☐ Test ☒ Reference

**Site Location Description:**
Parked at end of driveable road. Walked up on old winter trail ~~1km~~ or so from truck.

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD83 | **GPS Altitude (masl or fasl)** | 569 |
| ***Latitude:** | 63°55' 32.2" | Stream Order (1:50,000): | 3 |
| ***Longitude:** | 139° 24' 00.5 | Ecoregion: | Taiga Cordillera |

(*use decimal degrees)

**Photos taken:**
☑ Field sheet ☑ Upstream ☑ Downstream ☑ Across channel ☑ Dry substrate ☑ Aquatic substrate ☑ Aerial substrate

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):
   ☐ hydraulic jump ☒ riffle ☒ rapids ☐ straight run ☒ pool/back eddy
2. **Canopy Coverage** (check one):
   ☐ 0% ☐ 1-25% ☒ 26-50% ☐ 51-75% ☐ 76-100%
3. **Macrophyte Coverage** (check one):
   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%
4. **Riparian Zone** (check those present):
   ☒ 1 - ferns/grasses ☒ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees
5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):
   - ☐ 1 – Not slippery, no colour (<0.5mm)
   - ☒ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   - ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   - ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   - ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 22 | **Water T (C)** | 9.3 | **Cond.** | 137.9 | **DO (mg/L)** | 10.34 |
| **pH** | 7.66 | **Turbidity** | 17.1 | **sp Cond. (us\cm)** | 202.9 | **DO %** | 79.6 |

**Water Samples Collected:** ☑ TSS (500ml) ☑ General (500 ml) ☑ Total metals (250 ml) ☑ Nutrients (250 ml) ☑ Other

Sampling Date (D/M/Y): 30-July-20 Site Code: YPS-AS

## SUBSTRATE COMPOSITION IN RIFFLE (kicking area)

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.9 | | 26 | 7.5 | | 51 | 5.1 | | 76 | 4.6 | |
| 2 | 4.3 | | 27 | 5.9 | | 52 | 3.4 | | 77 | 5.9 | |
| 3 | 8.7 | | 28 | 5.3 | | 53 | 6.9 | | 78 | 5.4 | |
| 4 | 4.2 | | 29 | 4.9 | | 54 | 4.6 | | 79 | 7.8 | |
| 5 | 6.6 | | 30 | 5.5 | 0 | 55 | 14.4 | | 80 | 17.2 | 1/4 |
| 6 | 14.2 | | 31 | 4.3 | | 56 | 7.9 | | 81 | 7.6 | |
| 7 | 14.6 | | 32 | 8.1 | | 57 | 11.5 | | 82 | 8.3 | |
| 8 | 6.1 | | 33 | 8.9 | | 58 | 4.6 | | 83 | 8.3 | |
| 9 | 4.2 | | 34 | 6.5 | | 59 | 13.3 | | 84 | 4.1 | |
| 10 | 5.0 | 0 | 35 | 5.2 | | 60 | 11.7 | 1/4 | 85 | 5.9 | |
| 11 | 8.9 | | 36 | 3.8 | | 61 | 10.9 | | 86 | 3.7 | |
| 12 | 8.4 | | 37 | 18.0 | | 62 | 5.7 | | 87 | 9.9 | |
| 13 | 8.9 | | 38 | 8.9 | | 63 | 2.6 | | 88 | 5.6 | |
| 14 | 3.5 | | 39 | 5.5 | | 64 | 8.4 | | 89 | 2.8 | |
| 15 | 4.4 | | 40 | 3.5 | 1/4 | 65 | 10.2 | | 90 | 6.9 | 1/2 |
| 16 | 10.8 | | 41 | 5.0 | | 66 | 15.7 | | 91 | 5.9 | |
| 17 | 11.0 | | 42 | 7.5 | | 67 | 6.6 | | 92 | 4.1 | |
| 18 | 8.4 | | 43 | 4.1 | | 68 | 8.5 | | 93 | 6.0 | |
| 19 | 1.9 | | 44 | 8.9 | | 69 | 2.9 | | 94 | 8.9 | |
| 20 | 2.4 | 0 | 45 | 5.4 | | 70 | 5.4 | 0 | 95 | 9.6 | |
| 21 | 6.8 | | 46 | 6.4 | | 71 | 2.4 | | 96 | 6.6 | |
| 22 | 7.4 | | 47 | 14.8 | | 72 | 3.9 | | 97 | 2.6 | |
| 23 | 7.0 | | 48 | 15.4 | | 73 | 13.3 | | 98 | 3.6 | |
| 24 | 9.9 | | 49 | 7.8 | | 74 | 10.0 | | 99 | 12.6 | |
| 25 | 6.7 | | 50 | 7.6 | 1/4 | 75 | 13.2 | | 100 | 4.5 | 1/4 |

*Note:* The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☒ 2 - (sand) 0.1 – 0.2 cm
- ☐ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y) 30-Jul-20 Site Code: YPS-A5 20

3. **Sediment Samples Collected:** ☒ (300-500g)

Depth of easily penetrable sediments (cm): 7 Depth of sediment sampled (cm): 0-7

Sediment texture and colour: Dark brown, trace silt over coarse sand / fine gravel

**Check those present:** ☐ woody debris ☐ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** limited depositional areas in reach, sample from one specific location of riffle 3 left bank

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☒ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacPhail | → | → |
| Time of Day: | 14:20 | 14:27 | 14:35 |
| Sampling time (i.e. 3 min) | 3min | → | → |
| No. of sample jars | 1 | 1 | 1 |
| Typical depth (in kick area) | ~20-30cm | → | → |

## *CHANNEL DATA*

1. **Channel**

| | | | |
|---|---|---|---|
| Slope/Gradient (%) | 4 | Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood | |
| Bankfull Width (m) | 2.7 | Wetted Stream Width (m) | 2.3 |
| Bankfull Wetted Depth (distance between water level and top of bank) (cm) | | | 46 |
| **Location in site** *(note where in sample site taken i.e. d/s of kick area)* | | | U/S of Kick area |

2. **Channel Transect** from left bank

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | **AVG** |
|---|---|---|---|---|---|---|
| Distance from shore (m) | .40 | .80 | 1.2 | 1.6 | 2.0 | |
| Depth (cm) | 30 | 24.5 | 11 | 9 | 7 | 6.32 |
| Velocity (m/s) | 0.4 | 0.1 | 0.1 | 0.0 | 0.0 | 0.084 |

Notes. Creek appears to be in reference condition. No evidence of disturbance within reach.

Winter trail runs along creek but doesn't appear to have any impact.

Evidence of reference status is the fact that all the banks are intact, no riparian disturbance. Trail is fairly overgrown.

Reach is slightly steeper than test sites.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Discharge | 0.049 | 0.001 | 0.0004 | 0 | 0 | Total - 0.04942 |

Sampling Date (D/M/Y): 30-Jul-20

Site Code: YPS-A4

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon - AHM

**River/Stream name:** Adams Creek

**Basin:** Klondike River

☒ Test ☐ Reference

**Site Location Description:**

Drive up adams Creek road until you reach a clearing, follow down to the creek and walk upstream through open area of creek

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD83 | **GPS Altitude (masl or fasl)** | 512 |
| ***Latitude:** | 63° 55' 40.3" | **Stream Order** (1:50,000): | 3 |
| ***Longitude:** | 139° 27' 22.3" | **Ecoregion:** | Taiga Cordillera |

(*use decimal degrees)

**Photos taken:**

☒ Field sheet ☒ Upstream ☒ Downstream ☒ Across channel ☒ Dry substrate ☒ Aquatic substrate ~~☐ Aerial substrate~~

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):

   ☐ hydraulic jump ☒ riffle ☐ rapids ☐ straight run ☒ pool/back eddy

2. **Canopy Coverage** (check one):

   ☐ 0% ☐ 1-25% ☒ 26-50% ☐ 51-75% ☐ 76-100%

3. **Macrophyte Coverage** (check one):

   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

4. **Riparian Zone** (check those present):

   ☒ 1 - ferns/grasses ☐ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees

5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):

   ☐ 1 – Not slippery, no colour (<0.5mm)
   ☒ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 20.0 | **Water T (C)** | 5.2 | **Cond.** | 250.2 | **DO (mg/L)** | 10.25 |
| **pH** | 7.73 | **Turbidity** | 2.01 | **sp Cond. (us\cm)** | 359.1 | **DO %** | 80.7 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other

1 nalgene
120mL TOC

Sampling Date (D/M/Y): 30-Jul-20 Site Code: YPS-A4

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

1. **100 Pebble Count & Substrate Embeddedness**
   - Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
   - Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
   - Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.6 | | 26 | 9.5 | | 51 | 7.2 | | 76 | 7.2 | |
| 2 | 4.6 | | 27 | 6.0 | | 52 | 5.9 | | 77 | 1.9 | |
| 3 | 6.9 | | 28 | 9.2 | | 53 | 3.4 | | 78 | 12.8 | |
| 4 | 15.9 | | 29 | 15.1 | | 54 | 5.6 | | 79 | 9.5 | 0 |
| 5 | 6.8 | | 30 | 9.4 | 0 | 55 | 2.9 | | 80 | 5.3 | |
| 6 | 11.2 | | 31 | 8.7 | | 56 | 6.9 | | 81 | 14.7 | |
| 7 | 5.2 | | 32 | 6.6 | | 57 | 6.1 | | 82 | 5.9 | |
| 8 | 6.1 | | 33 | 4.1 | | 58 | 10.7 | | 83 | 10.1 | |
| 9 | 6.7 | | 34 | 4.5 | | 59 | 2.9 | | 84 | 7.2 | |
| 10 | 6.3 | 1/4 | 35 | 8.7 | | 60 | 5.8 | 0 | 85 | 15.1 | |
| 11 | 6.0 | | 36 | 5.7 | | 61 | 3.0 | | 86 | 6.8 | |
| 12 | 5.3 | | 37 | 7.4 | | 62 | 5.7 | | 87 | 3.7 | |
| 13 | 9.8 | | 38 | 15.4 | | 63 | 14.0 | | 88 | 4.1 | |
| 14 | 13.6 | | 39 | 17.6 | | 64 | 7.3 | | 89 | 3.6 | |
| 15 | 8.6 | | 40 | 8.9 | 0 | 65 | 8.8 | | 90 | 4.6 | 1/2 |
| 16 | 8.4 | | 41 | 3.5 | | 66 | 5.6 | | 91 | 3.8 | |
| 17 | 6.6 | | 42 | 12.6 | | 67 | 10.9 | | 92 | 9.4 | |
| 18 | 5.6 | | 43 | 7.6 | | 68 | 6.9 | | 93 | 7.3 | |
| 19 | 8.3 | | 44 | 4.2 | | 69 | 4.4 | | 94 | 5.4 | |
| 20 | 7.7 | 1/4 | 45 | 2.6 | | 70 | 6.4 | 0 | 95 | 13.6 | |
| 21 | 14.6 | | 46 | 3.8 | | 71 | 12.3 | | 96 | 15.1 | |
| 22 | 6.9 | | 47 | 11.2 | | 72 | 5.8 | | 97 | 13.9 | |
| 23 | 4.5 | | 48 | 1.6 | | 73 | 8.3 | | 98 | 4.1 | |
| 24 | 5.4 | | 49 | 2.1 | | 74 | 13.6 | | 99 | 8.7 | |
| 25 | 3.7 | | 50 | 7.5 | 0 | 75 | 6.9 | | 100 | 10.2 | 1/4 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

2. **Surrounding/Interstitial Material** - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☐ 2 - (sand) 0.1 – 0.2 cm
- ☒ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 30-Jul-20 Site Code: YPS-A4

3. **Sediment Samples Collected:** ☒ (300-500g)

Depth of easily penetrable sediments (cm): ~5cm Depth of sediment sampled (cm): 0-5

Sediment texture and colour: Brown, sands fines

**Check those present:** ☒ woody debris ☒ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** Collected from three depositional areas

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| 500 µm mesh Kicknet** | Riffle 1 | Riffle 2 | Riffle 3 |
|---|---|---|---|
| Operator: | A. MacPhail | | |
| Time of Day: | 12:10 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 2 | | |
| Typical depth (in kick area) | ~30cm | | |

## *CHANNEL DATA*

1. **Channel**

| | | | |
|---|---|---|---|
| Slope/Gradient (%) | 3 | Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood | |
| Bankfull Width (m) | 6.8 | Wetted Stream Width (m) | 3.2 |
| Bankfull Wetted Depth (distance between water level and top of bank) (cm) | | | 75 |
| **Location in site** *(note where in sample site taken i.e. d/s of kick area)* | | | U/S of Kick area |

2. **Channel Transect** starting from right bank

| Velocity/Depth | 1 | 2 | 3 | 4 | 5 | AVG |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 0.5 | 1 | 1.5 | 2 | 2.5 | |
| Depth (cm) | 10 | 13 | 12 | 8 | 8 | 10.2 |
| Velocity (m/s) | 0.2 | 0.7 | 0.3 | 0.1 | 0.1 | 0.28 |

Notes: Site is easily accessed from road. Remnants of old workings around site but does not appear to have any recent activity. Creek is confined through part of the reach and opens up as you move downstream. Unconfined area has been influenced by spring flows. Lots of woody debris on banks + floodplain.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Discharge | 0.010 | 0.046 | 0.018 | 0.004 | 0.004 | Total - 0.0815 $m^3/s$ |

Sampling Date (D/M/Y): 30-Jul-20

Site Code: YPS-A3

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon-AHM

**River/Stream name:** Adams Creek

**Basin:** Klondike River

☒ Test ☐ Reference

**Site Location Description:**
Just below road that goes up Adams Creek. Can park ~200m below and walk up creek or come down from Road

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD83 | **GPS Altitude (masl or fasl)** | 493 |
| ***Latitude:** | 63°55'46.5" | **Stream Order** (1:50,000): | 3 |
| ***Longitude:** | 139°21'35.9" | **Ecoregion:** | Taiga Cordillera |

(*use decimal degrees)

**Photos taken:**
☑ Field sheet ☑ Upstream ☑ Downstream ☑ Across channel ☑ Dry substrate ☑ Aquatic substrate ☐ ~~Aerial substrate~~

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):

   ☐ hydraulic jump ☒ riffle ☐ rapids ☐ straight run ☒ pool/back eddy

2. **Canopy Coverage** (check one):

   ☐ 0% ☐ 1-25% ☒ 26-50% ☐ 51-75% ☐ 76-100%

3. **Macrophyte Coverage** (check one):

   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

4. **Riparian Zone** (check those present):

   ☒ 1 - ferns/grasses ☒ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees

5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):

   ☐ 1 – Not slippery, no colour (<0.5mm)
   ☒ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 14.5 | **Water T (C)** | 4.1 | **Cond.** | 261.9 | **DO (mg/L)** | 10.98 |
| **pH** | 7.53 | **Turbidity** | 1.50 | **sp Cond. (us\cm)** | 387.5 | **DO %** | 80.3 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other

1 nalgene
120mL TOC

Sampling Date (D/M/Y) 30-July-20 Site Code: YPS-43

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.3 | | 26 | 4.3 | | 51 | 8.8 | | 76 | 5.5 | |
| 2 | 5.6 | | 27 | 6.2 | | 52 | 10.6 | | 77 | 4.4 | |
| 3 | 8.7 | | 28 | 6.8 | | 53 | 4.2 | | 78 | 7.2 | |
| 4 | 4.8 | | 29 | 6.7 | | 54 | 8.3 | | 79 | 9.1 | |
| 5 | 6.4 | | 30 | 5.7 | 1/2 | 55 | 6.2 | | 80 | 10.3 | 0 |
| 6 | 4.4 | | 31 | 4.7 | | 56 | 9.5 | | 81 | 9.4 | |
| 7 | 3.6 | | 32 | 3.5 | | 57 | 18.3 | | 82 | 6.7 | |
| 8 | 5.9 | | 33 | 15.0 | | 58 | 7.9 | | 83 | 6.8 | |
| 9 | 3.2 | | 34 | 5.7 | | 59 | 5.8 | | 84 | 7.7 | |
| 10 | 4.8 | 0 | 35 | 8.6 | | 60 | 5.3 | 1/4 | 85 | 5.7 | |
| 11 | 12.2 | | 36 | 4.0 | | 61 | 4.2 | | 86 | 2.6 | |
| 12 | 10.9 | | 37 | 5.1 | | 62 | 5.9 | | 87 | 3.8 | |
| 13 | 2.8 | | 38 | 8.8 | | 63 | 8.3 | | 88 | 4.7 | |
| 14 | 4.6 | | 39 | 14.1 | | 64 | 6.3 | | 89 | 5.9 | |
| 15 | 4.3 | | 40 | 4.1 | 3/4 | 65 | 11.0 | | 90 | 10.6 | 1/4 |
| 16 | 6.8 | | 41 | 13.2 | | 66 | 7.9 | | 91 | 4.8 | |
| 17 | 11.4 | | 42 | 8.4 | | 67 | 5.2 | | 92 | 6.0 | |
| 18 | 6.6 | | 43 | 6.3 | | 68 | 9.1 | | 93 | 2.1 | |
| 19 | 1.8 | | 44 | 5.3 | | 69 | 4.1 | | 94 | 4.4 | |
| 20 | 5.6 | 0 | 45 | 4.9 | | 70 | 6.4 | 0 | 95 | 13.1 | |
| 21 | 4.1 | | 46 | 9.3 | | 71 | 7.3 | | 96 | 5.9 | |
| 22 | 8.4 | | 47 | 6.0 | | 72 | 6.3 | | 97 | 3.8 | |
| 23 | 17.1 | | 48 | 10.4 | | 73 | 7.6 | | 98 | 3.9 | |
| 24 | 8.9 | | 49 | 8.6 | | 74 | 5.7 | | 99 | 6.1 | |
| 25 | 4.3 | | 50 | 4.0 | 1/4 | 75 | 6.8 | | 100 | 5.8 | 0 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☒ 2 - (sand) 0.1 – 0.2 cm
- ☐ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 30-July-20 Site Code: YPS-34

3. **Sediment Samples Collected:** ☒ (300-500g)

Depth of easily penetrable sediments (cm): 22. Depth of sediment sampled (cm): 0-12

Sediment texture and colour: brown/dark brown sand (F-m), trace silt

**Check those present:** ☒ woody debris (trace, rootlets) ☐ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** Collected from left bank at 3 locations

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacPhail | | |
| Time of Day: | 11:00 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 1 | | |
| Typical depth (in kick area) | ~20cm | | |

## *CHANNEL DATA*

1. **Channel**

| | | | |
|---|---|---|---|
| Slope/Gradient (%) | 3 | Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood | |
| Bankfull Width (m) | 4.8 | Wetted Stream Width (m) | 3.8 |
| Bankfull Wetted Depth (distance between water level and top of bank) (cm) | | | 42 |
| **Location in site** *(note where in sample site taken i.e. d/s of kick area)* | | | just upstream of kick area |

2. **Channel Transect** from right bank

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | AVG |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 0.6 | 1.2 | 1.8 | 2.4 | 3.0 | |
| Depth (cm) | 8 | 11.5 | 18 | 15 | 7 | 11.9 |
| Velocity (m/s) | 0.1 | 0.5 | 0.6 | 0.5 | 0.1 | 0.36 |

Notes: Appear to be outside active + proposed mining area. Were stakes leading up the creek, went above the stakes in the hope were outside where they may mine in the future

Creek is confined on both sides by steep banks. Evidence of thawing permafrost on banks noted along reach

Canopy cover measured using CANOPEO APP.

| Discharge | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| | 0.005 | 0.035 | 0.064 | 0.045 | 0.004 | Total 0.1533 m³/s |

Sampling Date (D/M/Y): 30-Jul-20

Site Code: YPS-A2

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon-AHM

**River/Stream name:** Adams Creek

**Basin:** Klondike River

☒ Test ☐ Reference

**Site Location Description:**

Immediately D/S of active dirt works. Still in undeveloped area of creek that appears like it likely wont be altered later. Best for access by walking up from YPS-A1. Can also drive up along road.

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD83 | **GPS Altitude (masl or fasl)** | 476 |
| ***Latitude:** | 63°55'58.8" | Stream Order (1:50,000): | 3 |
| ***Longitude:** | 139° 20' 03.9" | Ecoregion: | Taiga Cordillera |

(*use decimal degrees)

**Photos taken:**

☒ Field sheet ☒ Upstream ☒ Downstream ☐ ~~Across channel~~ ☐ ~~Dry substrate~~ ☐ ~~Aquatic substrate~~ ☐ ~~Aerial substrate~~

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):

☐ hydraulic jump ☒ riffle ☐ rapids ☐ straight run ☒ pool/back eddy

2. **Canopy Coverage** (check one): Average of multiple values.

☐ 0% ☒ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

3. **Macrophyte Coverage** (check one):

☐ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

4. **Riparian Zone** (check those present):

☒ 1 - ferns/grasses ☒ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees

5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):

☐ 1 – Not slippery, no colour (<0.5mm)
☒ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 11°C | **Water T (C)** | 4.2 | **Cond.** | 298.6 | **DO (mg/L)** | 10.51 |
| **pH** | 7.75 | **Turbidity** | 3.11 | **sp Cond. (us\cm)** | 441.2 | **DO %** | 80.7 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other

1L Nalgene
120mL TOC

Sampling Date (D/M/Y): 30-Jul-20 Site Code: YPS-A2

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.7 | | 26 | 3.1 | | 51 | 8.7 | | 76 | 12.2 | |
| 2 | 9.4 | | 27 | 6.4 | | 52 | 6.8 | | 77 | 9.8 | |
| 3 | 90 | | 28 | 14.1 | | 53 | 11.3 | | 78 | 7.6 | |
| 4 | 3.2 | | 29 | 12.2 | | 54 | 8.8 | | 79 | 6.0 | |
| 5 | 2.9 | | 30 | 10.1 | 1/2 | 55 | 4.9 | | 80 | 5.9 | 0 |
| 6 | 8.7 | | 31 | 3.6 | | 56 | 1.7 | | 81 | 5.3 | |
| 7 | 9.1 | | 32 | 3.8 | | 57 | 4.2 | | 82 | 12.2 | |
| 8 | 8.8 | | 33 | 5.9 | | 58 | 2.4 | | 83 | 6.4 | |
| 9 | 9.6 | | 34 | 4.6 | | 59 | 3.3 | | 84 | 11.1 | |
| 10 | 12.0 | 0 | 35 | 9.7 | | 60 | 10.8 | 1/4 | 85 | 7.7 | |
| 11 | 7.1 | | 36 | 9.1 | | 61 | 4.1 | | 86 | 11.2 | |
| 12 | 8.4 | | 37 | 2.5 | | 62 | 4.9 | | 87 | 11.1 | |
| 13 | 3.9 | | 38 | 6.6 | | 63 | 6.4 | | 88 | 5.9 | |
| 14 | 6.2 | | 39 | 8.6 | | 64 | 5.2 | | 89 | 8.7 | |
| 15 | 8.4 | | 40 | 7.5 | 0 | 65 | 10.5 | | 90 | 3.8 | 1/4 |
| 16 | 14.1 | | 41 | 3.6 | | 66 | 4.9 | | 91 | 5.2 | |
| 17 | 5.9 | | 42 | 6.9 | | 67 | 7.7 | | 92 | 3.2 | |
| 18 | 2.9 | | 43 | 6.1 | | 68 | 6.4 | | 93 | 12.6 | |
| 19 | 3.4 | | 44 | 4.8 | | 69 | 3.1 | | 94 | 7.3 | |
| 20 | 3.1 | | 45 | 8.1 | | 70 | 1.6 | 0 | 95 | 2.9 | |
| 21 | 2.9 | | 46 | 5.4 | | 71 | 13.8 | | 96 | 7.3 | |
| 22 | 4.4 | | 47 | 6.7 | | 72 | 8.1 | | 97 | 12.5 | |
| 23 | 5.9 | | 48 | 5.9 | | 73 | 2.2 | | 98 | 11.3 | |
| 24 | 9.9 | 1/2 | 49 | 8.5 | | 74 | 4.1 | | 99 | 3.2 | |
| 25 | 3.1 | | 50 | 4.8 | 0 | 75 | 9.1 | | 100 | 9.6 | 0 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☒ 2 - (sand) 0.1 – 0.2 cm
- ☐ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 30-July-20 Site Code: 4PS-42

3. **Sediment Samples Collected:** ☒ (300-500g)

Depth of easily penetrable sediments (cm): 6 Depth of sediment sampled (cm): 0-5

Sediment texture and colour: Brown sand, trace fine silt + trace coarse gravel

**Check those present:** ☐ woody debris ☐ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** Collected from microdeposition areas above riffle

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacPhail | | |
| Time of Day: | 9:30 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 1 | | |
| Typical depth (in kick area) | ~25cm | | |

## *CHANNEL DATA*

1. **Channel**

| | | | |
|---|---|---|---|
| Slope/Gradient (%) | 3 | Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood | |
| Bankfull Width (m) | 3 | Wetted Stream Width (m) | 2.3 |
| Bankfull Wetted Depth (distance between water level and top of bank) (cm) | | | 43 |
| **Location in site** *(note where in sample site taken i.e. d/s of kick area)* | | | U/S of Kick area |

2. **Channel Transect**

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | AVG |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 0.40 | 0.80 | 1.20 | 1.60 | 2.00 | |
| Depth (cm) | 10 | 19 | 22 | 26.5 | 15 | 0.186 |
| Velocity (m/s) | 0.4 | 0.6 | 0.7 | 0.5 | 0.2 | 0.54 |

Notes: Appear to be out of where mining will occur in the future. Creek is confined by steep banks on both sides, unlikely to change course. Lots of riparian veg has been pushed overtop of creek, increasing canopy cover, Flagged site for future events.

Potential for bank erosion is high given steepness of banks. Doesn't appear to be any sluicing upstream. Might change as day progresses.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Discharge | 0.016 | 0.046 | 0.062 | 0.086 | 0.012 | Total - 0.2216m³/s |

Sampling Date (D/M/Y): 30-July-20 Site Code: YPS-41

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon - AHM **Basin:** Klondike River

**River/Stream name:** Adams Creek ☒ Test ☐ Reference

**Site Location Description:**
About 50-75m on Adams Creek from Bonanza Creek Road. Old ford location of site. Easily accessed by walking.

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD83 | **GPS Altitude (masl or fasl)** | 503 |
| ***Latitude:** | 63° 56' 02.0" | Stream Order (1:50,000): | 3 |
| ***Longitude:** | 139° 19' 54.9" | Ecoregion: | Taiga |

(*use decimal degrees)

**Photos taken:**
☑ Field sheet ☑ Upstream ☑ Downstream ☑ Across channel ☑ Dry substrate ☑ Aquatic substrate ~~☐ Aerial substrate~~

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):
   ☐ hydraulic jump ☒ riffle ☐ rapids ☐ straight run ☒ pool/back eddy
2. **Canopy Coverage** (check one):
   ☐ 0% ☒ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%
3. **Macrophyte Coverage** (check one):
   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%
4. **Riparian Zone** (check those present):
   ☒ 1 - ferns/grasses ☒ 2 - shrubs ☐ 3 - deciduous trees ☐ 4 - coniferous trees
5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):
   ☒ 1 – Not slippery, no colour (<0.5mm)
   ☒ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 6.5 | **Water T (C)** | 3.5 | **Cond.** | 289.0 | **DO (mg/L)** | 10.29 |
| **pH** | 7.78 | **Turbidity** | 4.04 | **sp Cond. (us\cm)** | 436.0 | **DO %** | 81.2 |

**Water Samples Collected:** ☒ TSS (500ml) ☐ General (500 ml) ☐ Total metals (250 ml) ☐ Nutrients (250 ml) ☒ Other
1L Nalgene
120mL TOC

YPS-DUP-2 collected

Sampling Date (D/M/Y): 30-July-20 Site Code: YPS-41

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.6 | | 26 | 8.4 | | 51 | 10.5 | | 76 | 5.0 | |
| 2 | 7.4 | | 27 | 9.5 | | 52 | 4.0 | | 77 | 3.1 | |
| 3 | 9.1 | | 28 | 7.4 | | 53 | 6.1 | | 78 | 3.3 | |
| 4 | 5.9 | | 29 | 5.8 | | 54 | 5.0 | | 79 | 6.4 | |
| 5 | 4.9 | | 30 | 5.1 | 0 | 55 | 2.6 | | 80 | 5.1 | 0 |
| 6 | 3.0 | | 31 | 3.8 | | 56 | 2.7 | | 81 | 7.3 | |
| 7 | 8.5 | | 32 | 4.8 | | 57 | 5.7 | | 82 | 4.9 | |
| 8 | 8.7 | | 33 | 6.1 | | 58 | 3.8 | | 83 | 4.8 | |
| 9 | 9.3 | | 34 | 3.8 | | 59 | 6.7 | | 84 | 9.2 | |
| 10 | 10.9 | 1/2 | 35 | 8.1 | | 60 | 7.1 | 0 | 85 | 7.1 | |
| 11 | 7.7 | | 36 | 2.5 | | 61 | 5.5 | | 86 | 8.2 | |
| 12 | 4.9 | | 37 | 7.2 | | 62 | 6.1 | | 87 | 6.9 | |
| 13 | 4.2 | | 38 | 3.4 | | 63 | 4.8 | | 88 | 6.6 | |
| 14 | 7.1 | | 39 | 6.6 | | 64 | 5.3 | | 89 | 5.9 | |
| 15 | 4.7 | | 40 | 3.0 | 1/4 | 65 | 5.6 | | 90 | 4.0 | 1/4 |
| 16 | 4.1 | | 41 | 4.6 | | 66 | 5.6 | | 91 | 8.6 | |
| 17 | 5.2 | | 42 | 8.4 | | 67 | 3.9 | | 92 | 7.9 | |
| 18 | 3.9 | | 43 | 4.9 | | 68 | 7.2 | | 93 | 4.8 | |
| 19 | 8.3 | | 44 | 7.4 | | 69 | 4.7 | | 94 | 4.1 | |
| 20 | 4.3 | 1/4 | 45 | 6.9 | | 70 | 7.4 | 1/2 | 95 | 4.5 | |
| 21 | 4.5 | | 46 | 4.6 | | 71 | 8.9 | | 96 | 5.2 | |
| 22 | 8.0 | | 47 | 3.2 | | 72 | 3.5 | | 97 | 7.9 | |
| 23 | 3.8 | | 48 | 7.7 | | 73 | 7.0 | | 98 | 6.9 | |
| 24 | 4.9 | | 49 | 7.6 | | 74 | 5.2 | | 99 | 4.2 | |
| 25 | 7.7 | | 50 | 9.5 | 1/4 | 75 | 4.3 | | 100 | 3.4 | 0 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☒ 2 - (sand) 0.1 – 0.2 cm
- ☐ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y) 30-July-20 Site Code: YPS-A1

3. **Sediment Samples Collected:** ☒ (300-500g) → duplicate also collected YPS-DUP-2

| | | | |
|---|---|---|---|
| Depth of easily penetrable sediments (cm): | 4 | Depth of sediment sampled (cm): | 0-4 |
| Sediment texture and colour: | Brown sand (f-c), trace silt, trace fine gravel | | |

**Check those present:** ☐ woody debris ☐ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** Collected from micro deposition areas @ riffle 3 + lower riffle 2

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacPhail | A. MacPhail | A. MacPhail |
| Time of Day: | 8:00 | 8:10 | 8:20 |
| Sampling time (i.e. 3 min) | 3 min | 3 min | 3 min |
| No. of sample jars | 1 | 1 | 1 |
| Typical depth (in kick area) | ~15cm-20cm | ~15cm-20cm | ~15-20cm |

## *CHANNEL DATA*

**1. Channel**

| | | | |
|---|---|---|---|
| Slope/Gradient (%) | 3 | Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood | |
| Bankfull Width (m) | 3.9 | Wetted Stream Width (m) | 2.7 |
| Bankfull Wetted Depth (distance between water level and top of bank) (cm) | | | 40 |
| **Location in site** *(note where in sample site taken i.e. d/s of kick area)* | | | |

**2. Channel Transect**

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | **AVG** |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 0.40 | 0.80 | 1.20 | 1.60 | 2.00 | |
| Depth (cm) | 12 | 19 | 23 | 20 | 12 | 0.172 |
| Velocity (m/s) | 0.4 | 0.6 | 0.6 | 0.5 | 0.4 | 0.5 |

Notes: moved U/S of originally proposed location, Dirt Work on stream just before it crosses the Road.

Reach is relatively undisturbed until near Bonanza Creek Road. Wide flood plain looks like channel could move depending on Freshet.

No active sluicing happening U/S - or appears this way based on turbidity

Less fine sediment deposition compared to Hunker Creek.

| Discharge | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| | 0.019 | 0.046 | 0.055 | 0.040 | 0.019 | Total 0.1792 m³/s |

Sampling Date (D/M/Y): 29-Jul-20

Site Code: YPS-078

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon-AHM

**River/Stream name:** Hunker Creek

**Basin:** Klondike River

☒ Test ☐ Reference

**Site Location Description:**

Immediately adjacent to Hunker Creek Road at coordinates provided by YG.

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD83 | **GPS Altitude (masl or fasl)** | 588 |
| ***Latitude:** | 63°55' 20.6" | Stream Order (1:50,000): | 3 |
| ***Longitude:** | 138° 53' 02.6" | Ecoregion: | Taiga Cordillera |

(*use decimal degrees)

**Photos taken:**

☑ Field sheet ☑ Upstream ☑ Downstream ☑ Across channel ☑ Dry substrate ☑ Aquatic substrate ☐ ~~Aerial substrate~~

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):

   ☐ hydraulic jump ☒ riffle ☐ rapids ☐ straight run ☒ pool/back eddy

2. **Canopy Coverage** (check one):

   ☐ 0% ☒ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

3. **Macrophyte Coverage** (check one):

   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

4. **Riparian Zone** (check those present):

   ☒ 1 - ferns/grasses ☒ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees

5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):

   ☐ 1 – Not slippery, no colour (<0.5mm)
   ☒ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 17 | **Water T (C)** | 6.0 | **Cond.** | 346.2 | **DO (mg/L)** | 9.73 |
| **pH** | 7.69 | **Turbidity** | 8.95 | **sp Cond. (us\cm)** | 446.1 | **DO %** | 78.3 |

**Water Samples Collected:** ☑ TSS (500ml) ☑ General (500 ml) ☑ Total metals (250 ml) ☑ Nutrients (250 ml) ☑ Other

1L Nalgene
120mL TKN

Sampling Date (D/M/Y): 29-Jul-20 Site Code: YPS.078

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.8 | | 26 | 8.2 | | 51 | 12.0 | | 76 | 8.5 | |
| 2 | 7.6 | | 27 | 8.0 | | 52 | 6.8 | | 77 | 7.7 | |
| 3 | 6.1 | | 28 | 12.4 | | 53 | 6.9 | | 78 | 4.6 | |
| 4 | 9.0 | | 29 | 8.4 | | 54 | 9.4 | | 79 | 7.4 | |
| 5 | 4.5 | | 30 | 3.9 | 0 | 55 | 3.2 | | 80 | 7.3 | 1/4 |
| 6 | 4.1 | | 31 | 5.7 | | 56 | 6.9 | | 81 | 6.2 | |
| 7 | 6.3 | | 32 | 6.6 | | 57 | 5.5 | | 82 | 9.5 | |
| 8 | 6.5 | | 33 | 4.3 | | 58 | 5.3 | | 83 | 10.8 | |
| 9 | 5.2 | | 34 | 5.3 | | 59 | 4.7 | | 84 | 6.7 | |
| 10 | 5.4 | 1/4 | 35 | 13.5 | | 60 | 4.9 | 1/4 | 85 | 3.6 | |
| 11 | 5.6 | | 36 | 6.3 | | 61 | 6.6 | | 86 | 3.2 | |
| 12 | 6.6 | | 37 | 9.4 | | 62 | 5.5 | | 87 | 6.1 | |
| 13 | 9.0 | | 38 | 7.9 | | 63 | 4.6 | | 88 | 9.3 | |
| 14 | 9.1 | | 39 | 9.1 | | 64 | 4.5 | | 89 | 4.4 | |
| 15 | 7.6 | | 40 | 5.2 | 1/4 | 65 | 5.0 | | 90 | 4.0 | 0 |
| 16 | 4.5 | | 41 | 5.1 | | 66 | 8.5 | | 91 | 7.3 | |
| 17 | 8.2 | | 42 | 4.9 | | 67 | 7.5 | | 92 | 4.2 | |
| 18 | 5.7 | | 43 | 12.1 | | 68 | 14.0 | | 93 | 4.2 | |
| 19 | 7.0 | | 44 | 11.1 | | 69 | 8.2 | | 94 | 3.9 | |
| 20 | 4.0 | 0 | 45 | 5.4 | | 70 | 10.0 | 0 | 95 | 3.5 | |
| 21 | 7.0 | | 46 | 3.2 | | 71 | 12.2 | | 96 | 8.1 | |
| 22 | 6.2 | | 47 | 7.1 | | 72 | 4.1 | | 97 | 5.5 | |
| 23 | 8.1 | | 48 | 9.1 | | 73 | 8.1 | | 98 | 6.2 | |
| 24 | 17.0 | | 49 | 4.4 | | 74 | 3.0 | | 99 | 6.6 | |
| 25 | 4.8 | | 50 | 7.1 | 3/4 | 75 | 4.7 | | 100 | 4.8 | 0 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☒ 2 - (sand) 0.1 – 0.2 cm
- ☐ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 29-July-20 Site Code: YPS-078

3. **Sediment Samples Collected:** ☒ (300-500g)

Depth of easily penetrable sediments (cm): 6 Depth of sediment sampled (cm): 0-5

Sediment texture and colour: brown (faint light brown/red), sand (m+c)

**Check those present:** ☐ woody debris ☐ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** Collected from micro depositional areas within riffles

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacPhail | | |
| Time of Day: | 14:20 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 1 | | |
| Typical depth (in kick area) | ~10cm | | |

## *CHANNEL DATA*

**1. Channel**

Slope/Gradient (%): 3 Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood

Bankfull Width (m): 4.9 Wetted Stream Width (m): 2.9

Bankfull Wetted Depth (distance between water level and top of bank) (cm): 51

**Location in site** *(note where in sample site taken i.e. d/s of kick area)*: U/S of Kick area

**2. Channel Transect**

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | **AVG** |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | |
| Depth (cm) | 6 | 18 | 9 | 7 | 5 | 0.09 |
| Velocity (m/s) | 0 | 0.4 | 0.3 | 0.3 | 0.1 | 0.22 |

Notes: Water has cleared up significantly. Visual assessment of kick material indicates more bugs present

Canopy cover very limited on right bank (same side as road). Assessed using canopeo app.

Rocks are heavily embedded within kick area. lots of depositional sediment along reach. Other trib or channel noticed U/S

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Discharge | 0 | 0.036 | 0.014 | 0.011 | 0.003 | Total - 0.0625 m³/s |

Sampling Date (D/M/Y): 28-VII-20

Site Code: YPS-613

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon - AHM

**River/Stream name:** Hunker Creek

**Basin:** Klondike River

☒ Test ☐ Reference

**Site Location Description:**

Adjacent to placer settling pond,

**GPS Datum:** WGS84 or NAD83

***Latitude:** 64° 00' 41.5"

***Longitude:** 139° 05' 20.9"

(*use decimal degrees)

07W 0593415
7099702

**GPS Altitude (masl or fasl):** 394

**Stream Order** (1:50,000): 4

**Ecoregion:** Taiga Cordillera

**Photos taken:**

☒ Field sheet ☒ Upstream ☒ Downstream ☒ Across channel ☒ Dry substrate ☒ Aquatic substrate ☐ Aerial substrate

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):

   ☐ hydraulic jump ☐ riffle ☐ rapids ☒ straight run ☒ pool/back eddy

2. **Canopy Coverage** (check one):

   ☐ 0% ☒ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

3. **Macrophyte Coverage** (check one): Difficult to determine with turbidity

   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

4. **Riparian Zone** (check those present):

   ☒ 1 - ferns/grasses ☐ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees

5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):

   ☒ 1 – Not slippery, no colour (<0.5mm)
   ☐ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 15.1 | **Water T (C)** | 9.0 | **Cond.** | 510 | **DO (mg/L)** | 9.30 |
| **pH** | 7.84 | **Turbidity** | 61.9 | **sp Cond. (us\cm)** | 664 | **DO %** | 80.6 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other 1L Nalgene

Sampling Date (D/M/Y): 28-July-20 Site Code: YPS-G13

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.9 | | 26 | 4.3 | | 51 | 3.2 | | 76 | 1.6 | |
| 2 | 1.7 | | 27 | 1.9 | | 52 | 2.8 | | 77 | 2.4 | |
| 3 | 6.7 | | 28 | 6.2 | | 53 | 5.8 | | 78 | 3.8 | |
| 4 | 1.9 | | 29 | 2.2 | | 54 | 3.4 | | 79 | 2.9 | |
| 5 | 1.4 | | 30 | 2.6 | 3/4 | 55 | 1.4 | | 80 | 2.8 | 0 |
| 6 | 3.3 | | 31 | 2.4 | | 56 | 2.9 | | 81 | 2.4 | |
| 7 | 2.4 | | 32 | 2.9 | | 57 | 2.2 | | 82 | 2.1 | |
| 8 | 8.1 | | 33 | 1.9 | | 58 | 2.6 | | 83 | 3.2 | |
| 9 | 2.1 | | 34 | 3.0 | | 59 | 2.5 | | 84 | 4.1 | |
| 10 | 3.7 | 1/4 | 35 | 5.1 | | 60 | 2.2 | 1/4 | 85 | 3.1 | |
| 11 | 1.6 | | 36 | 5.1 | | 61 | 2.6 | | 86 | 5.4 | |
| 12 | 2.4 | | 37 | 4.6 | | 62 | 3.0 | | 87 | 3.9 | |
| 13 | 2.1 | | 38 | 4.7 | | 63 | 4.4 | | 88 | 2.6 | |
| 14 | 2.8 | | 39 | 4.4 | | 64 | 1.8 | | 89 | 2.4 | |
| 15 | 2.3 | | 40 | 3.6 | 1/4 | 65 | 1.7 | | 90 | 2.7 | 1/4 |
| 16 | 1.8 | | 41 | 2.7 | | 66 | 2.1 | | 91 | 2.0 | |
| 17 | 1.4 | | 42 | 4.9 | | 67 | 2.4 | | 92 | 2.3 | |
| 18 | 2.6 | | 43 | 6.7 | | 68 | 1.5 | | 93 | 2.6 | |
| 19 | 4.4 | | 44 | 5.9 | | 69 | 2.1 | | 94 | 1.7 | |
| 20 | 2.6 | 0 | 45 | 4.8 | | 70 | 1.8 | 1/2 | 95 | 1.4 | |
| 21 | 2.4 | | 46 | 3.4 | | 71 | 2.1 | | 96 | 5.6 | |
| 22 | 2.1 | | 47 | 3.6 | | 72 | 6.6 | | 97 | 3.8 | |
| 23 | 5.2 | | 48 | 2.0 | | 73 | 2.8 | | 98 | 2.1 | |
| 24 | 3.1 | | 49 | 1.9 | | 74 | 2.1 | | 99 | 2.6 | |
| 25 | 1.3 | | 50 | 1.6 | 0 | 75 | 2.1 | | 100 | 3.7 | 0 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☒ 1 - (silt) <0.1 cm
- ☒ 2 - (sand) 0.1 – 0.2 cm
- ☐ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 28-July-20

Site Code: YPS-613

3. **Sediment Samples Collected:** ☒ (300-500g)

Depth of easily penetrable sediments (cm): 6cm

Depth of sediment sampled (cm): 3cm

Sediment texture and colour: Dark brown, fine sand/silt, trace organics

**Check those present:** ☒ woody debris ☐ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** Lots of fine seds available at site, composite sample taken U/S + D/S of Kick area

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacPhail | | |
| Time of Day: | 13:20 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 1 | | |
| Typical depth (in kick area) | ~20cm | | |

## *CHANNEL DATA*

**1. Channel**

Slope/Gradient (%): 3%

Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood

Bankfull Width (m): 11.1

Wetted Stream Width (m): 8.0

Bankfull Wetted Depth (distance between water level and top of bank) (cm): RB - 28 LB 1.4

**Location in site** *(note where in sample site taken i.e. d/s of kick area)*: Within Kick area

**2. Channel Transect**

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | **AVG** |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 1.3 | 2.6 | 3.9 | 5.2 | 6.5 | |
| Depth (cm) | 13.5 | 11 | 12.5 | 21 | 16 | 0.15 |
| Velocity (m/s) | 0.3 | 0.4 | 0.4 | 0.6 | 0.4 | 0.42 |
| Discharge ($m^3/s$) | 0.055 | 0.057 | 0.068 | 0.164 | 0.083 | Total 0.4264 $m^3/s$ |

Sampling Date (D/M/Y) 28-Jul-20 Site Code: YPS-612

## *PRIMARY SITE DATA*

**CABIN Study name:** YPS-612

**River/Stream name:** Hunker Creek

**Basin:** Klondike River

☒ Test ☐ Reference

**Site Location Description:**

Approx 40m D/S of old bridge, small road + ford location lead to site.

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD 83 | **GPS Altitude (masl or fasl)** | 375 |
| ***Latitude:** | 64° 00' 49.3" | Stream Order (1:50,000): | 4 |
| ***Longitude:** | 139° 05' 32.9" | Ecoregion: | Taiga Cordillera |

(*use decimal degrees)

07W 0593244
7099936

**Photos taken:**

☑ Field sheet ☑ Upstream ☑ Downstream ☑ Across channel ☑ Dry substrate ☑ Aquatic substrate ☐ ~~Aerial substrate~~ N/A on ground

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):

   ☐ hydraulic jump ☒ riffle ☐ rapids ☒ straight run ☐ pool/back eddy

2. **Canopy Coverage** (check one):

   ☐ 0% ☒ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

3. **Macrophyte Coverage** (check one): Difficult to assess due to turbidity

   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

4. **Riparian Zone** (check those present):

   ☒ 1 - ferns/grasses ☐ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees

5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):

   ☒ 1 – Not slippery, no colour (<0.5mm) Small amount of sediment on rocks
   ☐ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 13.0 | **Water T (C)** | 9.6 | **Cond.** | 558 | **DO (mg/L)** | 8.67 |
| **pH** | 7.18 | **Turbidity** | 76.6 | **sp Cond. (us\cm)** | 712 | **DO %** | 76.5 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other

1L nalgene

Sampling Date (D/M/Y): 28-July-20

Site Code: YPS-6V2

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.5 | | 26 | 5.4 | | 51 | 11.2 | | 76 | 9.6 | |
| 2 | 7.4 | | 27 | 9.5 | | 52 | 9.1 | | 77 | 8.1 | |
| 3 | 6.0 | | 28 | 9.6 | | 53 | 7.2 | | 78 | 8.7 | |
| 4 | 2.5 | | 29 | 6.6 | | 54 | 7.5 | | 79 | 6.3 | |
| 5 | 1.9 | | 30 | 5.1 | 0 | 55 | 6.5 | | 80 | 13.6 | 1/2 |
| 6 | 7.7 | | 31 | 6.3 | | 56 | 7.9 | | 81 | 7.2 | |
| 7 | 3.2 | | 32 | 6.8 | | 57 | 11.3 | | 82 | 12.1 | |
| 8 | 3.1 | | 33 | 12.6 | | 58 | 6.4 | | 83 | 8.4 | |
| 9 | 6.8 | | 34 | 8.6 | | 59 | 6.6 | | 84 | 11.2 | |
| 10 | 5.1 | 1/2 | 35 | 5.8 | | 60 | 10.4 | 1/2 | 85 | 6.3 | |
| 11 | 10.9 | | 36 | 10.5 | | 61 | 9.8 | | 86 | 10.5 | |
| 12 | 11.2 | | 37 | 14.6 | | 62 | 11.7 | | 87 | 5.0 | |
| 13 | 10.7 | | 38 | 6.7 | | 63 | 11.2 | | 88 | 4.0 | |
| 14 | 5.8 | | 39 | 6.6 | | 64 | 5.6 | | 89 | 6.0 | |
| 15 | 3.4 | | 40 | 3.5 | 1/4 | 65 | 9.8 | | 90 | 12.3 | 1/4 |
| 16 | 1.9 | | 41 | 11.6 | | 66 | 7.6 | | 91 | 11.4 | |
| 17 | 2.3 | | 42 | 6.2 | | 67 | 7.6 | | 92 | 5.2 | |
| 18 | 3.2 | | 43 | 7.1 | | 68 | 7.9 | | 93 | 4.8 | |
| 19 | 9.1 | | 44 | 5.3 | | 69 | 4.9 | | 94 | 8.2 | |
| 20 | 7.6 | 1/4 | 45 | 12.4 | | 70 | 5.9 | 1/4 | 95 | 4.7 | |
| 21 | 6.9 | | 46 | 9.6 | | 71 | 7.8 | | 96 | 8.9 | |
| 22 | 8.8 | | 47 | 10.1 | | 72 | 10.3 | | 97 | 5.9 | |
| 23 | 6.5 | | 48 | 7.6 | | 73 | 9.6 | | 98 | 6.7 | |
| 24 | 5.9 | | 49 | 10.4 | | 74 | 5.3 | | 99 | 9.6 | |
| 25 | 8.2 | | 50 | 7.3 | 0 | 75 | 8.9 | | 100 | 10.9 | 0 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☒ 1 - (silt) <0.1 cm
- ☒ 2 - (sand) 0.1 – 0.2 cm
- ☒ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

0-33 Riffle 1
34-66 Riffle 2
67-100 Riffle 3

Sampling Date (D/M/Y): 28-July-20    Site Code: YPS-612

3. **Sediment Samples Collected:** ☐ (300-500g)

| | | | |
|---|---|---|---|
| Depth of easily penetrable sediments (cm): | 7 | Depth of sediment sampled (cm): | 5 |
| Sediment texture and colour: | mix of brown sand (m-c) and fine sand/silt dark brown | | |

(ie composite sample)

**Check those present:** ☐ woody debris ☐ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** Taken U/S + D/S of Kick areas

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle Rep 1, 2, 3 ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A MacPhail → | | |
| Time of Day: | 11:00 | 11:10 | 11:20 |
| Sampling time (i.e. 3 min) | 3 min | 3 min | 3 min |
| No. of sample jars | 1 | 2 | 1 |
| Typical depth (in kick area) | ~ 30cm | ~25cm | ~30cm |

## *CHANNEL DATA*

1. **Channel**

| | | | |
|---|---|---|---|
| Slope/Gradient (%) | 2% | Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood | |
| Bankfull Width (m) | 14.2 / 13.5 / 12.2 | Wetted Stream Width (m) | 7.8 / 7.9 / 7.9 |
| Bankfull Wetted Depth (distance between water level and top of bank) (cm) | | | 600 (R) / 110 (L) / 360 (R) 320 (L) / 190 (R) 310 (L) |
| **Location in site** *(note where in sample site taken i.e. d/s of kick area)* | | | |

at three locations
riffle 3 (up)
riffle 2 (middle)
riffle 1 (down)

2. **Channel Transect** → between riffle 1 (down) and 2 (middle)

| **Velocity/Depth** | **1** (2.9) | **2** (4.1) | **3** (5.3) | **4** (6.5) | **5** (7.7) | **AVG** |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 1.2 | 2.4 | 3.6 | 4.8 | 6.0 | |
| Depth (cm) | 23.5 | 27.5 | 24 | 12 | 11 | 0.20 |
| Velocity (m/s) | 0.4 | 0.6 | 0.6 | 0.4 | 0.3 | 0.46 |

1.7m → 8.8m : wetted width = 7.1 interval = 1.2

ie from left bank wetted width

| | | | | | | |
|---|---|---|---|---|---|---|
| Discharge | 0.115 | 0.202 | 0.173 | 0.058 | 0.040 | Total 0.5868 m³/s |

Sampling Date (D/M/Y): 28-Jul-2020

Site Code: YPS-544

## *PRIMARY SITE DATA*

**CABIN Study name:** YPS-544

**River/Stream name:** Hunker Creek

**Basin:** Klondike River

☒ Test ☐ Reference

**Site Location Description:**

At YPS-544, approx 80m U/S of highway, sampled near blue flagging tape.
Small bridge approx 5m U/S of site

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD83 | **GPS Altitude (masl or fasl)** | 364 |
| ***Latitude:** | 64° 01' 44.8" | **Stream Order** (1:50,000): | 4 |
| ***Longitude:** | 139° 10' 40.7" | **Ecoregion:** | Taiga Cordillera |

(*use decimal degrees)

UTM 07W 0589016
7101583

**Photos taken:**

☒ Field sheet ☒ Upstream ☒ Downstream ☒ Across channel ☒ Dry substrate ☐ ~~Aquatic substrate~~ ☒ ~~Aerial substrate~~

unable to collect due to high NTU

## *REACH DATA* (*Represent 6 x bankfull width*)

1. **Habitat Types Present/Flow State Reach** (check those present):
   ☐ hydraulic jump ☒ riffle ☐ rapids ☒ straight run ☐ pool/back eddy
2. **Canopy Coverage** (check one):
   ☐ 0% ☒ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%
3. **Macrophyte Coverage** (check one): Difficult to determine given turbidity
   ☐ 0% ☒ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%
4. **Riparian Zone** (check those present):
   ☒ 1 - ferns/grasses ☐ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees
5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):
   ☒ 1 – Not slippery, no colour (<0.5mm) Difficult to determine due to turbidity
   ☐ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 10.5 | **Water T (C)** | 10.6 | **Cond.** | 612 | **DO (mg/L)** | 8.49 |
| **pH** | 7.58 | **Turbidity** | 391 | **sp Cond. (us\cm)** | 766 | **DO %** | 76.6 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other

1L Nalgene for Settability

Sampling Date (D/M/Y): 28-July-20

Site Code: YKR·504

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.7 | | 26 | 4.5 | | 51 | 2.4 | | 76 | 4.1 | |
| 2 | 5.3 | | 27 | 2.2 | | 52 | 2.4 | | 77 | 4.8 | |
| 3 | 5.4 | | 28 | 3.6 | | 53 | 1.3 | | 78 | 5.3 | |
| 4 | 3.8 | | 29 | 3.9 | | 54 | 3.4 | | 79 | 4.4 | |
| 5 | 6.1 | | 30 | 3.3 | 1/2 | 55 | 2.5 | | 80 | 3.6 | 3/4 |
| 6 | 1.9 | | 31 | 6.9 | | 56 | 2.3 | | 81 | 1.1 | |
| 7 | 2.8 | | 32 | 3.6 | | 57 | 2.5 | | 82 | 2.4 | |
| 8 | 4.6 | | 33 | 2.9 | | 58 | 2.2 | | 83 | 3.9 | |
| 9 | 7.1 | | 34 | 3.0 | | 59 | 3.3 | | 84 | 3.4 | |
| 10 | 1.4 | 0 | 35 | 2.1 | | 60 | 4.4 | 1/4 | 85 | 4.7 | |
| 11 | 5.2 | | 36 | 2.7 | | 61 | 3.6 | | 86 | 2.9 | |
| 12 | 1.8 | | 37 | 1.4 | | 62 | 1.6 | | 87 | 4.9 | |
| 13 | 3.6 | | 38 | 1.3 | | 63 | 2.1 | | 88 | 3.2 | |
| 14 | 0.8 | | 39 | 2.1 | | 64 | 6.9 | | 89 | 5.4 | |
| 15 | 1.6 | | 40 | 4.1 | 3/4 | 65 | 4.3 | | 90 | 5.5 | 1/4 |
| 16 | 1.6 | | 41 | 5.2 | | 66 | 6.6 | | 91 | 3.4 | |
| 17 | 8.7 | | 42 | 5.6 | | 67 | 4.3 | | 92 | 4.1 | |
| 18 | 2.0 | | 43 | 4.7 | | 68 | 1.8 | | 93 | 2.6 | |
| 19 | 6.8 | | 44 | 5.3 | | 69 | 4.3 | | 94 | 4.7 | |
| 20 | 3.6 | 1/4 | 45 | 5.7 | | 70 | 2.7 | 3/4 | 95 | 2.2 | |
| 21 | 3.9 | | 46 | 3.5 | | 71 | 3.6 | | 96 | 5.2 | |
| 22 | 2.9 | | 47 | 2.6 | | 72 | 5.0 | | 97 | 1.1 | |
| 23 | 5.5 | | 48 | 5.7 | | 73 | 6.4 | | 98 | 3.8 | |
| 24 | 4.9 | | 49 | 4.1 | | 74 | 2.1 | | 99 | 5.6 | |
| 25 | 6.0 | | 50 | 3.8 | 1/2 | 75 | 2.2 | | 100 | 2.6 | 1 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☑ 1 - (silt) <0.1 cm
- ☑ 2 - (sand) 0.1 – 0.2 cm
- ☑ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 28-Jul-20 Site Code: YPS-544

3. **Sediment Samples Collected:** ☑ (300-500g)

Depth of easily penetrable sediments (cm): 22 Depth of sediment sampled (cm): 5-10cm

Sediment texture and colour: Dark brown, coarse sand

**Check those present:** ☒ woody debris ☐ Leaf litter ☒ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** Difficult to assess sediment in water, sample collected near banks

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A.MacPhail | | |
| Time of Day: | 8:15 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 2 | | |
| Typical depth (in kick area) | ~40cm | | |

## *CHANNEL DATA*

1. **Channel**

Slope/Gradient (%): 2 Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood

Bankfull Width (m): 11.7 Wetted Stream Width (m): 6.1

Bankfull Wetted Depth (distance between water level and top of bank) (cm): 350 (L)/300 (R) (325 AVG)

**Location in site** *(note where in sample site taken i.e. d/s of kick area)*: U/S of kick area

2. **Channel Transect**

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | **AVG** |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 1 | 2 | 3 | 4 | 5 | |
| Depth (cm) | 33.5 | 31 | 37 | 34 | 23 | 0.32 |
| Velocity (m/s) (Average) | 0.2 | 0.4 | 0.5 | 0.4 | 0.3 | 0.36 |

from left bank, wetted width

↳ 1 minute

instrument reads to one decimal

| Discharge | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|
| | 0.068 | 0.124 | 0.185 | 0.136 | 0.069 | 0.5820 m³/s |

Sampling Date (D/M/Y): 29-July-20

Site Code: YPS-079

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon-AHM

**River/Stream name:** Hunker Creek

**Basin:** Klondike River

☐ Test ☐ Reference

**Site Location Description:**

Very close to 2019 location, creek is heavily disturbed. Walked ~20m from road down steep bank.

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD83 | **GPS Altitude (masl or fasl)** | 470 |
| ***Latitude:** | 63°57'42.1" | **Stream Order** (1:50,000): | 3 |
| ***Longitude:** | 138° 57' 21.9" | **Ecoregion:** | Taiga Cordillera |

(*use decimal degrees)

**Photos taken:**

☑ Field sheet ☑ Upstream ☑ Downstream ☑ Across channel ☑ Dry substrate ☑ Aquatic substrate ☑ Aerial substrate From Road

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):

   ☐ hydraulic jump ☒ riffle ☐ rapids ☒ straight run ☒ pool/back eddy

2. **Canopy Coverage** (check one):

   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

3. **Macrophyte Coverage** (check one): Difficult to assess

   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

4. **Riparian Zone** (check those present): No riparian veg on right bank looking D/S

   ☒ 1 - ferns/grasses ☒ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees

5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):

   ☒ 1 – Not slippery, no colour (<0.5mm)
   ☐ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 14.0 | **Water T (C)** | 9.50 | **Cond.** | 377.9 | **DO (mg/L)** | 9.95 |
| **pH** | 7.97 | **Turbidity** | 49.5 | **sp Cond. (us\cm)** | 498.3 | **DO %** | 76.6 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other 1L nalgen 120mL TKN

Sampling Date (D/M/Y) 29-Jul-20 Site Code: YPS-079

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.2 | | 26 | 3.9 | | 51 | 6.1 | | 76 | 4.1 | |
| 2 | 3.7 | | 27 | 4.4 | | 52 | 3.6 | | 77 | 3.5 | |
| 3 | 3.8 | | 28 | 4.7 | | 53 | 10.9 | | 78 | 7.0 | |
| 4 | 8.0 | | 29 | 3.0 | | 54 | 5.9 | | 79 | 4.2 | |
| 5 | 3.9 | | 30 | 3.5 | 0 | 55 | 4.9 | | 80 | 2.9 | 0 |
| 6 | 2.6 | | 31 | 6.1 | | 56 | 5.7 | | 81 | 3.9 | |
| 7 | 5.1 | | 32 | 4.9 | | 57 | 4.9 | | 82 | 6.4 | |
| 8 | 9.1 | | 33 | 3.4 | | 58 | 4.7 | | 83 | 7.3 | |
| 9 | 4.3 | | 34 | 5.0 | | 59 | 4.7 | | 84 | 3.6 | |
| 10 | 6.1 | 1/4 | 35 | 3.6 | | 60 | 4.4 | 1/4 | 85 | 25 | |
| 11 | 4.3 | | 36 | 7.1 | | 61 | 5.3 | | 86 | 3.0 | |
| 12 | 3.4 | | 37 | 6.4 | | 62 | 4.5 | | 87 | 4.3 | |
| 13 | 3.6 | | 38 | 4.8 | | 63 | 7.8 | | 88 | 2.6 | |
| 14 | 4.2 | | 39 | 7.2 | | 64 | 5.4 | | 89 | 3.4 | |
| 15 | 3.9 | | 40 | 5.2 | 1/4 | 65 | 7.6 | | 90 | 8.6 | 3/4 |
| 16 | 2.6 | | 41 | 3.3 | | 66 | 3.1 | | 91 | 4.4 | |
| 17 | 5.5 | | 42 | 7.1 | | 67 | 3.8 | | 92 | 5.7 | |
| 18 | 4.2 | | 43 | 3.6 | | 68 | 3.2 | | 93 | 3.1 | |
| 19 | 3.7 | | 44 | 4.5 | | 69 | 4.9 | | 94 | 3.1 | |
| 20 | 6.1 | 0 | 45 | 9.1 | | 70 | 5.3 | 0 | 95 | 2.7 | |
| 21 | 4.9 | | 46 | 4.9 | | 71 | 5.5 | | 96 | 4.5 | |
| 22 | 3.3 | | 47 | 2.3 | | 72 | 7.4 | | 97 | 4.7 | |
| 23 | 2.9 | | 48 | 3.5 | | 73 | 3.2 | | 98 | 3.4 | |
| 24 | 7.6 | | 49 | 2.5 | | 74 | 4.2 | | 99 | 3.2 | |
| 25 | 5.1 | | 50 | 4.9 | 1/4 | 75 | 3.7 | | 100 | 2.7 | 0 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☒ 2 - (sand) 0.1 – 0.2 cm
- ☐ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y) 29-Jul-20    Site Code: YPS-079

3. **Sediment Samples Collected:** ☒ (300-500g)

Depth of easily penetrable sediments (cm): 13    Depth of sediment sampled (cm): 5-10

Sediment texture and colour: grey fine sand w/ one aliquot of brown sand (+) gravelly

**Check those present:** ☐ woody debris ☐ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** No additional comments

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacPhail | | |
| Time of Day: | 11:35 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 2 | | |
| Typical depth (in kick area) | ~10-15 | | |

## *CHANNEL DATA*

1. **Channel**

Slope/Gradient (%) 3    Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood

Bankfull Width (m) 13    Wetted Stream Width (m) 4.2

Bankfull Wetted Depth (distance between water level and top of bank) (cm) 128

**Location in site** *(note where in sample site taken i.e. d/s of kick area)* U/S of Kick area

2. **Channel Transect**

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | **AVG** |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 0.6 | 1.20 | 1.80 | 2.40 | 3.00 | |
| Depth (cm) | 10 | 13 | 13 | 11 | 6.5 | 0.11 |
| Velocity (m/s) | 0.4 | 0.7 | 0.6 | 0.4 | 0.2 | 0.46 |

Notes: Left bank has been heavily disturbed, difficult to determine bankfull width with current conditions.

Had a visit from local miner who was not pleased with our presence.

No canopy cover due to destruction of riparian zone (LB + RB) from placer.

| | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|
| Discharge | 0.024 | 0.055 | 0.047 | 0.026 | 0.008 | 0.1602 m3/s |

Sampling Date (D/M/Y): 29Jul-20

Site Code: YPS-080

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon - AHM

**River/Stream name:** Hunker Creek

**Basin:** Klondike River

☒ Test ☐ Reference

**Site Location Description:**
Drove down road marked by Red caribou antlers, approx 40m U/S of coordinates in riffle section.

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD 83 | **GPS Altitude (masl or fasl)** | 474 |
| ***Latitude:** | 63°58'06.0 | **Stream Order** (1:50,000): | 4 |
| ***Longitude:** | 138°58'56.7 | **Ecoregion:** | Taiga Cordillera |

(*use decimal degrees)

**Photos taken:**
☑ Field sheet ☑ Upstream ☑ Downstream ☑ Across channel ☑ Dry substrate ☑ Aquatic substrate ☐ Aerial substrate

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):

   ☐ hydraulic jump ☒ riffle ☒ rapids ☒ straight run ☐ pool/back eddy

2. **Canopy Coverage** (check one):

   ☐ 0% ☐ 1-25% ☒ 26-50% ☐ 51-75% ☐ 76-100%

3. **Macrophyte Coverage** (check one): Difficult to assess

   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

4. **Riparian Zone** (check those present):

   ☒ 1 - ferns/grasses ☒ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees

5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):

   ☒ 1 – Not slippery, no colour (<0.5mm)
   ☐ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 10.5 | **Water T (C)** | 6.8 | **Cond.** | 330.1 | **DO (mg/L)** | 9.74 |
| **pH** | 8.06 | **Turbidity** | 73.1 | **sp Cond. (us\cm)** | 459.2 | **DO %** | 80.0 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other 1L Nalgene

Sampling Date (D/M/Y) 29-Jul-20 Site Code: YPS-080

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15.6 | | 26 | 18.1 | | 51 | 5.4 | | 76 | 10.0 | |
| 2 | 7.2 | | 27 | 15.6 | | 52 | 5.2 | | 77 | 8.1 | |
| 3 | 9.9 | | 28 | 6.2 | | 53 | 8.3 | | 78 | 4.4 | |
| 4 | 5.5 | | 29 | 12.8 | | 54 | 8.9 | | 79 | 11.2 | |
| 5 | 5.9 | | 30 | 10.5 | 0 | 55 | 15.4 | | 80 | 6.8 | 1/2 |
| 6 | 1.9 | | 31 | 4.3 | | 56 | 4.2 | | 81 | 8.9 | |
| 7 | 13.2 | | 32 | 8.4 | | 57 | 4.7 | | 82 | 3.9 | |
| 8 | 8.6 | | 33 | 11.4 | | 58 | 10.4 | | 83 | 16.5 | |
| 9 | 3.3 | | 34 | 5.1 | | 59 | 8.5 | | 84 | 6.4 | |
| 10 | 4.3 | 1/4 | 35 | 9.7 | | 60 | 6.6 | 1/4 | 85 | 9.6 | |
| 11 | 10.4 | | 36 | 18.4 | | 61 | 10.5 | | 86 | 17.1 | |
| 12 | 6.5 | | 37 | 14.4 | | 62 | 11.6 | | 87 | 9.5 | |
| 13 | 9.6 | | 38 | 4.9 | | 63 | 5.9 | | 88 | 4.9 | |
| 14 | 6.7 | | 39 | 11.4 | | 64 | 7.1 | | 89 | 5.2 | |
| 15 | 6.6 | | 40 | 13.7 | 0 | 65 | 5.1 | | 90 | 4.2 | 3/4 |
| 16 | 15.2 | | 41 | 2.8 | | 66 | 6.8 | | 91 | 2.8 | |
| 17 | 6.3 | | 42 | 9.2 | | 67 | 6.7 | | 92 | 12.6 | |
| 18 | 6.1 | | 43 | 2.1 | | 68 | 5.4 | | 93 | 9.4 | |
| 19 | 18.1 | | 44 | 5.6 | | 69 | 10.4 | | 94 | 11.2 | |
| 20 | 3.0 | 3/4 | 45 | 9.1 | | 70 | 6.2 | 1/2 | 95 | 7.2 | |
| 21 | 15.6 | | 46 | 8.6 | | 71 | 8.4 | | 96 | 2.8 | |
| 22 | 11.5 | | 47 | 9.6 | | 72 | 9.3 | | 97 | 11.3 | |
| 23 | 7.9 | | 48 | 5.4 | | 73 | 7.6 | | 98 | 2.7 | |
| 24 | 4.3 | | 49 | 14.2 | | 74 | 9.1 | | 99 | 6.3 | |
| 25 | 19.6 | | 50 | 15.8 | 0 | 75 | 10.2 | | 100 | 5.3 | 1/2 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☒ 2 - (sand) 0.1 – 0.2 cm
- ☐ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 29-Jul-20

Site Code: YPS-080

3. **Sediment Samples Collected:** ☒ (300-500g)

Depth of easily penetrable sediments (cm): 12

Depth of sediment sampled (cm): 0-10

Sediment texture and colour: Fine sand, brown

**Check those present:** ☐ woody debris ☐ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** No additional comments, minimal fine sediment deposition area

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacPhail | | |
| Time of Day: | 9:45 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 1 | | |
| Typical depth (in kick area) | ~ 20cm | | |

## *CHANNEL DATA*

1. **Channel**

Slope/Gradient (%): 2

Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood

Bankfull Width (m): 6.6

Wetted Stream Width (m): 4.2

Bankfull Wetted Depth (distance between water level and top of bank) (cm): 87.5

**Location in site** *(note where in sample site taken i.e. d/s of kick area)*: D/S of kick area

2. **Channel Transect**

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | AVG |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 0.6 | 1.20 | 1.80 | 2.40 | 3.00 | |
| Depth (cm) | 35 | 37.5 | 32.0 | 31.0 | 26 | |
| Velocity (m/s) | 0.2 | 0.4 | 0.3 | 0.3 | 0.2 | |

Notes: Can hear activity U/s of site.

Kicking area dominated by cobble, heavily embedded.

Moved U/s of point to find adequate kicking section. Heavy canopy cover at site compared to previous locations. Turbidity appears to be decreasing as we move upstream.

| | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|
| Discharge | 0.042 | 0.091 | 0.058 | 0.056 | 0.031 | 0.2779 m3/s |

Sampling Date (D/M/Y): 29-Jul-20

Site Code: YPS-621

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon-AHM

**River/Stream name:** Hunker Creek

**Basin:** Klondike River

☒ Test ☐ Reference

**Site Location Description:**

Drove down 503913 Inc Road to confluence with Hunker, walked approx 100 m U/S of cut road to sampling location

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or | **GPS Altitude (masl or fasl)** | 404 |
| ***Latitude:** | 64°00'31.2" | **Stream Order** (1:50,000): | 4 |
| ***Longitude:** | 139° 04' 46.8 | **Ecoregion:** | Taiga Cordillera |

(*use decimal degrees)

**Photos taken:**

☑ Field sheet ☑ Upstream ☑ Downstream ☑ Across channel ☑ Dry substrate ☑ Aquatic substrate ☐ ~~Aerial substrate~~

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):

☐ hydraulic jump ☒ riffle ☐ rapids ☒ straight run ☒ pool/back eddy

2. **Canopy Coverage** (check one): - Used Canopeo App - 8 locations checked

☐ 0% ☒ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

3. **Macrophyte Coverage** (check one): - difficult to assess

☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

4. **Riparian Zone** (check those present):

☒ 1 - ferns/grasses ☒ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees

5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):

☒ 1 – Not slippery, no colour (<0.5mm)
☐ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 10.5 | **Water T (C)** | 7.3 | **Cond.** | 445.1 | **DO (mg/L)** | 9.54 |
| **pH** | 7.46 | **Turbidity** | 73.1 | **sp Cond. (us\cm)** | 604.4 | **DO %** | 79.4 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other

1 L nalgene
120mL TKC

Sampling Date (D/M/Y) 29-July-20 Site Code: YPS-621

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.6 | | 26 | 8.1 | | 51 | 6.9 | | 76 | 6.7 | |
| 2 | 10.6 | | 27 | 4.6 | | 52 | 9.3 | | 77 | 5.9 | |
| 3 | 8.2 | | 28 | 7.6 | | 53 | 7.9 | | 78 | 3.6 | |
| 4 | 9.4 | | 29 | 8.2 | | 54 | 2.9 | | 79 | 5.9 | |
| 5 | 5.2 | | 30 | 8.3 | 1/4 | 55 | 3.1 | | 80 | 9.7 | 0 |
| 6 | 7.8 | | 31 | 9.6 | | 56 | 4.9 | | 81 | 5.4 | |
| 7 | 5.9 | | 32 | 6.6 | | 57 | 3.8 | | 82 | 6.6 | |
| 8 | 3.8 | | 33 | 7.9 | | 58 | 3.7 | | 83 | 4.3 | |
| 9 | 7.3 | | 34 | 9.6 | | 59 | 7.2 | | 84 | 4.6 | |
| 10 | 5.1 | 1/4 | 35 | 2.8 | | 60 | 3.6 | 1/4 | 85 | 6.9 | |
| 11 | 9.2 | | 36 | 2.2 | | 61 | 4.1 | | 86 | 2.2 | |
| 12 | 5.2 | | 37 | 6.8 | | 62 | 5.6 | | 87 | 6.6 | |
| 13 | 1.6 | | 38 | 7.2 | | 63 | 8.3 | | 88 | 2.9 | |
| 14 | 1.7 | | 39 | 6.2 | | 64 | 4.6 | | 89 | 6.1 | |
| 15 | 7.8 | | 40 | 7.7 | 0 | 65 | 7.7 | | 90 | 7.4 | 0 |
| 16 | 6.6 | | 41 | 4.3 | | 66 | 7.3 | | 91 | 5.6 | |
| 17 | 9.3 | | 42 | 2.6 | | 67 | 4.9 | | 92 | 5.8 | |
| 18 | 12.0 | | 43 | 8.1 | | 68 | 4.1 | | 93 | 6.1 | |
| 19 | 4.5 | | 44 | 9.4 | | 69 | 2.7 | | 94 | 10.9 | |
| 20 | 6.5 | 0 | 45 | 5.3 | | 70 | 2.7 | 1/2 | 95 | 5.6 | |
| 21 | 7.4 | | 46 | 14.8 | | 71 | 3.6 | | 96 | 4.2 | |
| 22 | 6.1 | | 47 | 4.4 | | 72 | 5.9 | | 97 | 3.6 | |
| 23 | 8.4 | | 48 | 10.7 | | 73 | 6.9 | | 98 | 3.3 | |
| 24 | 7.7 | | 49 | 5.0 | | 74 | 6.3 | | 99 | 4.8 | |
| 25 | 8.4 | | 50 | 2.7 | 0 | 75 | 7.3 | | 100 | 6.6 | 0 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☐ 2 - (sand) 0.1 – 0.2 cm
- ☒ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 29-July-20 Site Code: YPS-621

3. **Sediment Samples Collected:** ☒ (300-500g)

| | | | |
|---|---|---|---|
| Depth of easily penetrable sediments (cm): | 7 | Depth of sediment sampled (cm): | 5 |
| Sediment texture and colour: | brown/grey w/ trace black sediment | | |

**Check those present:** ☒ woody debris ☒ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** Duplicate YPS-DUP collected

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacKail | | |
| Time of Day: | 8:00 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 2 | | |
| Typical depth (in kick area) | ~20cm | | |

## *CHANNEL DATA*

1. **Channel**

| | | | |
|---|---|---|---|
| Slope/Gradient (%) | 3 | Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood | |
| Bankfull Width (m) | 10.1 | Wetted Stream Width (m) | 8.0 |
| Bankfull Wetted Depth (distance between water level and top of bank) (cm) | | | 54 |
| **Location in site** *(note where in sample site taken i.e. d/s of kick area)* | | | U/S of kick area |

2. **Channel Transect**

| **Velocity/Depth** | **1** | **2** | **3** | **4** | **5** | **AVG** |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 1.5 | 3.6 | 4.5 | 6.0 | 7.5 | |
| Depth (cm) | 15 | 25 | 24 | 18 | 5 | 0.17 |
| Velocity (m/s) | 0.2 | 0.4 | 0.4 | 0.3 | 0.1 | 0.28 |
| Discharge ($m^3/s$) | 0.045 | 0.150 | 0.144 | 0.081 | 0.008 | Total 0.4275 $m^3/s$ |

Sampling Date (D/M/Y): 28-Jul-20

Site Code: YPS-614

## *PRIMARY SITE DATA*

**CABIN Study name:** AHM

**River/Stream name:** Hunker Creek

**Basin:** Klondike River

☒ Test ☐ Reference

**Site Location Description:**

Off hunker Creek road approx 200m, followed old Road and then walked up Creek

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD 83 | **GPS Altitude (masl or fasl)** | 430 |
| ***Latitude:** | 63° 58' 56.8" | **Stream Order** (1:50,000): | 4 |
| ***Longitude:** | 139° 01' 01.6" | **Ecoregion:** | Taiga Cordillera |

(*use decimal degrees)

07 V 0597035
7096869

**Photos taken:**

☑ Field sheet ☑ Upstream ☑ Downstream ☑ Across channel ☑ Dry substrate ☑ Aquatic substrate ☐ ~~Aerial substrate~~

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):

   ☐ hydraulic jump ☒ riffle ☐ rapids ☒ straight run ☒ pool/back eddy

2. **Canopy Coverage** (check one):

   ☐ 0% ☒ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

3. **Macrophyte Coverage** (check one): - difficult to determine

   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

4. **Riparian Zone** (check those present):

   ☒ 1 - ferns/grasses ☒ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees

5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):

   ☒ 1 – Not slippery, no colour (<0.5mm) - Difficult to determine, some with minimal sed
   ☐ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 14.0 | **Water T (C)** | 8.7 | **Cond.** | 365.1 | **DO (mg/L)** | 9.35 |
| **pH** | 7.88 | **Turbidity** | 132 | **sp Cond. (us\cm)** | 479.1 | **DO %** | 80.9 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other

1L Nalgene
120mL TKC

Sampling Date (D/M/Y) 29-July-20 Site Code: YPS-619

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.1 | | 26 | 6.9 | | 51 | 4.1 | | 76 | 4.3 | |
| 2 | 2.3 | | 27 | 5.4 | | 52 | 3.1 | | 77 | 8.6 | |
| 3 | 2.7 | | 28 | 3.5 | | 53 | 3.7 | | 78 | 6.6 | |
| 4 | 13.1 | | 29 | 3.0 | | 54 | 3.9 | | 79 | 12.0 | |
| 5 | 4.6 | | 30 | 4.5 | 0 | 55 | 8.4 | | 80 | 10.1 | 1/2 |
| 6 | 8.9 | | 31 | 2.1 | | 56 | 4.6 | | 81 | 11.1 | |
| 7 | 6.3 | | 32 | 8.7 | | 57 | 7.5 | | 82 | 5.9 | |
| 8 | 9.5 | | 33 | 4.1 | | 58 | 6.9 | | 83 | 8.4 | |
| 9 | 3.8 | | 34 | 2.3 | | 59 | 7.7 | | 84 | 6.3 | |
| 10 | 5.4 | 1/4 | 35 | 9.6 | | 60 | 5.4 | 1/4 | 85 | 6.1 | |
| 11 | 7.6 | | 36 | 4.8 | | 61 | 3.8 | | 86 | 8.9 | |
| 12 | 4.9 | | 37 | 4.4 | | 62 | 6.9 | | 87 | 9.2 | |
| 13 | 3.3 | | 38 | 5.1 | | 63 | 5.3 | | 88 | 6.5 | |
| 14 | 4.8 | | 39 | 1.7 | | 64 | 2.7 | | 89 | 6.6 | |
| 15 | 9.1 | | 40 | 3.8 | 0 | 65 | 6.3 | | 90 | 9.9 | 0 |
| 16 | 5.1 | | 41 | 4.2 | | 66 | 4.9 | | 91 | 9.6 | |
| 17 | 3.4 | | 42 | 8.6 | | 67 | 4.5 | | 92 | 8.4 | |
| 18 | 9.9 | | 43 | 3.5 | | 68 | 4.5 | | 93 | 3.8 | |
| 19 | 6.1 | | 44 | 5.9 | | 69 | 6.4 | | 94 | 5.8 | |
| 20 | 2.7 | | 45 | 8.9 | | 70 | 5.8 | 1/4 | 95 | 10.1 | |
| 21 | 7.5 | 1/4 | 46 | 2.2 | | 71 | 7.4 | | 96 | 7.0 | |
| 22 | 8.6 | | 47 | 2.4 | | 72 | 5.8 | | 97 | 6.5 | |
| 23 | 4.8 | | 48 | 5.1 | | 73 | 9.4 | | 98 | 9.9 | |
| 24 | 11.7 | | 49 | 7.8 | | 74 | 2.6 | | 99 | 4.2 | |
| 25 | 5.4 | | 50 | 2.8 | 0 | 75 | 6.7 | | 100 | 7.7 | 0 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☐ 2 - (sand) 0.1 – 0.2 cm
- ☒ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 28-July-20 Site Code: YPS-614

3. **Sediment Samples Collected:** ☑ (300-500g)

Depth of easily penetrable sediments (cm): 8 Depth of sediment sampled (cm): 6

Sediment texture and colour: Brown/grey w/ trace black organics, sand (F) + silt

**Check those present:** ☑ woody debris ☑ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** 3 samples taken for one composite sample

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☑ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacPhail | | |
| Time of Day: | 17:20 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 3 | | |
| Typical depth (in kick area) | ~20cm | | |

## *CHANNEL DATA*

1. **Channel**

Slope/Gradient (%): 2 Flow Stage: ☐ Low/ ☑ Moderate/ ☐ High/ ☐ Flood

Bankfull Width (m): 8.8 Wetted Stream Width (m): 5.2

Bankfull Wetted Depth (distance between water level and top of bank) (cm): LB: 1.80 RB: 2.70

**Location in site** *(note where in sample site taken i.e. d/s of kick area)*: U/S of kick area

2. **Channel Transect**

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | **AVG** |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 0.80 | 1.60 | 2.40 | 3.20 | 4.0 | |
| Depth (cm) | 34 | 27 | 19 | 12 | 5 | 0.19 |
| Velocity (m/s) | 0.6 | 0.6 | 0.4 | 0.3 | 0.3 | 0.44 |
| Notes: Discharge | 0.163 | 0.130 | 0.061 | 0.029 | 0.012 | |

Limited canopy cover at site. Used CANEPEO App to assess canopy cover.

Sampling Date (D/M/Y): 28-July-20

Site Code: YPS-051

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon AHM

**River/Stream name:** Hunker Creek

**Basin:** Klondike River

☐ Test ☐ Reference

**Site Location Description:**

Immediately D/s of large metal bridge, ford location

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or NAD83 ✓ | **GPS Altitude (masl or fasl)** | 420 |
| ***Latitude:** | 63°59'30.4" | Stream Order (1:50,000): | 4 |
| ***Longitude:** | 139°02'29.1" | Ecoregion: | / |

(*use decimal degrees)

07V 0595815
7097573

**Photos taken:**

☒ Field sheet ☒ Upstream ☒ Downstream ☒ Across channel ☒ Dry substrate ☒ Aquatic substrate ☒ Aerial substrate from Bridge

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):

   ☐ hydraulic jump ☒ riffle ☒ rapids ☒ straight run ☐ pool/back eddy

2. **Canopy Coverage** (check one):

   ☐ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

3. **Macrophyte Coverage** (check one): Difficult to determine

   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

4. **Riparian Zone** (check those present):

   ☒ 1 - ferns/grasses ☒ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees

5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):

   ☒ 1 – Not slippery, no colour (<0.5mm) Some sediment
   ☐ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   ☐ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 13.1 | **Water T (C)** | 8.8 | **Cond.** | 437.4 | **DO (mg/L)** | 8.82 |
| **pH** | 7.53 | **Turbidity** | 128 | **sp Cond. (us\cm)** | 570.9 | **DO %** | 76.0 |

**Water Samples Collected:** ☒ TSS (500ml) ☒ General (500 ml) ☒ Total metals (250 ml) ☒ Nutrients (250 ml) ☒ Other

1L nalgene

Sampling Date (D/M/Y) 28-July-20    Site Code: YPS-051

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

### 1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.1 | | 26 | 8.3 | | 51 | 4.6 | | 76 | 12.1 | |
| 2 | 4.6 | | 27 | 6.1 | | 52 | 4.6 | | 77 | 5.8 | |
| 3 | 5.7 | | 28 | 7.1 | | 53 | 5.1 | | 78 | 10.7 | |
| 4 | 8.7 | | 29 | 4.5 | | 54 | 8.3 | | 79 | 10.6 | |
| 5 | 4.1 | | 30 | 7.2 | 0 | 55 | 12.6 | | 80 | 14.6 | 1/4 |
| 6 | 6.6 | | 31 | 3.2 | | 56 | 8.6 | | 81 | 12.0 | |
| 7 | 5.1 | | 32 | 4.3 | | 57 | 5.3 | | 82 | 7.3 | |
| 8 | 3.4 | | 33 | 5.3 | | 58 | 11.3 | | 83 | 9.1 | |
| 9 | 5.1 | | 34 | 4.9 | | 59 | 2.0 | | 84 | 8.7 | |
| 10 | 8.7 | 1/4 | 35 | 5.9 | | 60 | 15.1 | 1/4 | 85 | 6.0 | |
| 11 | 4.1 | | 36 | 1.9 | | 61 | 4.4 | | 86 | 5.3 | |
| 12 | 4.2 | | 37 | 4.7 | | 62 | 2.5 | | 87 | 18.2 | |
| 13 | 6.3 | | 38 | 6.3 | | 63 | 4.0 | | 88 | 1.8 | |
| 14 | 10.1 | | 39 | 8.5 | | 64 | 2.6 | | 89 | 10.6 | |
| 15 | 4.6 | | 40 | 4.0 | 1/4 | 65 | 2.2 | | 90 | 6.9 | 1/4 |
| 16 | 2.2 | | 41 | 7.8 | | 66 | 4.5 | | 91 | 6.2 | |
| 17 | 7.4 | | 42 | 10.6 | | 67 | 5.8 | | 92 | 3.3 | |
| 18 | 10.6 | | 43 | 4.8 | | 68 | 6.7 | | 93 | 3.8 | |
| 19 | 3.9 | | 44 | 4.7 | | 69 | 10.8 | | 94 | 3.4 | |
| 20 | 4.6 | 0 | 45 | 2.3 | | 70 | 2.6 | 1/4 | 95 | 6.6 | |
| 21 | 8.0 | | 46 | 3.6 | | 71 | 18.3 | | 96 | 8.4 | |
| 22 | 6.8 | | 47 | 5.2 | | 72 | 1.9 | | 97 | 3.2 | |
| 23 | 6.5 | | 48 | 6.5 | | 73 | 8.9 | | 98 | 16.6 | |
| 24 | 8.3 | | 49 | 7.6 | | 74 | 1.6 | | 99 | 10.8 | |
| 25 | 12.9 | | 50 | 12.1 | 0 | 75 | 2.7 | | 100 | 4.2 | 0 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

### 2. Surrounding/Interstitial Material - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☐ 2 - (sand) 0.1 – 0.2 cm
- ☒ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 28-July-20

Site Code: YPS-051

3. **Sediment Samples Collected:** ☒ (300-500g)

Depth of easily penetrable sediments (cm): 7cm

Depth of sediment sampled (cm): 5cm

Sediment texture and colour: Dark brown, trace organics, fine sand + silt

**Check those present:** ☒ woody debris ☒ Leaf litter ☐ macrophytes ☐ biofilms ☐ periphyton ☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** Composite sample of three locations.

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A.MacPhail | | |
| Time of Day: | 15:15 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 3 | | |
| Typical depth (in kick area) | ~20cm | | |

## *CHANNEL DATA*

1. **Channel**

Slope/Gradient (%): 2%

Flow Stage: ☐ Low/ ☒ Moderate/ ☐ High/ ☐ Flood

Bankfull Width (m): 8.3

Wetted Stream Width (m): RB-2.15 LB 1.1

Bankfull Wetted Depth (distance between water level and top of bank) (cm): 9.7

switch

**Location in site** *(note where in sample site taken i.e. d/s of kick area)*: Within kick area

2. **Channel Transect**

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | **AVG** |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 1.10 | 2.20 | 3.30 | 4.40 | 5.50 | |
| Depth (cm) | 4 | 16 | 18 | 25 | 19 | 0.16 |
| Velocity (m/s) | 0.2 | 0.5 | 0.5 | 0.6 | 0.4 | 0.44 |
| Discharge | 0.009 | 0.088 | 0.099 | 0.165 | 0.084 | Total 0.444 m3/s |

Sampling Date (D/M/Y): 29-Jul-20

Site Code: YPS-GU

## *PRIMARY SITE DATA*

**CABIN Study name:** Yukon-AHM

**River/Stream name:** Hunker Creek

**Basin:** Klondike River

☒ Test ☐ Reference

**Site Location Description:**
Parked beside 6 below pup, sample coordinates in heavily impacted beaver area. Moved D/S approx. 40m to find adequate kick location

| | | | |
|---|---|---|---|
| **GPS Datum:** | WGS84 or | **GPS Altitude (masl or fasl)** | 530 |
| ***Latitude:** | 63°56'58.2" | **Stream Order** (1:50,000): | 3 |
| ***Longitude:** | 138°54'22.6" | **Ecoregion:** | / |

(*use decimal degrees)

**Photos taken:**
☑ Field sheet ☑ Upstream ☑ Downstream ☑ Across channel ☐ Dry substrate ☐ Aquatic substrate ☐ Aerial substrate

## *REACH DATA* *(Represent 6 x bankfull width)*

1. **Habitat Types Present/Flow State Reach** (check those present):
   ☐ hydraulic jump ☒ riffle ☐ rapids ☒ straight run ☒ pool/back eddy
2. **Canopy Coverage** (check one):
   ☐ 0% ☐ 1-25% ☒ 26-50% ☐ 51-75% ☐ 76-100%
3. **Macrophyte Coverage** (check one): Difficult to assess.
   ☒ 0% ☐ 1-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%
4. **Riparian Zone** (check those present):
   ☒ 1 - ferns/grasses ☒ 2 - shrubs ☒ 3 - deciduous trees ☐ 4 - coniferous trees
5. **Periphyton Coverage on Substrate** (benthic algae, not moss) (check one):
   - ☒ 1 – Not slippery, no colour (<0.5mm)
   - ☐ 2 – Slightly slippery, yellow-brown to light green (0.5-1mm)
   - ☒ 3 – Noticeably slippery, patches of thicker green to brown (1.0-5mm)
   - ☐ 4 – Very slippery, numerous large clumps of green to dark brown (5.0-20mm)
   - ☐ 5 - Rocks mostly obscured, extensive green, brown to black mass may have long strands (> 20mm)

## *WATER CHEMISTRY*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Air Temp (C)** | 17.5 | **Water T (C)** | 9.6 | **Cond.** | 392.3 | **DO (mg/L)** | 9.02 |
| **pH** | 7.64 | **Turbidity** | 56.2 | **sp Cond. (us\cm)** | 503.3 | **DO %** | 79.31 |

**Water Samples Collected:** ☑ TSS (500ml) ☑ General (500 ml) ☑ Total metals (250 ml) ☑ Nutrients (250 ml) ☑ Other

1L nutgene
120ml TKN

Sampling Date (D/M/Y): 29-Jul-20 Site Code: YPS-611

## *SUBSTRATE COMPOSITION IN RIFFLE (kicking area)*

1. **100 Pebble Count & Substrate Embeddedness**
   - Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
   - Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
   - Embeddedness categories (E): Completely embedded = 1, 3/4 embedded, 1/2 embedded, 1/4 embedded, unembedded = 0

| | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E | | Diameter (cm) | E |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.6 | | 26 | 10.6 | | 51 | 5.5 | | 76 | 12.2 | |
| 2 | 2.8 | | 27 | 8.0 | | 52 | 7.3 | | 77 | 3.9 | |
| 3 | 5.2 | | 28 | 9.9 | | 53 | 6.4 | | 78 | 16.0 | |
| 4 | 6.6 | | 29 | 5.4 | | 54 | 2.3 | | 79 | 8.6 | |
| 5 | 9.1 | | 30 | 4.8 | 0 | 55 | 3.5 | | 80 | 11.5 | 1/4 |
| 6 | 9.7 | | 31 | 10.6 | | 56 | 2.9 | | 81 | 16.2 | |
| 7 | 8.3 | | 32 | 3.6 | | 57 | 3.1 | | 82 | 11.0 | |
| 8 | 4.8 | | 33 | 6.0 | | 58 | 2.8 | | 83 | 6.9 | |
| 9 | 11.4 | | 34 | 9.8 | | 59 | 2.2 | | 84 | 5.9 | |
| 10 | 14.3 | 1/4 | 35 | 11.3 | | 60 | 4.9 | 1/4 | 85 | 9.0 | |
| 11 | 5.1 | | 36 | 2.1 | | 61 | 3.4 | | 86 | 3.7 | |
| 12 | 3.2 | | 37 | 11.4 | | 62 | 8.8 | | 87 | 7.3 | |
| 13 | 6.8 | | 38 | 10.0 | | 63 | 2.9 | | 88 | 4.5 | |
| 14 | 7.7 | | 39 | 14.7 | | 64 | 3.1 | | 89 | 12.3 | |
| 15 | 4.3 | | 40 | 21.2 | 0 | 65 | 7.9 | | 90 | 2.2 | 0 |
| 16 | 9.9 | | 41 | 15.1 | | 66 | 11.1 | | 91 | 3.8 | |
| 17 | 3.9 | | 42 | 6.5 | | 67 | 6.6 | | 92 | 4.7 | |
| 18 | 5.5 | | 43 | 1.9 | | 68 | 4.8 | | 93 | 2.6 | |
| 19 | 4.2 | | 44 | 12.5 | | 69 | 4.2 | | 94 | 7.8 | |
| 20 | 4.7 | 1/4 | 45 | 14.6 | | 70 | 8.8 | | 95 | 7.1 | |
| 21 | 10.6 | | 46 | 10.1 | | 71 | 6.5 | 1/2 | 96 | 8.4 | |
| 22 | 11.6 | | 47 | 3.3 | | 72 | 7.9 | | 97 | 7.0 | |
| 23 | 4.6 | | 48 | 7.6 | | 73 | 13.4 | | 98 | 12.2 | |
| 24 | 4.6 | | 49 | 9.6 | | 74 | 12.5 | | 99 | 4.9 | |
| 25 | 3.9 | | 50 | 9.6 | 0 | 75 | 13.1 | | 100 | 6.4 | 1/4 |

***Note:*** The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

2. **Surrounding/Interstitial Material** - check the substrate size category for the surrounding material.

- ☐ 0 – organic cover (>50% cover)
- ☐ 1 - (silt) <0.1 cm
- ☒ 2 - (sand) 0.1 – 0.2 cm
- ☐ 3 - (gravel) 0.2 – 1.6 cm
- ☐ 4 - (pebble) 1.6 – 3.2 cm
- ☐ 5 - (pebble) 3.2 – 6.4 cm
- ☐ 6 - (cobble) 6.4 – 12.8 cm
- ☐ 7 - (cobble) 12.8 – 25.6 cm
- ☐ 8 - (boulder) > 25.6 cm
- ☐ 9 - Bedrock

Sampling Date (D/M/Y): 29-July-20

Site Code: YPS-64

3. **Sediment Samples Collected:** ☒ (300-500g)

| | | | |
|---|---|---|---|
| Depth of easily penetrable sediments (cm): | 19 | Depth of sediment sampled (cm): | 5-15 |
| Sediment texture and colour: | brown Sand (f-m) | | |

**Check those present:** ☐ woody debris ☐ Leaf litter ☒ macrophytes (trace) ☐ biofilms ☒ periphyton (trace) (on surface)
☐ odour ☐ oily sheen ☐ invertebrates

**Comments:** collected from depositional area above riffles

## *BIOLOGICAL: BENTHIC INVERTEBRATE SAMPLES*

1. **Kicknet Sample** (location): ☒ riffle ☐ rapid ☐ straight run ☐ pool/back eddy

| **500 µm mesh Kicknet**** | **Riffle 1** | **Riffle 2** | **Riffle 3** |
|---|---|---|---|
| Operator: | A. MacPhail | | |
| Time of Day: | 13:00 | | |
| Sampling time (i.e. 3 min) | 3 min | | |
| No. of sample jars | 1 | | |
| Typical depth (in kick area) | ~ 20cm | | |

## *CHANNEL DATA*

1. **Channel**

| | | | |
|---|---|---|---|
| Slope/Gradient (%) | 3 | Flow Stage: ☐ Low/ ☐ Moderate/ ☐ High/ ☐ Flood | |
| Bankfull Width (m) | 5.4 | Wetted Stream Width (m) | 3.1 |
| Bankfull Wetted Depth (distance between water level and top of bank) (cm) | | | 82 |
| **Location in site** *(note where in sample site taken i.e. d/s of kick area)* | | | D/S of kick area |

2. **Channel Transect**

| **Velocity/Depth** | 1 | 2 | 3 | 4 | 5 | AVG |
|---|---|---|---|---|---|---|
| Distance from shore (m) | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | |
| Depth (cm) | 14 | 10 | 23 | 20 | 5 | 0.14 |
| Velocity (m/s) | 0.1 | 0.4 | 0.5 | 0.7 | 0.1 | 0.36 |

Notes. Extensive beaver activity approx 40-50m U/S of site. Creek has become more confined, heavier riparian area.

Canopy cover measured using CANOPEO APP

Some periphyton evident, first site with any indication

| | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|
| Discharge | 0.007 | 0.020 | 0.058 | 0.070 | 0.003 | 0.1570 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KLHU-02 | Project Number: | Date: 28-Jul-20 |
| Sampler: ~~CH~~ AM, AB | Project Name: WQOM | Sampling Method: GS |
| Weather/Temp: ~10°C Overcast | | Photo No. Iphone |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Very turbid, no odour |
| Flow Direction and Intensity: | Moderate flow |
| Depth of water (approximately): | ~40cm |
| Disturbance (i.e. rain, surface water flow from other areas): | Heavy rainfall on 27-July. extensive placer development |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Some SWD + LWD |
| Sampled for: | TSS, Setability |
| Comments/Notes | GPS point is off creek, moved parrallel to waypoint and moved up ~10m to take sample. equipment ford at site |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 0950 | | |
| Temperature (C) | 10.6 | DO (mg/L) | 8.46 |
| Specific Conductivity | 759 (us/cm) | pH | 8.13 |
| TDS (g/L) | — | ORP (mV) | 300.3 |
| Salinity | \ | Turbidity (NTU) | 243 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KLHU-01 | Project Number: | Date: 28-Jul-20 |
| Sampler: ~~CH~~ AM | Project Name: WGOM | Sampling Method: GS |
| Weather/Temp: ~10°C Overcast | | Photo No. Iphone |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Very silty |
| Flow Direction and Intensity: | See Cabin notes for flows, appear high |
| Depth of water (approximately): | See cabin for notes, ~ 40cm |
| Disturbance (i.e. rain, surface water flow from other areas): | Heavy rainfall on July 27, extensive placer development U/S |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Some SWD + LWD |
| Sampled for: | See CABIN notes |
| Comments/Notes | Taken at same location as YPS-594, coordinate was off of creek but parallel with YPS 594 |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 7:50 | | |
| Temperature (C) | 10.6 | DO (mg/L) | 8.48, 76.6 % |
| Specific Conductivity | 766 | pH | 7.88 |
| TDS (g/L) | / | ORP (mV) | / |
| Salinity | / | Turbidity (NTU) | 391 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: VLHU_04 | Project Number: 105125-01 | Date: 28-July-20 |
| Sampler: ~~CH~~ AM, AB | Project Name: WQOM | Sampling Method: GS |
| Weather/Temp: ~15°C Overcast | | Photo No. Iphone |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Turbid, no odour |
| Flow Direction and Intensity: | Moderate flow |
| Depth of water (approximately): | ~10-20cm |
| Disturbance (i.e. rain, surface water flow from other areas): | Heavy rains on 27-July - extensive placer development |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | LWD + SWD |
| Sampled for: | Setalibity, TSS |
| Comments/Notes | Unable to get to GPS point, ends up in active mining area, sample taken Appears creek has been diverted. @ 07W 0593501 7099526 |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 14:20 | | |
| Temperature (C) | 8.7 | DO (mg/L) | 9.36, 80.5% |
| Specific Conductivity | 663, 506 | pH | 7.74 |
| TDS (g/L) | / | ORP (mV) | / |
| Salinity | | Turbidity (NTU) | 71.9 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KLHU_03 | Project Number: 105725 | Date: 28-July-20 |
| Sampler: ~~CH~~ AM, AB | Project Name: WQOM | Sampling Method: GS |
| Weather/Temp: | Photo No. Iphone | |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Very turbid, no odour |
| Flow Direction and Intensity: | Moderate flow |
| Depth of water (approximately): | ~ 30cm |
| Disturbance (i.e. rain, surface water flow from other areas): | Heavy rainfall on 27-July-20, Placer mining U/S |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | SWD + LWD present in creek |
| Sampled for: | See COC |
| Comments/Notes | Approx 30m U/S of YPS 612 |

Field Parameters:

| | | | |
|---|---|---|---|
| Time : | 11:00 | | |
| Temperature (C) | 9.6 | DO (mg/L) | 8.67, 76.5 |
| Specific Conductivity | 712 | pH | 7.78 |
| TDS (g/L) | / | ORP (mV) | / |
| Salinity | / | Turbidity (NTU) | 76.6 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KM10 | Project Number: 105125 | Date: 28 July - 20 |
| Sampler: ~~CH~~ AM, AB | Project Name: WQOM | Sampling Method: GS |
| Weather/Temp: ~15°C Overcast | | Photo No. Iphone |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Very turbid, no odour |
| Flow Direction and Intensity: | Moderate flow |
| Depth of water (approximately): | ~30-40cm |
| Disturbance (i.e. rain, surface water flow from other areas): | Heavy rainfall on 27-July, extensive placer development |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | SWD + LWD |
| Sampled for: | Settleability |
| Comments/Notes | U/S of Hester Creek inflow Sample taken @ 63°59'30.4" 139°02'29.1" |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 16:19 | | |
| Temperature (C) | 8.4 | DO (mg/L) | 9.04, 77.7 |
| Specific Conductivity | 547.3, C-413.4 | pH | 7.37 |
| TDS (g/L) | | ORP (mV) | |
| Salinity | | Turbidity (NTU) | 107 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | | |
|---|---|---|---|
| Location ID: KL-HU05 | Project Number: 105125-01 | | Date: 29-Jul-20 |
| Sampler: ~~CH~~ AM, AB | Project Name: WQOM | | Sampling Method: GS |
| Weather/Temp: ~15°C Overcast | | Photo No. Iphone | |
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Silty, turbid, no odour | | |
| Flow Direction and Intensity: | Moderate | | |
| Depth of water (approximately): | ~ 30cm | | |
| Disturbance (i.e. rain, surface water flow from other areas): | Placer mining U/S, can hear equipment | | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Lots of log jams + SWD + LWD | | |
| Sampled for: | Setalability, TSS | | |
| Comments/Notes | Point is 20m off creek, moved parralell to take sample @ 63°58'08.4" 138°58'59.4 | | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 10:40 | | |
| Temperature (C) | 7.1 | DO (mg/L) | 9.75, 90.5 |
| Specific Conductivity | 454.6 | pH | 8.07 |
| TDS (g/L) | / | ORP (mV) | / |
| Salinity | / | Turbidity (NTU) | 29.3 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KL-HU-G01 | Project Number: 105125-01 | Date: 29-JUL-20 |
| Sampler: CHAM, AB | Project Name: WQOM | Sampling Method: GS |
| Weather/Temp: ~15°C Overcast | | Photo No. Iphone |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Slightly turbid, no odour |
| Flow Direction and Intensity: | Moderate flow |
| Depth of water (approximately): | 20-30cm |
| Disturbance (i.e. rain, surface water flow from other areas): | Heavy rainfall in previous two days |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Minimal LWD, some SWD |
| Sampled for: | TSS, Setalability |
| Comments/Notes | Sample taken at mouth of GB Creek in the creek itself. N63°57'50.7 W 138°58'02.0 |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 11:00 | | |
| Temperature (C) | 6.5 | DO (mg/L) | 10.12, 82.5% |
| Specific Conductivity | 435.9 | pH | 8.10 |
| TDS (g/L) | / | ORP (mV) | / |
| Salinity | / | Turbidity (NTU) | 10.1 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | | |
|---|---|---|---|
| Location ID: KL-HU06 | Project Number: | | Date: |
| Sampler: ~~CH~~ AM, AB | Project Name: · WGOM | | Sampling Method: |
| Weather/Temp: ~15°C Overcast | | Photo No. Iphone | |
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Silty, no odour | | |
| Flow Direction and Intensity: | Moderate flow | | |
| Depth of water (approximately): | ~ 30cm | | |
| Disturbance (i.e. rain, surface water flow from other areas): | Placer mining, heavy rain in past couple days | | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Some SWD + LWD | | |
| Sampled for: | TSS, Setability | | |
| Comments/Notes | Sample taken approx. 40m U/S of Gold Bottom Creek | N 63° 57' 50.5" W 138° 57' 55.5" | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 11:05 | | |
| Temperature (C) | 8.8 | DO (mg/L) | 9.04, 77.9 % |
| Specific Conductivity | 501.4 | pH | 8.13 |
| TDS (g/L) | / | ORP (mV) | / |
| Salinity | / | Turbidity (NTU) | 50.0 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| Location ID: YW_OK1 | Project Number: 105125-01 | Date: ~~28~~ 31-July-20 |
|---|---|---|
| Sampler: ~~CH~~ AM | Project Name: WQOM | Sampling Method: GS |
| Weather/Temp: ~10°C Sunny | | Photo No. Iphone |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Clear no odour |
| Flow Direction and Intensity: | Moderate |
| Depth of water (approximately): | ~40cm |
| Disturbance (i.e. rain, surface water flow from other areas): | Unknown |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Tons of SWD + LWD |
| Sampled for: | TSS, turbidity |
| Comments/Notes | Sample taken above ford on Creek. Sample taken @ 64°01'39.50" 139°31'23.00" |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 7:20 | | |
| Temperature (C) | 6.8 | DO (mg/L) | 9.42, 77.7 |
| Specific Conductivity | 64.6 | pH | 7.79 |
| TDS (g/L) | / | ORP (mV) | / |
| Salinity | / | Turbidity (NTU) | 6.5 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: | Project Number: | Date: |
| Sampler: CH | Project Name: | Sampling Method: |
| Weather/Temp: | Photo No. | |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | |
| Flow Direction and Intensity: | |
| Depth of water (approximately): | |
| Disturbance (i.e. rain, surface water flow from other areas): | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | |
| Sampled for: | |
| Comments/Notes | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | | | |
| Temperature (C) | | DO (mg/L) | |
| Specific Conductivity | | pH | |
| TDS (g/L) | | ORP (mV) | |
| Salinity | | Turbidity (NTU) | |

## SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL-HU08 | Project Number: 105125-01 | Date: |
| Sampler: ~~CH~~ AM, AD | Project Name: WQOM | Sampling Method: GS |
| Weather/Temp: ~20°C Clear | Photo No. | |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Clear, no odour |
| Flow Direction and Intensity: | Moderate flow |
| Depth of water (approximately): | ~10cm |
| Disturbance (i.e. rain, surface water flow from other areas): | Placer U/S |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Minimal |
| Sampled for: | TSS, Sel. |
| Comments/Notes | U/S of confluence with road. Sample taken @ 63° 53' 25.7" 138° 55' 34.1" |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 16:10 | | |
| Temperature (C) | 4.3 | DO (mg/L) | 10.42, 80.3 |
| Specific Conductivity | 435.3 | pH | 7.75 |
| TDS (g/L) | / | ORP (mV) | / |
| Salinity | / | Turbidity (NTU) | 4.97 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL-HU07 | Project Number: 105125-01 | Date: 29-July-20 |
| Sampler: ~~CH~~ AM, AB | Project Name: WQOM | Sampling Method: GS |
| Weather/Temp: ~20°C Sunny | | Photo No. Iphone |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Clear, no odour |
| Flow Direction and Intensity: | Moderate |
| Depth of water (approximately): | ~10-20cm |
| Disturbance (i.e. rain, surface water flow from other areas): | Unknown |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Minimal |
| Sampled for: | TSS |
| Comments/Notes | Coordinate provided is above Hunker Creek Road, sampled parallel to point on H @ 63° 54' 38" 138° 53' 08.6" |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 15:35 | | |
| Temperature (C) | 5.0 | DO (mg/L) | 9.47, 74.1 |
| Specific Conductivity | 363.4 | pH | 7.21 |
| TDS (g/L) | | ORP (mV) | / |
| Salinity | / | Turbidity (NTU) | 6.58 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KL-HU09 | Project Number: 105125-01 | Date: 29-July-20 |
| Sampler: ~~GH~~ AM, AB | Project Name: WQOM | Sampling Method: GS |
| Weather/Temp: ~20°C Sunny | | Photo No. Iphone |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Silty, no odour |
| Flow Direction and Intensity: | Moderate flow |
| Depth of water (approximately): | ~20-30cm |
| Disturbance (i.e. rain, surface water flow from other areas): | Placer mining U/S |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Some SWD, minimal LWD |
| Sampled for: | TSS, Setalability |
| Comments/Notes | Sample taken ~ 20m U/s of ford over hunker @ 63°54'54.0" 138° 53' 04.1 |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 15:15 | | |
| Temperature (C) | 7.1 | DO (mg/L) | 9.54, 78.9 |
| Specific Conductivity | 438.3 | pH | 7.30 |
| TDS (g/L) | / | ORP (mV) | / |
| Salinity | / | Turbidity (NTU) | 39.1 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KM20 | Project Number: 105125-01 | Date: 29-Jul-20 |
| Sampler: ~~CH~~ AM, ~~AB~~ | Project Name: WQOM | Sampling Method: GS |
| Weather/Temp: ~15°C | | Photo No. Iphone - YPS-611 |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Turbid, no odour |
| Flow Direction and Intensity: | Moderate |
| Depth of water (approximately): | ~30cm |
| Disturbance (i.e. rain, surface water flow from other areas): | Placer mining, heavy rain in previous days |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | LWD + SWD, heavy canopy cover |
| Sampled for: | TSS settalability |
| Comments/Notes | See details for site on YPS-611 Cabin forms |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 13:56 | | |
| Temperature (C) | 9.6 | DO (mg/L) | 9.02 / 79.3 % |
| Specific Conductivity | 503.3 | pH | 7.64 |
| TDS (g/L) | / | ORP (mV) | / |
| Salinity | / | Turbidity (NTU) | 56.2 |

YUKON WQOM ^ Sept 22, 2020

15:00

Clear Water Sample.

- collecting on the way to Dawson.

- GPS took us in strange spot not on creek, sampling immediately upstream of bridge.

Coordinates. on sheet.

Flow measurements:

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Distance from shore (m) | 2.2 | 4.4 | 6.6 | 8.8 | 11.0 |
| Depth. | 19cm | 34cm | 47cm | 57cm | 56cm |
| velocity (m/s) | 0.2 | 0.7 | 0.8 | 1.1 | 1.0 |

from west bank to east

Rite in the Rain

YUKON WQOM    Sept 23, 2020

9:25
YPS-A1 / KL-BO-A001

Avenza: marked on iPAD
GPS: 07 V 0581898 7090531
Turbidity = ~~7.6~~ 8.05

Wetted width: 2.4m    wetted depth: ~~0.26~~ ~~0.3m~~ 22cm
bankful width: ~4m, but stream bed might migrate.

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| distance from shore (m) | 0.4 | 0.8 | 1.2 | 1.6 | 2 |
| depth (cm) | 14 | 14 | 21 | 13 | 9 |
| velocity (m/s) | 0.3 | 0.5 | 0.4 | 0.3 | 0.2 |

* Right to left bank.

YUKON WQOM    Sept 23, 2020

drove up to placer operation to talk to miners. Operations above A001, some discharge out of settling pond. Adams creek right by road. Discharge relatively minor and dissapates quickly.

Walked up creek to A002

10:14
KL-BO-A002 (YPS-A2)

location (flagged) downstream from operations and observed discharge.

bankful width: 3.2m

wetted width: 2.5m

wetted depth: 21cm

Rite in the Rain

YUKON WQOM    Sept 23 2020

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| distance (cm) | 0.4 | 0.8 | 1.2 | 1.6 | 2.0 |
| depth (cm) | 15 | 16 | 14 | 11 | 11 |
| velocity (m/s) | 0.7 | 0.9 | 0.7 | 0.2 | 0.4 |

* right to left bank

07 V   0581756   @ flagged
       7090434   location
       Nad27
       (change to 83)

* sluicing started just shortly after we collected sample

YUKON WQOM    Sept 23, 2020

11:19

YPS-A3 / KL_BO_AD03

63°55'46.5 N    NAD83
-139°21'35.9 W

upstream from operations
deadfall along creek

bankfull width: 5.1 m

wetted width 4.0m.
wetted depth: 41cm.

colour light brown to nearly clear

| | | | | | |
|---|---|---|---|---|---|
| dist. m | ~~0.7~~ 0.7 | ~~1.8~~ 1.4 | 2.1 | 2.8 | 3.5 |
| depth cm | 9 | ~~25~~ 14 | 8 | 26 | 4 |
| vel m/s | 0.5 | 0.7 | 0.1 | 0.1 | 0 |

from right to left bank

YUKON WQOM

Sept 23, 2020

11:57

AL_BO_AD04

wetted depth 55cm

width 3m

bankful width 6m

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| distance m | 0.5 | 1 | 1.5 | 2 | ~~3~~ 2.5 |
| depth cm | 11 | 14 | 17 | 5 | 13 |
| velocity m/s | 0.2 | 0.5 | 0.3 | 0 | 0 |

63°55'40.4" N
-139°22'22.6" W

no observed operations nearby.

10:55

Sept 23, 2020

YPS-A5 / KL_BO_AD05

right hand pocket

bankful width: 3.8 m
wetted " " : 2.7m
wetted depth : 44cm

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| distance | 0.45 | 0.9 | 1.35 | 1.8 | 2.25 m |
| depth | 3 | 9 | 14 | 10 | 4 cm |
| velocity | 0 | 0.2 | 0.8 | 0.4 | 0.1 m/s |

63°55'32.4" N
139°24'00.3" W.

sampled in area just upstream of removed alluvium trees & shrubs up to bank in sampling location.

13:22 Sept 23, 2020

walked along overgrown paths beside creek, upstream, No evidence of activity, looks undisturbed. moss covering banks and shrubbery overhanging the banks.

KL_BO_AD06

63°55'27.9" N Nad83
139°24'35.8" W

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| distance m | 0.25 | 0.5 | 0.75 | 1.0 | 1.25 |
| depth cm | 13 | 14 | 18 | 16 | 12 |
| velocity m/s | 0.1 | 0.3 | 0.3 | 0.4 | 0.3 |

*from right to left bank.

wetted width: 1.5
bankfull width: 1.9
wetted depth: 19cm

13:58 Sept 23, 2020

looked for unnamed creek that sometimes(?) feeds into Adams. We found dry channel that maybe the dry creek bed
@
N 63°55'33.9"
W 139°23'06.7

14:16

Stampede gulch just upstream from confluence to Adams.

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| distance | 0.16 | ~~[illegible]~~ | ~~0.4~~ | ~~[illegible]~~ | |
| depth | 6 | 9 | 12 | 18 | 17 |
| velocity | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 |

bankfull width: 1.2m
wet width: 1.0m
wetted depth: 8cm

STAM in GPS
STAMPEDE sample label
63°55'36.5" N
139°22'43.3" W

Rite in the Rain

@-AL01 ~~-2~~

Grabbing another sample @-AL02
" KL_BO_AD01-2",
" KL_BO_AD02-2"

Remeasuring flow @ KLBO_AL01
Wetted width: 2.4

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| distance (m) | 0.4 | 0.8 | 1.2 | 1.6 | 2.0 |
| depth (cm) | 8 | 14 | 17 | 12 | 11 |
| velocity m/s | 0.3 | 0.5 | 0.7 | 0.4 | 0.1 |

16:15 YN_OK01

Sampling above pond, as described in Andrews notes from July, although GPS coordinates differ slightly:

64°01'39.7" N
139°31'27.8 W



Decided not to sample YN_SW01 downstream of fording. Not representative of natural conditions. Difficult access for low importance sample.

16:56
YPS-386

Swede Creek
Much larger, good flowing creek/river. Placer operations & zero permitted discharge (said Mice) ~4km upstream.

wetted width: 13.1m
bankfull width: 16m
wetted depth: 36cm
from left to right bank ?

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist. (m) | 2.2 | 4.4 | 6.6 | 8.8 | ~~10.0~~ 11 |
| depth (cm) | 61 | 55 | 46 | 32 | 17 |
| vel (m/s) | 0.8 | 0.8 | 0.5 | 0.3 | 0.1 |

no activity or disturbance in immediate area.

YUKON WOOM

sept 23, 2020

N 64°01'31.2"
W 139°34'24.9

right ontop of July coordinates

---

Note about today:
- conducted field work w Alice McCulley from T.H. fish & wildlife
- cloudy to partly cloudy weather, cool weather that warmed up through day from jacket to sweater weather.

YUKON WOOM

SEPT 24, 2020

9:01
KL-KU01

wetted width and bankfull width very similar, ~ 30cm from wetted to bankful.

too muddy & deep to wade in beaver dam & activity.

64°01'46.4" N
139°10'42.5" W

measure wetted distance using bridge: 9.30m.

9:20
KL_KU02
~30-35 m upstream of ford
(GPS is a little off)

new GPS:
64°01'42.3"
139°10'26.3"

Rite in the Rain

yukon wOOm

Sept 24, 2020

bankful w: 11.9 m
wetted w: 8.3 m
d.: 65 cm

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| dist. (m) | 1.4 | 2.8 | 4.2 | 5.6 | 7 |
| dep (cm) | 23 | 16 | 10 | 9 | 8 |
| vel (m/s) | 1.0 | 0.7 | 0.6 | 0.4 | 0.6 |

from right to left bank.

KL_HU03
10.08

bankful w 8.3m
wetted w 8.0m
wetted d: 32 cm

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| dist. (m) | 1.3 | 2.6 | 3.9 | 5.2 | 6.5 |
| dep. (cm) | 8 | 13 | 13 | 17 | 24 |
| vel (m/s) | 0.3 | 0.5 | 0.5 | 0.4 | 0.4 |

# DNP 300

10:45

Sept 24, 2020

KL-HU04

bankful width: 9.1 m
wetted width: 8.1 m
depth: 51 cm

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| dist. m | 1.35 | | | | |
| depth cm | 15 | 28 | 22 | 14 | 11 |
| vel m/s. | 0.4 | 0.6 | 0.6 | 0.5 | 0.3 |

from left to right bank

07W 0593548 NAD83
7099516.

Rite in the Rain

Yukon WQM Sept 24, 2020

11:22
YPS-621

Followed Andrew's directions down road to where road crosses Klunker. Walked 100m upstream from culverted road to location that was sampled in July.

Took sample and measurements @: 07 W 0593899 Nad83
7099382

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist. m | 1.1 | 2.2 | 3.3 | 4.4 | 5.5 |
| depth cm | 7 | 9 | 6 | 6 | 24 |
| vel m/s | 0.6 | 0.6 | 0.7 | 0.4 | 1.1 |

from right to left bank

bankful width: 8.2 m
wetted width 6.8 m
wetted depth 16 cm

Sept 24, 2020

11:40

On drive up to KM 10 noted:
— haul trucks moving around on operation, however could not tell if sluicing. Large claims and difficult to see from road.
— operations and worked material extensive tow sites.

11:45

sampling above and below bridge and Hester Creek inlet. Hester is a small tributary.

YPS-051 63°59'30.5"N NAD 83
139°02'29.3"W

bankful width: 9.2 m
wetted width: 8.7m
wetted depth: 28cm

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist. (m) | 1.5 | 3 | 4.5 | 6 | 7.5 |
| depth (cm) | 4 | 17 | 17 | 14 | 13 |
| vel (m/s) | 0 | 0.5 | 1.1 | 0.7 | 0.6 |

Sept 24, 2020

12:08
outflow KM10
presumably hester creek
- outflow of from pond to
Hunker (settling pond?)

45cm x 3cm
avg velocity 1.3 m/s
at "weir", fully confined flow
in this cross section, unless
some water flows through
alluvium

water is clear

N 63° 59' 29.8"
W 139° 02' 26.6"

6.48 turbidity (NTU

7.22°C temp
0.735 mS/cm SPC
0.485 mS/cm cond
0.477 TDS%
0.36 sal

Sept 24, 2020

117.8% DO
14.19 mg/L DO
8.38 pH
-22.0 ORP

12:20

sampled upstream of confluence
w Hester / outflow from pond

$\boxed{\text{KM10}}$
bankfull width: 7.6 m
wetted width: 7.0 m
" depth: ~~[illegible]~~ 33cm

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| distance (m) | 1.2 | 2.4 | 3.6 | 4.8 | 6 |
| depth (cm) | 9 | 12 | 8 | 13 | 18 |
| vel (m/s) | 0.3 | 0.6 | 0.5 | 0.6 | 0.7 |

* from right to left bank

Rite in the Rain

YUKON WQOM

Sept 24, 2020

63° 59' 29.6" N
137° 02' 25.9 W
(NAD83)

13:30
YPS-614 *

* discrepancy b/w points marked on GPS and what was written in field notes from July sampling. Went to what's marked in GPS (2 points as YPS-614), no points marked near written coord.

Sampled @:

63° 59' 06.9" N
139° 01' 01.1" W

Nad 83

YUKON WQOM

Sept 24, 2020

bankfull width: 8 m
wetted width: 4.6m
avg depth: 35m

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist. (cm) | 0.75 | 1.5 | 2.25 | 3 | 3.75 |
| depth (cm) | 7 | 12 | 18 | 27 | 26 |
| vel (m/s) | 0.2 | 0.3 | 0.6 | 0.7 | 0.6 |

from right to left bank

KE11

KL-HU05

Sept 24, 2020

bankfull width: 7.3 m
wetted width: 2.9 m
" " depth: 43 cm

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist (m) | 0.5 | 1 | 1.5 | 2 | ~~3~~ 2.5 |
| depth (cm) | 11 | 23 | 29 | 32 | 11 |
| vel (m/s) | 0.2 | 0.8 | 0.9 | 1.4 | 0.2 |

* right to left bank

057 GPS

63°58'08.5" N
138°58'59.5" W
NAD 83

14:36

Sept 24, 2020

KL-HU-GO 07

bankfull width: 46.0 m
wetted width: 4.6 m
wetted depth: 21 cm

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist. (m) | 0.75 | 1.5 | 2.25 | 3 | 3.75 |
| depth (cm) | 5 | 6 | 11 | 12 | 11 |
| vel (m/s) | 0.1 | 0.5 | 0.5 | 0.5 | 0.5 |

* from left to right bank

63°57'50.7" N
138°58'02.2" W
NAD 83

Sept 24, 2020

13:07
KL-HU06

wetted width. ~~data~~ 5.4 m
bankful width. 10.1 m
wetted depth. 29 cm

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist. m | 0.9 | 1.8 | 2.7 | 3.6 | 4.5 |
| depth cm | 10 | 13 | 9 | 6 | 4 |
| vel m/s | 0.5 | 0.5 | 0.5 | 0.3 | 0.1 |

left to right bank

63°57'50.6"
138°57'56.7"
NAD83.

YUKON W00 M

Sept 24, 2020

15:20
YPS-079

drove down from Hunker road down a steep road after pink house and through placer operation to get to site.

area upstream is heavily reworked. Noted large settling pond on the way.

No observed sluicing or activity.

63°57'41.5"
138°57'22.3"
NAD83.
(same as July)

YUKON WQOM Sept 24, 2020

bankful width: 11.2 m
wetted width: 4.6 m
wetted depth: 7.7 cm

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist. (m) | 0.75 | 1.5 | 2.25 | 3 | 3.75 |
| depth (cm) | 5 | 10 | 12 | 10 | 6 |
| vel. m/s | 0.3 | 0.6 | 0.6 | 0.6 | 0.4 |

YUKON WQOM Sept 24, 2020

15:53
KM20 (YPS-6U)

bankful width: 3.3 m
wetted width: 3.0 m
wetted depth: 30cm

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist (m) | 0.5 | 1 | 1.5 | 2 | 2.5 |
| depth (cm) | 23 | 24 | 22 | 19 | 6 |
| vel. (m/s) | 0.6 | 0.3 | 0.5 | 0.1 | 0.1 |

63° 56' 58.5" N
138° 54' 24.4" W
NAD83

yukon woom

Sept 24, 2020

16:08
YPS - 078

location right next to road.

63° 55' 21.0" N
138° 53' 02.5"

wetted width: 4.1 m
bankful width: 8.7 m
wetted depth: 31 cm

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist. m | 0.7 | 1.4 | 2.1 | 2.8 | 3.5 |
| depth cm | 9 | 6 | 6 | 5 | 9 |
| vel. m/s - | 0.4 | 0.1 | 0.6 | 0.2 | 0.5 |

16:39
KL-HU09

Sept 24, 2020

upstream 20 m from ford

63° 54' 54" N
138° 53' 04.6" W

bankful width: 3.4 m
wetted width: 3 m
wetted depth: 24 cm

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist. (m) | 0.5 | 1.0 | 1.5 | 2.0 | ~~3~~ 2.5 |
| depth (cm) | 7 | 6 | 7 | 16 | 9 |
| vel. (m/s) | 0.5 | 0.2 | 0.2 | 0.7 | 0.6 |

Rite in the Rain

YUKON WOOM

Sept 24, 2020

~~[illegible]~~
~~Area~~

left hunker for heading to W08
gate @ upper road is locked

63°54'02.3"
138°55'27.9"

lower road blocked by giant tire and ~~[illegible]~~ orange cone.

63°53'57.3" N
138°55'35.8" W

Sept 24, 2020

KL_WA08
creek is next to closed operation.
only operation w/ blockade 2/ site.

63°53'25.7" N NW083
138°55'34.4" W

bankfull width : 3.5 m
wetted width : 1.5 m
wetted depth : 18 cm

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist (cm) | 0.25 | 0.5 | 0.75 | 1.0 | 1.25 |
| depth (cm) | 5 | 5 | 4 | 6 | 4 |
| vel. (m/s) | 0.2 | 0.2 | 0.1 | 0 (<0.1) | 0 (<0.1) |

YUKON WOOM Sept 24, 2020

end of placer access road, u/s from HU08

63°53'11.5" NAD83
138°55'42.4

took photo

~~X~~ 17:53

new potential reference station:
KL-HU10

walked along grassy path from where road ended. steeper gradient than in lower valley.

picked a nice confined channel

63°53'06.9 N Nad83
138°55'45.7 W

Sept 24, 2020

*bankful width : 3.9m
wetted width : 1.2m
wetted depth :

*not confident in bankful width.

| | | | | | | |
|---|---|---|---|---|---|---|
| distance | 0.2 | 0.4 | 0.6 | 0.8 | 1.0 | m |
| depth | 4 | 5 | 4 | 4 | 4 | cm |
| vel | 0.1 | 0.2 | 0.2 | 0 | 0 | m/s |

18:45
KL-HU07

63°54'37.8"
~~[illegible]~~
138°53'03.5

wetted ~~de~~ width : 1.1 m
bankful width : 2.8 m
wetted depth : 23 cm

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist m | 0.2 | 0.4 | 0.6 | 0.8 | 1.0 |
| depth cm | 8 | 9 | 7 | 8 | 4 |
| vel m/s | 0.2 | 0.3 | 0.3 | 0.4 | 0.1 |

YUKON WQOM Sept 25, 2020

Woke up to drizzly rain progressed to rainy conditions by 8:50.

made COC for Y.G. (yellow paper

10:00 NAD83

KL-AL01 07 V 0616780 709800

taking a couple samples in all gold creek, location ~ 45 min from Dawson on the way back to Whitehorse.

Bankful width: ~~7.9~~ 9
Wetted width: ~~9~~ 7.9
Wetted depth: 27

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| dist (m) | 1.35 | | | | |
| depth (cm) | 30 | 13 | sand bar 4 | 12 | 23 |
| vel (m/s) | 0.6 | 0.3 | 0.1 | 0.8 | 0.9 |

YUKON WQOM Sept 25, 2020

Weather: rainy

Appearance:
Clear, odourless.

Disturbance
In area heavily reworked area.
Banks are large blocks of rock.
Engineered channel.
veget/debris:
Some shrubs along bank. Creek

Sampled for:
TSS

Notes:
Channel just upstream of highway culvert.

YUKON WOOM Sept 25 2020

TIME

TEMP 2.44 °C

SPC 0.297 cond: 0.169 mS/cm

TDS 0.193

Sal. 0.14

DO mg/L 14.32

DO % 104.8

pH 7.51

ORP 66.6

Turb. 3.32 * NTU

*Turbidity meter ready by zeroed w/ blank to get ready.

1 NTU = 1.32 1st

1 NTU = 1.10 2nd

flow ~~toward~~ highway rapids, small waterfalls.

☆ DUP-300

YUKON WOOM Sept 25 2020

11:30

drove up extent of passable road to try and access undisturbed area of gold bottom, but road took us to high elevation above creek & turned around

establishing station upstream of confluence c lucky creek, upstream of ford and disturbed area.

Not considered a reference station.

KL-AL02 (check c YG if ok name).

bankful width 4.3 m

wetted width 3.7 m

wetted depth 27 cm

| | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| dist (m) | 0.6 | 1.2 | 1.8 | 2.4 | 3.0 |
| depth (cm) | 29 | 27 | 24 | 15 | 11 |
| vel (m/s) | 0.2 | 0.5 | 0.6 | 0.3 | |

YUKON WOOM Sept 25, 2020

location of new Station:
07 V 0611716
7088481

NAD83

DROVE BACK TO WHITEHORSE

Rite in the Rain

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: YPS-614 | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cloudy | Photo No. | |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | brown, silty, cannot see bottom of deepest sections, can see bottom in shallow section. nearly clear in bottle, faint brown. |
| Flow Direction and Intensity: | N, riffles, some white caps on rocks |
| Depth of water (approximately): | 7-27cm. |
| Disturbance (i.e. rain, surface water flow from other areas): | none. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | occassional twig or leaf. leafs submerged. |
| Sampled for: | TSS. |
| Comments/Notes | twigs, trees to bank of creek. undisturbed area. (although placer activity nearby). |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 13:32 | | |
| Temperature (C) | ~~0.494~~ 5.23 | DO (mg/L) | 14.03 (110.4%) |
| Specific Conductivity mS/cm | 0494 (cond: 0.307) | pH | 7.91 |
| TDS (g/L) | 0.321 | ORP (mV) | 17.4 |
| Salinity | 0.24 | Turbidity (NTU) | 23.8 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KMIO | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ NM &AB | Project Name: YUKON WQDM 2020 | Sampling Method: GRAB |
| Weather/Temp: cloudy, cool. | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | brown, silty, can only see bottom in shallowest portions of creek. |
| Flow Direction and Intensity: | West |
| Depth of water (approximately): | 8 - 18 cm. |
| Disturbance (i.e. rain, surface water flow from other areas): | None observed. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | rare leaf. |
| Sampled for: | TSS. |
| Comments/Notes | u/s of confluence w Hester Creek (?) ~~is~~ is an outflow (controlled w make-shift weir) from pond. banks are vegetated. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 12:27 | | |
| Temperature (C) | 4.72 | DO (mg/L) | 13.48 (105.2%) |
| Specific Conductivity mS/cm | 0.527 cond: 0.323 | pH | 7.96 |
| TDS (g/L) | 0.343 | ORP (mV) | 7.8 |
| Salinity | 0.25 | Turbidity (NTU) | 25.5 NTU |

## SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: YPS-051 | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQM 2020 | Sampling Method: Grab |
| Weather/Temp: cloudy | Photo No. | |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | light brown, no odour. |
| Flow Direction and Intensity: | west, large riffles / small rapids over surface of rocks |
| Depth of water (approximately): | ~ 15-17 cm |
| Disturbance (i.e. rain, surface water flow from other areas): | inflow from small tributary (Hester creek) |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | None. |
| Sampled for: | TSS |
| Comments/Notes | sampled d/s of brown/rusty metal bridge & Hester inflow. Area surrounding creek disturbed by placer activity. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 11:53 | | |
| Temperature (C) | 4.95 | DO (mg/L) | 15.81 (129%) |
| Specific Conductivity mS/cm | 0.591 cond. 0.364 | pH | 7.84 |
| TDS (g/L) | 0.384 | ORP (mV) | -24.2 |
| Salinity | 0.29 | Turbidity (NTU) | 30.5 |

## SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: YPS-621 | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ AB & NM | Project Name: Yukon WOOM 2020 | Sampling Method: GRAB |
| Weather/Temp: overcast. | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | grey-brown (silty) can see portion of creek bottom where shallow. |
| Flow Direction and Intensity: | NW |
| Depth of water (approximately): | 7 - 24m |
| Disturbance (i.e. rain, surface water flow from other areas): | None. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | None |
| Sampled for: | TSS |
| Comments/Notes | Surrounding area disturbed (reworked alluvium, operations, tailings). Shrubs up to bank in portions of the immediate reach as well as reworked alluvium. trucks drove by. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 11:~~[illegible]~~ 22 | | |
| Temperature (C) | 4.82 | DO (mg/L) | 106.5% 13.61 mg/L |
| Specific Conductivity mS/cm | 0.651 cond: 0.400 | pH | 7.80 |
| TDS (g/L) | 0.423 | ORP (mV) | 0.4 |
| Salinity | 0.32 | Turbidity (NTU) | 45.0 |

## SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KM20 (YPS-611) | Project Number: | Date: Sept 24 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cloudy | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | bottle nearly clear, faint brown colour some silt evident in creek, clear in ~30% of stream |
| Flow Direction and Intensity: | NW, small rapids, riffles |
| Depth of water (approximately): | ~ 20cm |
| Disturbance (i.e. rain, surface water flow from other areas): | small creek confluence upstream. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | leaves along shore. |
| Sampled for: | TSS |
| Comments/Notes | sample site near road, moss & vegetation close up to bank. relatively undisturbed creek although ~~heavily disturbed up & down stream.~~ |

| Field Parameters: | culvert w/ creek coming under road to connect w/ trunk ~20m | | |
|---|---|---|---|
| Time : | 15:51 | | |
| Temperature (C) | 5.55 | DO (mg/L) | 13.59 (108.7%) |
| Specific Conductivity mS/cm | 0.477 0.300 | pH | 8.00 |
| TDS (g/L) | 0.310 | ORP (mV) | 16.1 |
| Salinity | 0.23 | Turbidity (NTU) | 12.3 |

u/s where we parked

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: YPS-079 | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cloudy, cool, starting to trickle. | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | light brown, can see bottom of shallow clear to clear both light brown colour |
| Flow Direction and Intensity: | west, n tros. |
| Depth of water (approximately): | 6-12cm |
| Disturbance (i.e. rain, surface water flow from other areas): | extensive recovery upstream, no known/designed active placer mining (observed) |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | none |
| Sampled for: | TSS |
| Comments/Notes | in area of operations & reworked alluvium |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 15:29 | | |
| Temperature (C) | 6.00 | DO (mg/L) | 13.96 (111.9%) |
| Specific Conductivity | 0.481 cond: 0.207 | pH | 8.02 |
| TDS (g/L) | 0.313 | ORP (mV) | 5.2 |
| Salinity | 0.23 | Turbidity (NTU) | 13.8 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KL-AL01 (AllGold creek) | Project Number: | Date: Sept 25, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: drizzly, overcast | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | clear, odourless |
| Flow Direction and Intensity: | perpendicular to highway |
| Depth of water (approximately): | 12-30 cm |
| Disturbance (i.e. rain, surface water flow from other areas): | light rain. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Some shrubs around bank but channel in heavily reworked area in constructed/reworked channel. Engineered channel. |
| Sampled for: | TSS |
| Comments/Notes | upstream of highway culvert below mining operation, in heavily disturbed and reworked area. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 10:00 | | |
| Temperature (C) | 2.44 | DO (mg/L) | 14.32 (104.8%) |
| Specific Conductivity (mS/cm) | 0.297 cond. 0.169 | pH | 7.51 |
| TDS (g/L) | 0.193 | ORP (mV) | 66.6 |
| Salinity | 0.14 | Turbidity (NTU) | 3.32 |

* DUP-300 *

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL-AL-02 * new station | Project Number: | Date: Sept 25, 2020 |
| Sampler: ~~CH~~ NM & AB. | Project Name: | Sampling Method: GRAB. |
| Weather/Temp: | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | clear, odourless |
| Flow Direction and Intensity: | ~~the~~ East, riffles. |
| Depth of water (approximately): | 11- 29cm |
| Disturbance (i.e. rain, surface water flow from other areas): | none in immediate vicinity or observed! |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | leafs, grass up to ~~&~~ banks. & shrubs. |
| Sampled for: | |
| Comments/Notes | location selected for new test station u/s of lucky creek confluence and existing operation (not active currently) |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 11:43 | | |
| Temperature (C) | 1.76 | DO (mg/L) | 18.06 (128.2%) |
| Specific Conductivity | 0.256 mS/cm 0.142 | pH | 7.27 |
| TDS (g/L) | 0.166 | ORP (mV) | 13.7 |
| Salinity | 0.12 | Turbidity (NTU) | 2.60 NTU |

1.0NTU check = 1.32

* DUP - 200

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL - HU03 | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ HM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cloudy, dry. | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | silty, cannot see bottom, no |
| Flow Direction and Intensity: | NNW. |
| Depth of water (approximately): | 8-24cm |
| Disturbance (i.e. rain, surface water flow from other areas): | some riffles, generally flat flow |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | some grass, grassy along bank, no significant debris in flow |
| Sampled for: | TSS |
| Comments/Notes | sampled between ford & bridge. flagged location. area heavily disturbed but no noise or activity visible or heard from site. trucks on road. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 10:05 | | |
| Temperature (C) | 4.90 | DO (mg/L) | 119.1 % 15.05 mg/L |
| Specific Conductivity mS/cm | 0.675 cond: 0.416 | pH | 7.90 |
| TDS (g/L) | 0.439 | ORP (mV) | 10.0 |
| Salinity | 0.33 | Turbidity (NTU) | 48.9 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: | Project Number: | Date: |
| Sampler: CH | Project Name: | Sampling Method: |
| Weather/Temp: | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | |
| Flow Direction and Intensity: | |
| Depth of water (approximately): | |
| Disturbance (i.e. rain, surface water flow from other areas): | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | |
| Sampled for: | |
| Comments/Notes | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | | | |
| Temperature (C) | | DO (mg/L) | |
| Specific Conductivity | | pH | |
| TDS (g/L) | | ORP (mV) | |
| Salinity | | Turbidity (NTU) | |

#DUP-100

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: YPS - 386 | Project Number: | Date: Sept 23, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cool, cloudy, dry. | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | clear, odourless. |
| Flow Direction and Intensity: | south, riffle, some white caps |
| Depth of water (approximately): | up to Andrews upper thigh 17-61cm |
| Disturbance (i.e. rain, surface water flow from other areas): | None. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | None |
| Sampled for: | TSS. |
| Comments/Notes | claim ~4km up from sampling location. no activity or disturbance in lower swede creek. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 16:56 | | |
| Temperature (C) | 4.20 | DO (mg/L) | 121% / 15.76 mg/L |
| Specific Conductivity | 0.224 mS/cm cond 0.135 | pH | 7.91 |
| TDS (g/L) | 0.145 | ORP (mV) | 22.8. |
| Salinity | 0.11 | Turbidity (NTU) | 3.60 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: YN_OK01 | Project Number: | Date: Sept 23/20 |
| Sampler: ~~CH~~ NM & AB | Project Name: YUKON WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: overcast | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | light brown. |
| Flow Direction and Intensity: | south |
| Depth of water (approximately): | 0.10 – 0.5 m |
| Disturbance (i.e. rain, surface water flow from other areas): | none observed |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | lots of vegetation and debris. branches in creek, mossy bank. |
| Sampled for: | TS. |
| Comments/Notes | Sampled above pond. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 16:15 | | |
| Temperature (C) | 2.94 | DO (mg/L) | 104.7 % / 14.07 mg/L |
| Specific Conductivity | 0.662 mS/cm cond. 0.383 | pH | 8.01 |
| TDS (g/L) | 0.430 | ORP (mV) | 19.4 |
| Salinity | 0.32 | Turbidity (NTU) | 16.9 |

**SURFACE WATER SAMPLE COLLECTION SHEET**

HEMMERA

| | | |
|---|---|---|
| Location ID: KL_BO_AD01-2 | Project Number: | Date: Sept 23.2020 |
| Sampler: ~~CH~~ NM/AB | Project Name: YUKON WQON 2020 | Sampling Method: GRAB. |
| Weather/Temp: overcast | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | cannot see bottom of creek very turbid. |
| Flow Direction and Intensity: | East, n/1m/s |
| Depth of water (approximately): | see other notes (~14cm) |
| Disturbance (i.e. rain, surface water flow from other areas): | sluicing upstream |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | occassional leaf & twig in flow |
| Sampled for: | TSS. |
| Comments/Notes | sluicing occuring upstream (placer operation immediately upstream). |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 14:55 | | |
| Temperature (C) | 0.572 ms/cm \| cond 0.356 | DO (mg/L) | 110.3% / 13.94 mg/L |
| Specific Conductivity | 5.21 | pH | 7.80 |
| TDS (g/L) | 0.371 g/L | ORP (mV) | 22.4 |
| Salinity | 0.28 | Turbidity ~~(NTU)~~ | 929 AU |

## SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL - BO_AD02 - 2 | Project Number: | Date: Sept 23, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: warm, dry, some clouds | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Silty, turbid, cannot see bottom of creek |
| Flow Direction and Intensity: | East, [illegible] |
| Depth of water (approximately): | See [illegible] notes. |
| Disturbance (i.e. rain, surface water flow from other areas): | Sluicing upstream at nearest operation. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | occassional leaf/twig. |
| Sampled for: | TSS. |
| Comments/Notes | Sluicing effects apparent. collected to capture WQ while active sluicing occurring at operation immediately upstream |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 15:04 | | |
| Temperature (C) | 4.98 | DO (mg/L) | 104.0 / 13.22 mg/L |
| Specific Conductivity | 0.569 ms/cm \| cond. 0.351 | pH | ~~13.03~~ 7.71 |
| TDS (g/L) | 0.370 | ORP (mV) | 18.2 |
| Salinity | 0.28 | Turbidity ~~(NTU)~~ AU | 1009 AU |

## SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL-BO-AD02 (YDS-A2) | Project Number: | Date: Sept 23/20 |
| Sampler: ~~CH~~ NM & AB | Project Name: YUKON WOON 2020 | Sampling Method: GRAB. |
| Weather/Temp: cool, cloudy | | Photo No. |
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | Slightly more turbid than A01 although can see bottom of creek in most parts. | |
| Flow Direction and Intensity: | East, riffles. | |
| Depth of water (approximately): | ~0.14m | |
| Disturbance (i.e. rain, surface water flow from other areas): | None visible from site, however minor discharge from settling pond ~100-200m upstream. | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Some leaves along bank, and in flow. | |
| Sampled for: | TSS | |
| Comments/Notes | downstream from operations. operations consists of large open pit. Creek flows along access road side of. | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 10:14 | | |
| Temperature (C) | 2.37 | DO (mg/L) | % 112.8 / 15.3 mg/L |
| Specific Conductivity | 0.534 mS/cm 0.323 cond | pH | 7.73 |
| TDS (g/L) | 0.347 g/L | ORP (mV) | 16.1 |
| Salinity | 0.26 | Turbidity (NTU) | 12.3 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KL-BO-AD05 | Project Number: | Date: Sept 23, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: YUKON WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cool, cloudy | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | clear, odourless |
| Flow Direction and Intensity: | East, small steps, riffles. |
| Depth of water (approximately): | 4-14cm |
| Disturbance (i.e. rain, surface water flow from other areas): | none. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | leaves along bank & occassionally in flow. few branches stretched over side of bank, but none dagged in creek. |
| Sampled for: | TSS |
| Comments/Notes | reference station upstream of activity by at least 1km. upstream of confluences w/ other creeks (i.e. stampede) |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 12:55 | | |
| Temperature (C) | 1.65 | DO (mg/L) | 104 %/ 14.5 mg/L |
| Specific Conductivity | 0.216 ms/cm (cond: 0.121 ms/cm) | pH | 7.47 |
| TDS (g/L) | 0.141 | ORP (mV) | 28.3 |
| Salinity | 0.10 | Turbidity (NTU) | 1.69 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL_BO_AD04 / YPS-A4 | Project Number: | Date: Sept 23, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: YUKON WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cloudy, ~ 4-10°C | | Photo No. |
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | clear, odourless. | |
| Flow Direction and Intensity: | East, riffles, one very small rapid. | |
| Depth of water (approximately): | 11 - 28 cm | |
| Disturbance (i.e. rain, surface water flow from other areas): | None. | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | some. leafs in river/creek, & tree branches. | |
| Sampled for: | TSS | |
| Comments/Notes | close to road very clear water (can see entire bottom of stream bed. | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 11:57 | | |
| Temperature (C) | 1.88 | DO (mg/L) | 115.6% ~~16.37~~ 15.80 mg/L |
| Specific Conductivity | spc 0.431 ms/cm cond 0.241 ms/cm | pH | 7.70 |
| TDS (g/L) | 0.280 | ORP (mV) | 24.5 |
| Salinity | 0.21 | Turbidity (NTU) | 2.35 |

![HEMMERA]

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: YPS-A1 / KL-BQ A001 | Project Number: | Date: Sept 23, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: YUKON WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: 7°C, cloudy. | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | clear, can see bottom of shallow creek. |
| Flow Direction and Intensity: | flowing east, riffles. |
| Depth of water (approximately): | 9 – 21 cm. |
| Disturbance (i.e. rain, surface water flow from other areas): | None observed. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Some leaves, generally zero debris in flow. bank composed of alluvium and/or reworked alluvium from placer activity. |
| Sampled for: | TSS. |
| Comments/Notes | collected another sample at location during active sluicing at operation upstream. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 9:35 | | |
| Temperature (C) | 2.16 | DO (mg/L) | 102.6 % / 14.2 mg/L |
| Specific Conductivity | 0.533 mS/cm | pH | 7.80 |
| TDS (g/L) | 0.347. | ORP (mV) | 12.7. |
| Salinity | 0.26 | Turbidity (NTU) | 8.05 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL_BO_AD03 | Project Number: | Date: Sept 23, 2020 |
| Sampler: ~~CH~~ NM & A.B. | Project Name: YUKON WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: partly cloudy, cool | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | clear |
| Flow Direction and Intensity: | East, riffles. |
| Depth of water (approximately): | 8 - 26 cm |
| Disturbance (i.e. rain, surface water flow from other areas): | None. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | occassional leaves. |
| Sampled for: | TSS. |
| Comments/Notes | deadfall, steep slumped banks, small rapid over rock, generally riffle |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | ~~[illegible]~~ 11.25 | | |
| Temperature (C) | 1.00 | DO (mg/L) | 103.9% / 14.34 mg/L |
| Specific Conductivity | 0.464 mS/cm / 0.759 mS/cm nonstandard | pH | 7.65 |
| TDS (g/L) | 0.301 | ORP (mV) | 19.7 |
| Salinity | 0.22 | Turbidity (NTU) | 3.12 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL_BO_AD06 | Project Number: | Date: Sept 23, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cloudy 5-10°C. | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | clear |
| Flow Direction and Intensity: | East, small steps, riffles. |
| Depth of water (approximately): | 12-18 cm |
| Disturbance (i.e. rain, surface water flow from other areas): | None. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | some leaves along bank & in water. |
| Sampled for: | TSS |
| Comments/Notes | reference station upstream |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | ~~1:50~~ 13:22 | | |
| Temperature (C) | 1.50 | DO (mg/L) | (91.1%) 12.70 |
| Specific Conductivity | 0.213 mS/cm cond 0.117 | pH | 7.15 |
| TDS (g/L) | 0.139 | ORP (mV) | 28.4 |
| Salinity | 0.10 | Turbidity (NTU) | |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: STAMPEDE ~~[illegible]~~ | Project Number: | Date: Sep 23, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: YUKON WQOM 2020 | Sampling Method: GRAB. |
| Weather/Temp: cool, some clouds. | | Photo No. |
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | nearly clear, light brown colour | |
| Flow Direction and Intensity: | East. | |
| Depth of water (approximately): | 4-26 cm. | |
| Disturbance (i.e. rain, surface water flow from other areas): | NO. | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Leafs floating on top, along banks<br>Some organics in water. | |
| Sampled for: | TSS | |
| Comments/Notes | sampled just upstream of small waterfalls cascading down into Adams creek. Stampede parallels Adams before confluence | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 14:16. | | |
| Temperature (C) | 3.53 | DO (mg/L) | 112.2% / 14.85 mg/L |
| Specific Conductivity | 0.570 mS / cond 0.336 | pH | 7.80 |
| TDS (g/L) | 0.371 | ORP (mV) | 21.0 |
| Salinity | 0.28 | Turbidity (NTU) | 2.30 |

**SURFACE WATER SAMPLE COLLECTION SHEET**

HEMMERA

| | | |
|---|---|---|
| Location ID: | Project Number: | Date: |
| Sampler: CH | Project Name: | Sampling Method: |
| Weather/Temp: | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | |
| Flow Direction and Intensity: | |
| Depth of water (approximately): | |
| Disturbance (i.e. rain, surface water flow from other areas): | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | |
| Sampled for: | |
| Comments/Notes | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | | | |
| Temperature (C) | | DO (mg/L) | |
| Specific Conductivity | | pH | |
| TDS (g/L) | | ORP (mV) | |
| Salinity | | Turbidity (NTU) | |

63.62840° N 137.60727° W

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: clear creek. | Project Number: | Date: Sept 22, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: YUKON WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: Sunny, warm | | Photo No. |
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | brown in creek, nearly clear in bottle | |
| Flow Direction and Intensity: | 19 - 57cm | |
| Depth of water (approximately): | Flowing south towards bridge. | |
| Disturbance (i.e. rain, surface water flow from other areas): | None observed | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | Generally none, occassional leaf | |
| Sampled for: | TSS | |
| Comments/Notes | Sample jar looks clear, however, cannot see bottom of creek to bed. Sampled upstream from bridge. | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 15:25 | | |
| Temperature (C) | 4.35 | DO (mg/L) | 12.97 / %: 99.7 |
| Specific Conductivity | 0.162 mS/cm | pH | 6.96 |
| TDS (g/L) | 0.105 g/L | ORP (mV) | 59.3 |
| Salinity | 0.08 | Turbidity (NTU) | 27.6 |

Riffle.
0% canopy coverage.
grasses, shrubs, desiduous trees.

Bankful width: 19.3 m
Wetted ~~length~~ stream width: 13.2m
bankful wetted depth: 47cm

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: | Project Number: | Date: |
| Sampler: CH | Project Name: | Sampling Method: |
| Weather/Temp: | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | |
| Flow Direction and Intensity: | |
| Depth of water (approximately): | |
| Disturbance (i.e. rain, surface water flow from other areas): | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | |
| Sampled for: | |
| Comments/Notes | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | | | |
| Temperature (C) | | DO (mg/L) | |
| Specific Conductivity | | pH | |
| TDS (g/L) | | ORP (mV) | |
| Salinity | | Turbidity (NTU) | |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KL-HM07 | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: YUKON WQOM 2020 | Sampling Method: GRAB. |
| Weather/Temp: partly cloudy, cool | | Photo No. |
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | very clear, no odour steps & riffles. | |
| Flow Direction and Intensity: | ~ NW | |
| Depth of water (approximately): | ~4-8cm | |
| Disturbance (i.e. rain, surface water flow from other areas): | none observed | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | none. (occassional leaf) | |
| Sampled for: | TSS. | |
| Comments/Notes | ~~[illegible]~~ wetted stream bed heavily oxidized and stained orange red. Lots of ~~[illegible]~~ muscovite-schist in area. | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 18:50 | | |
| Temperature (C) | 2.49 | DO (mg/L) | 13.72 (100.3%) |
| Specific Conductivity | 0.336 mS/cm cond: 0.192 | pH | 7.37 |
| TDS (g/L) | 0.219 | ORP (mV) | 13.2 |
| Salinity | 0.16 | Turbidity (NTU) | 4.76 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: | Project Number: | Date: |
| Sampler: CH | Project Name: | Sampling Method: |
| Weather/Temp: | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | |
| Flow Direction and Intensity: | |
| Depth of water (approximately): | |
| Disturbance (i.e. rain, surface water flow from other areas): | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | |
| Sampled for: | |
| Comments/Notes | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | | | |
| Temperature (C) | | DO (mg/L) | |
| Specific Conductivity | | pH | |
| TDS (g/L) | | ORP (mV) | |
| Salinity | | Turbidity (NTU) | |

**SURFACE WATER SAMPLE COLLECTION SHEET**

HEMMERA

| | | |
|---|---|---|
| Location ID: KL-HU-G001 | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cool, dry, cloudy | Photo No. | |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | can see bottom of shallow creek, water light brown tone, almost clear in bottle. |
| Flow Direction and Intensity: | flowing north, riffles. |
| Depth of water (approximately): | 5-12cm |
| Disturbance (i.e. rain, surface water flow from other areas): | none. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | none. |
| Sampled for: | TSS. |
| Comments/Notes | sampled at mouth of stream. location near fourish facility. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 14:36 | | |
| Temperature (C) | 5.56 | DO (mg/L) | 16.40 (134.3%) |
| Specific Conductivity mS/cm | 0.465 cond: 292 | pH | 8.21 |
| TDS (g/L) | 0.302 | ORP (mV) | -8.6 |
| Salinity | 0.22 | Turbidity (NTU) | 16.9 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KL-ITU06 | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cloudy, cool | | Photo No. |
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | light brown but can see on the bottom. bottle is clear. odourless | |
| Flow Direction and Intensity: | west. | |
| Depth of water (approximately): | ~ 10cm | |
| Disturbance (i.e. rain, surface water flow from other areas): | none. | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | occassional leaf. | |
| Sampled for: | TSS | |
| Comments/Notes | ~~act~~ operations upstream owned by owners of tourism outfit near sampling location<br>bank comprised of alluvium. Grass up to bank in some spots | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 14:50 | | |
| Temperature (C) | 6.07 | DO (mg/L) | 13.88 (111.3%) |
| Specific Conductivity | 0.481 cond: 0.307 | pH | 8.21 |
| TDS (g/L) | 0.321 | ORP (mV) | 2.4. |
| Salinity | 0.23 | Turbidity (NTU) | 15.2 |

## SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL-HU02 | Project Number: | Date: Sept 23, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WOOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cloudy | | Photo No. |
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | silty, cannot see bottom of creek, no odour, light brown | |
| Flow Direction and Intensity: | considerable flow west. | |
| Depth of water (approximately): | 8-23cm | |
| Disturbance (i.e. rain, surface water flow from other areas): | will see if placer activity is occuring upstream, but none in immediate vicinity. | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | leaves along banks, lake inflow | |
| Sampled for: | TSS. | |
| Comments/Notes | upstream from ford (~30m) | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 9:20 | | |
| Temperature (C) | 5.25 | DO (mg/L) | 104.9% / 13.27 mg/L |
| Specific Conductivity mS/cm | 0.683 cond: 0.429 | pH | 8.28 |
| TDS (g/L) | 0.448 | ORP (mV) | 3.6. |
| Salinity | 0.34 | Turbidity (NTU) | 65.7 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KL_HU01 | Project Number: | Date: sept 24/20 |
| Sampler: ~~CH~~ NM & AB | Project Name: YUKON WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cool, cloudy, dry | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | silty, cannot see bottom. |
| Flow Direction and Intensity: | Nearly stagnant, slow flow NNW 0.1m/s along bank. |
| Depth of water (approximately): | too deep to wade in. Too murky to see bottom. |
| Disturbance (i.e. rain, surface water flow from other areas): | none observed |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | sticks & leaves in water |
| Sampled for: | TSS |
| Comments/Notes | Beaver observed building dam, swimming around. water level noticably ~~h~~ higher since July, presumably due to beaver dam. Middle of channel ≥ 90cm deep. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 8.59 | | |
| Temperature (C) | 5.44 | DO (mg/L) | 114.3% / 14.39 mg/L |
| Specific Conductivity | 0.607 mS/cm (cond 0.430) | pH | 8.26 |
| TDS (g/L) | 0.447 | ORP (mV) | 25.3 |
| Salinity | 0.23 | Turbidity (NTU) | 67.4 |

**SURFACE WATER SAMPLE COLLECTION SHEET**

HEMMERA

| | | |
|---|---|---|
| Location ID: KL-HU05 | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cool, cloudy | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | |
| Flow Direction and Intensity: | west, fast, riffles & rapids. |
| Depth of water (approximately): | 11-32cm |
| Disturbance (i.e. rain, surface water flow from other areas): | none. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | deadfall & tree debris in stream. |
| Sampled for: | TSS |
| Comments/Notes | near cabin, spoke to friendly owner. near road sampled near sand bar |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 14:11 | | |
| Temperature (C) | 5.60 | DO (mg/L) | 14.04 (111.5%) |
| Specific Conductivity mS/cm | 0.475 cond 0.299 | pH | 8.13 |
| TDS (g/L) | 0.309 | ORP (mV) | 8.6 |
| Salinity | 0.23 | Turbidity (NTU) | 1.61 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL-HU04 | Project Number: | Date: Sept 24, 20 |
| Sampler: ~~CH~~ NM & AB | Project Name: YUKON WQOM 2020 | Sampling Method: Grab |
| Weather/Temp: overcast. | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | brown, no odour. cannot see bottom of creek. |
| Flow Direction and Intensity: | West, riffles. |
| Depth of water (approximately): | 11 - 28 cm. |
| Disturbance (i.e. rain, surface water flow from other areas): | none. drainage ditches & diversions just downstream have been cut off by road. no visible in puts to creek nearby. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | ~~none~~. leaves along shore. occassional leaf or small twig. |
| Sampled for: | GRAB |
| Comments/Notes | adjacent to very large operation, bulldozer active in distance but no observed sluicing from this far away. settling adjacent to creek are empty. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 10:45 | | |
| Temperature (C) | ~~10:45~~ 4.79 | DO (mg/L) | 112.4% / 14.32 mg/L |
| Specific Conductivity mS/cm | 0.1057 Cond: 0.403 | pH | 7.88 |
| TDS (g/L) | 0.427 | ORP (mV) | -4.2 |
| Salinity | 0.32 | Turbidity (NTU) | 49.2 |

# SURFACE WATER SAMPLE COLLECTION SHEET

HEMMERA

| | | |
|---|---|---|
| Location ID: KL-HU08 | Project Number: | Date: Sept 24/20 |
| Sampler: ~~CH~~ NM&AB | Project Name: YUKON WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: Cloudy, cool | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | very clear, odourless. |
| Flow Direction and Intensity: | small bubbling creek, steps NNE |
| Depth of water (approximately): | ~6cm |
| Disturbance (i.e. rain, surface water flow from other areas): | none observed |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | leaves in creek. |
| Sampled for: | TSS |
| Comments/Notes | next to closed operation |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 17:31 | | |
| Temperature (C) | 2.31 | DO (mg/L) | 17.59 (127.0%) |
| Specific Conductivity | 0.416 mS/cm cond: 0.236 | pH | 8.27 |
| TDS (g/L) | 0.271 | ORP (mV) | -0.3 |
| Salinity | 0.20 | Turbidity (NTU) | 2.79 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KL-HU10 | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cloudy, a light sprinkle | | Photo No. |

| | |
|---|---|
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | clear odourless |
| Flow Direction and Intensity: | N, bubbling creek. stepped due to gradient & rocks |
| Depth of water (approximately): | 4cm |
| Disturbance (i.e. rain, surface water flow from other areas): | none. |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | leaves, twigs |
| Sampled for: | GRAB TSS |
| Comments/Notes | potential reference station, although did not hike up to headwaters. No disturbance. moss & flora to banks. |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 17:55 | | |
| Temperature (C) | 2.32 | DO (mg/L) | (96.6%) 13.13 |
| Specific Conductivity mS/cm | 0.271 cond: 0.154 | pH | 7.61 |
| TDS (g/L) | 0.176 | ORP (mV) | 15.4 |
| Salinity | 0.13 | Turbidity (NTU) | 3.28 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: KL-HU09 | Project Number: | Date: Sept 24, 2020 |
| Sampler: ~~CH~~ NM & AB | Project Name: Yukon WQOM 2020 | Sampling Method: GRAB |
| Weather/Temp: cloudy, cool. | | Photo No. |
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | clear, odourless. | |
| Flow Direction and Intensity: | riffles + small rapids. | |
| Depth of water (approximately): | 6-16cm. | |
| Disturbance (i.e. rain, surface water flow from other areas): | none observed | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | - lots of leaves in creek.<br>- rocks and sediment stained orange-red (iron oxidation?) over entire wetted creek. | |
| Sampled for: | TSS | |
| Comments/Notes | - oxidation noted above<br>- sampled 20m upstream of ford<br>- moss & shrubs to bank.<br>- undisturbed (recently) | |

Field Parameters:

| | | | |
|---|---|---|---|
| Time : | 16:38 | | |
| Temperature (C) | 4.15 | DO (mg/L) | 16.81 (127.3%) |
| Specific Conductivity | 0.423 mS/cm. cond: 0.255 | pH | 7.78 |
| TDS (g/L) | 0.275 | ORP (mV) | 8.4 |
| Salinity | 0.20 | Turbidity (NTU) | 4.04 |

HEMMERA

# SURFACE WATER SAMPLE COLLECTION SHEET

| | | |
|---|---|---|
| Location ID: YDS-07B | Project Number: | Date: Sept 24 |
| Sampler: ~~CH~~ NM & AB | Project Name: YUKON WQOM 2020 | Sampling Method: Grab |
| Weather/Temp: cool, cloudy, buggy! | | Photo No. |
| Appearance & Odour (Clear, Silty, HC sheen/odors, film, etc.) | creek looks clear. Iron oxidation (red) on rocks (or algae?) | |
| Flow Direction and Intensity: | riffles and small rapids. | |
| Depth of water (approximately): | 6-9 cm | |
| Disturbance (i.e. rain, surface water flow from other areas): | ~~None although~~ side channel directly u/s (~15m). | |
| Vegetation/Debris (i.e. chunks of wood, reeds, grass, etc): | lots of leaves along bank and in creek. Some twigs | |
| Sampled for: | TSS | |
| Comments/Notes | next to road @ Y.G. coordinate. | |

| Field Parameters: | | | |
|---|---|---|---|
| Time : | 16:15 | | |
| Temperature (C) | 4.21 | DO (mg/L) | 13.08 (106%) |
| Specific Conductivity mS/cm | 0.431 cond 0.260 | pH | 7.77 |
| TDS (g/L) | 0.280 | ORP (mV) | 10.3 |
| Salinity | 0.21 | Turbidity (NTU) | 4.74 |

# APPENDIX C
## Photolog

**July 2021**

**Photo 1** Adams Creek, KL_BO_AD01 (YPS-622) looking across.

**Photo 2** Adams Creek, KL_BO_AD01 (YPS-622) looking downstream.

**Photo 3** Adams Creek, KL_BO_AD01 (YPS-622) looking upstream.

**Photo 4** Adams Creek, KL_BO_AD01 (YPS-622) substrate aquatic.

**Photo 5** Adams Creek, KL_BO_AD01 (YPS-622) substrate dry.

**Photo 6** Adams Creek, KL_BO_AD02 (YPS-623) looking across.

**Photo 7** Adams Creek, KL_BO_AD02 (YPS-623) looking downstream.

**Photo 8** Adams Creek, KL_BO_AD02 (YPS-623) looking upstream.

**Photo 9** Adams Creek, KL_BO_AD02 (YPS-623) substrate aquatic.

**Photo 10** Adams Creek, KL_BO_AD02 (YPS-623) substrate dry.

**Photo 11** Adams Creek, KL_BO_AD03 (YPS-624) looking across.

**Photo 12** Adams Creek, KL_BO_AD03 (YPS-624) looking downstream.

**Photo 13** Adams Creek, KL_BO_AD03 (YPS-624) looking upstream.

**Photo 14** Adams Creek, KL_BO_AD03 (YPS-624) substrate aquatic.

**Photo 15** Adams Creek, KL_BO_AD03 (YPS-624) substrate dry.

**Photo 16** Adams Creek, KL_BO_AD04 (YPS-625) looking across.

**Photo 17** Adams Creek, KL_BO_AD04 looking (YPS-625) downstream.

**Photo 18** Adams Creek, KL_BO_AD04 (YPS-625) substrate aquatic.

**Photo 19** Adams Creek, KL_BO_AD04 (YPS-625) substrate dry.

**Photo 20** Adams Creek, KL_BO_AD05 (YPS-626) looking across.

**Photo 21** Adams Creek, KL_BO_AD05 (YPS-626) looking downstream.

**Photo 22** Adams Creek, KL_BO_AD05 (YPS-626) looking upstream.

**Photo 23** Adams Creek, KL_BO_AD05 (YPS-626) substrate aquatic.

**Photo 24** Adams Creek, KL_BO_AD05 (YPS-626) substrate dry.

**Photo 25** Hunker Creek, KL_HU02 looking across.

**Photo 26** Hunker Creek, KL_HU02 looking downstream.

**Photo 27** Hunker Creek, KL_HU02 looking upstream.

**Photo 28** Hunker Creek, KL_HU05 looking across.

**Photo 29** Hunker Creek, KL_HU05 looking downstream.

**Photo 30** Hunker Creek, KL_HU05 looking upstream.

**Photo 31** Hunker Creek, KL_HU06 looking across.

**Photo 32** Hunker Creek, KL_HU06 looking downstream.

**Photo 33** Hunker Creek, KL_HU06 looking upstream.

**Photo 34** Hunker Creek, KL_HU07 looking across.

**Photo 35** Hunker Creek, KL_HU07 looking downstream.

**Photo 36** Hunker Creek, KL_HU07 looking upstream.

**Photo 37** Hunker Creek, KL_HU08 looking across.

**Photo 38** Hunker Creek, KL_HU08 looking downstream.

**Photo 39** Hunker Creek, KL_HU08 looking upstream.

**Photo 40** Hunker Creek, KL_HU09 looking across.

**Photo 41** Hunker Creek, KL_HU09 looking downstream.

**Photo 42** Hunker Creek, KL_HU09 looking upstream.

**Photo 43** Hunker Creek, KL_HUGO01 looking across.

**Photo 44** Hunker Creek, KL_HUGO01 looking downstream.

**Photo 45** Hunker Creek, KL_HUGO01 looking upstream.

**Photo 46** Hunker Creek, YPS-051 looking across.

**Photo 47** Hunker Creek, YPS-051 looking downstream.

**Photo 48** Hunker Creek, YPS-051 looking upstream.

**Photo 49** Hunker Creek, YPS-051 substrate aquatic.

**Photo 50** Hunker Creek, YPS-051 substrate dry.

**Photo 51** Hunker Creek, YPS-078 looking across.

**Photo 52** Hunker Creek, YPS-078 looking downstream.

**Photo 53** Hunker Creek, YPS-078 looking upstream.

**Photo 54** Hunker Creek, YPS-078 substrate aquatic.

**Photo 55** Hunker Creek, YPS-078 substrate dry.

**Photo 56** Hunker Creek, YPS-079 looking across.

**Photo 57** Hunker Creek, YPS-079 looking downstream.

**Photo 58** Hunker Creek, YPS-079 looking upstream.

**Photo 59** Hunker Creek, YPS-079 substrate aquatic.

**Photo 60** Hunker Creek, YPS-079 substrate dry.

**Photo 61** Hunker Creek, YPS-080 looking across.

**Photo 62** Hunker Creek, YPS-080 looking downstream.

**Photo 63** Hunker Creek, YPS-080 looking upstream.

**Photo 64** Hunker Creek, YPS-080 substrate aquatic.

**Photo 65** Hunker Creek, YPS-080 substrate dry.

**Photo 66** Hunker Creek, YPS-544_KLHU01 looking across.

**Photo 67** Hunker Creek, YPS-544_KLHU01 looking downstream.

**Photo 68** Hunker Creek, YPS-544_KLHU01 looking upstream.


**Photo 69** Hunker Creek, YPS-544_KLHU01 substrate dry.

**Photo 70** Hunker Creek, YPS-611_KM20 looking across.

**Photo 71** Hunker Creek, YPS-611_KM20 looking downstream.

**Photo 72** Hunker Creek, YPS-611_KM20 looking upstream.

**Photo 73** Hunker Creek, YPS-611_KM20 substrate aquatic.

**Photo 74** Hunker Creek, YPS-611_KM20 substrate dry.

**Photo 75** Hunker Creek, YPS-612_KLHU03 looking across.

**Photo 76** Hunker Creek, YPS-612_KLHU03 looking downstream.

**Photo 77** Hunker Creek, YPS-612_KLHU03 looking upstream.

**Photo 78** Hunker Creek, YPS-612_KLHU03 substrate aquatic.

**Photo 79** Hunker Creek, YPS-612_KLHU03 substrate dry.

**Photo 80** Hunker Creek, YPS-613_KLHU04 looking across.

**Photo 81** Hunker Creek, YPS-613_KLHU04 looking downstream.

**Photo 82** Hunker Creek, YPS-613_KLHU04 looking upstream.

**Photo 83** Hunker Creek, YPS-613_KLHU04 substrate aquatic.

**Photo 84** Hunker Creek, YPS-613_KLHU04 substrate dry.

**Photo 85** Hunker Creek, YPS-614 looking across.

**Photo 86** Hunker Creek, YPS-614 looking downstream.

**Photo 87** Hunker Creek, YPS-614 looking upstream.

**Photo 88** Hunker Creek, YPS-614 substrate aquatic.

**Photo 89** Hunker Creek, YPS-614 substrate dry.

**Photo 90** Hunker Creek, YPS-621 looking across.

**Photo 91** Hunker Creek, YPS-621 looking downstream.

**Photo 92** Hunker Creek, YPS-621 looking upstream.

**Photo 93** Hunker Creek, YPS-621 substrate aquatic.

**Photo 94** Hunker Creek, YPS-621 substrate dry.

**Photo 95** OK Creek, YN_OK01 looking across.

**Photo 96** OK Creek, YN_OK01 looking downstream.

**Photo 97** OK Creek, YN_OK01 looking upstream.

**Photo 98** Swede Creek, YPS-386 looking across.

**Photo 99** Swede Creek, YPS-386 looking downstream.

**Photo 100** Swede Creek, YPS-386 looking upstream.

**Photo 101** Swede Creek, YPS-386 substrate aquatic.

**Photo 102** Swede Creek, YPS-386 substrate dry..

**September 2021**

**Photo 1** Adams Creek, KL_BO_AD01 (YPS-622) left bank.

**Photo 2** Adams Creek, KL_BO_AD01 (YPS-622) right bank.

**Photo 3** Adams Creek, KL_BO_AD01 (YPS-622) looking upstream, prior to placer activity.

**Photo 4** Adams Creek, KL_BO_AD01 (YPS-622) looking downstream, prior to placer activity.

**Photo 5** Adams Creek, KL_BO_AD01 (YPS-622) looking downstream, following placer activity.

**Photo 6** Adams Creek, KL_BO_AD01 (YPS-622) looking upstream, following placer activity.

**Photo 7** Adams Creek, KL_BO_AD02 (YPS-623) looking downstream, prior to placer activity.

**Photo 8** Adams Creek, KL_BO_AD02 (YPS-623) looking upstream, prior to placer activity.

**Photo 9** Adams Creek, KL_BO_AD02 (YPS-623) right bank.

**Photo 10** Adams Creek, KL_BO_AD02 (YPS-623) left bank.

**Photo 11** Adams Creek, KL_BO_AD02 (YPS-623) looking downstream, following placer activity.

**Photo 12** Adams Creek, KL_BO_AD02 (YPS-623) looking upstream, following placer activity.

**Photo 13** Adams Creek, KL_BO_AD03 (YPS-624) looking upstream.

**Photo 14** Adams Creek, KL_BO_AD03 (YPS-624) looking downstream.

**Photo 15** Adams Creek, KL_BO_AD03 (YPS-624) right bank.

**Photo 16** Adams Creek, KL_BO_AD03 (YPS-624) left bank.

**Photo 17** Adams Creek, KL_BO_AD04 (YPS-625) looking upstream.

**Photo 18** Adams Creek, KL_BO_AD04 (YPS-625) looking downstream.

**Photo 19** Adams Creek, KL_BO_AD04 (YPS-625) right bank.

**Photo 20** Adams Creek, KL_BO_AD04 (YPS-625) left bank.

**Photo 21** Adams Creek, KL_BO_AD05 (YPS-626) looking upstream.

**Photo 22** Adams Creek, KL_BO_AD05 (YPS-626) looking downstream.

**Photo 23** Adams Creek, KL_BO_AD05 (YPS-626) right bank.

**Photo 24** Adams Creek, KL_BO_AD05 (YPS-626) left bank.

**Photo 25** Adams Creek, KL_BO_AD06 looking upstream.

**Photo 26** Adams Creek, KL_BO_AD06 looking downstream.

**Photo 27** Adams Creek, KL_BO_AD06 right bank.

**Photo 28** Adams Creek, KL_BO_AD06 left bank.

**Photo 29** Stampede Gulch, looking upstream.

**Photo 30** Stampede Gulch, looking downstream

**Photo 31** Stampede Gulch, right bank.

**Photo 32** Stampede Gulch, left bank.

**Photo 33** Stampede Gulch confluence with Adams Creek.

**Photo 34** Clear Creek, looking upstream.

**Photo 35** Clear Creek, looking downstream.

**Photo 36** Clear Creek, right bank.

**Photo 37** Clear Creek, left bank.

**Photo 38** All Gold Creek, KL_AL01 looking upstream.

**Photo 39** All Gold Creek, KL_AL01 looking downstream.

**Photo 40** All Gold Creek, KL_AL01 left bank.

**Photo 41** All Gold Creek, KL_AL01 right bank.

**Photo 42** All Gold Creek, KL_AL02 looking upstream.

**Photo 43** All Gold Creek, KL_AL02 looking downstream.

**Photo 44** All Gold Creek, KL_AL01 left bank.

**Photo 45** All Gold Creek, KL_AL01 right bank.

**Photo 46** OK Creek, YN_OK1 looking upstream.

**Photo 47** OK Creek, YN_OK1 looking downstream.

**Photo 48** OK Creek, YN_OK1 right bank.

**Photo 49** OK Creek, YN_OK1 left bank.

**Photo 50** Swede Creek, YPS-386 looking upstream.

**Photo 51** Swede Creek, YPS-386 looking downstream.

**Photo 52** Swede Creek, YPS-386 left bank.

**Photo 53** Swede Creek, YPS-386 right bank.

**Photo 54** Hunker Creek, KL_HU_GO01 looking upstream.

**Photo 55** Hunker Creek, KL_HU_GO01 looking downstream.

**Photo 56** Hunker Creek, KL_HU_GO01 left bank.

**Photo 57** Hunker Creek, KL_HU_GO01 right bank.

**Photo 58** Hunker Creek, KL_HU01 looking upstream.

**Photo 59** Hunker Creek, KL_HU01 looking downstream

**Photo 60** Hunker Creek, KL_HU01 right bank.

**Photo 61** Hunker Creek, KL_HU01 left bank.

**Photo 62** Hunker Creek, KL_HU02 looking upstream.

**Photo 63** Hunker Creek, KL_HU02 looking downstream.

**Photo 64** Hunker Creek, KL_HU02 left bank.

**Photo 65** Hunker Creek, KL_HU02 right bank.

**Photo 66** Hunker Creek, KL_HU03 looking upstream.

**Photo 67** Hunker Creek, KL_HU03 looking downstream.

**Photo 68** Hunker Creek, KL_HU03 left bank.

**Photo 69** Hunker Creek, KL_HU03 right bank.

**Photo 70** Hunker Creek, KL_HU04 upstream.

**Photo 71** Hunker Creek, KL_HU04 downstream.

**Photo 72** Hunker Creek, KL_HU04 left bank.

**Photo 73** Hunker Creek, KL_HU04 right bank.

**Photo 74** Hunker Creek, KL_HU05 looking upstream.

**Photo 75** Hunker Creek, KL_HU05 looking downstream.

**Photo 76** Hunker Creek, KL_HU05 left bank.

**Photo 77** Hunker Creek, KL_HU05 right bank.

**Photo 78** Hunker Creek, KL_HU06 looking upstream.

**Photo 79** Hunker Creek, KL_HU06 looking downstream.

**Photo 80** Hunker Creek, KL_HU06 left bank.

**Photo 81** Hunker Creek, KL_HU06 right bank.

**Photo 82** Hunker Creek, KL_HU07 looking upstream.

**Photo 83** Hunker Creek, KL_HU07 looking downstream.

**Photo 84** Hunker Creek, KL_HU07 left bank.

**Photo 85** Hunker Creek, KL_HU07 right bank.

**Photo 86** Hunker Creek, KL_HU08 looking upstream.

**Photo 87** Hunker Creek, KL_HU08 looking downstream.

**Photo 88** Hunker Creek, KL_HU08 left bank.

**Photo 89** Hunker Creek, KL_HU08 right bank.

**Photo 90** Hunker Creek, KL_HU09 looking upstream.

**Photo 91** Hunker Creek, KL_HU09 looking downstream.

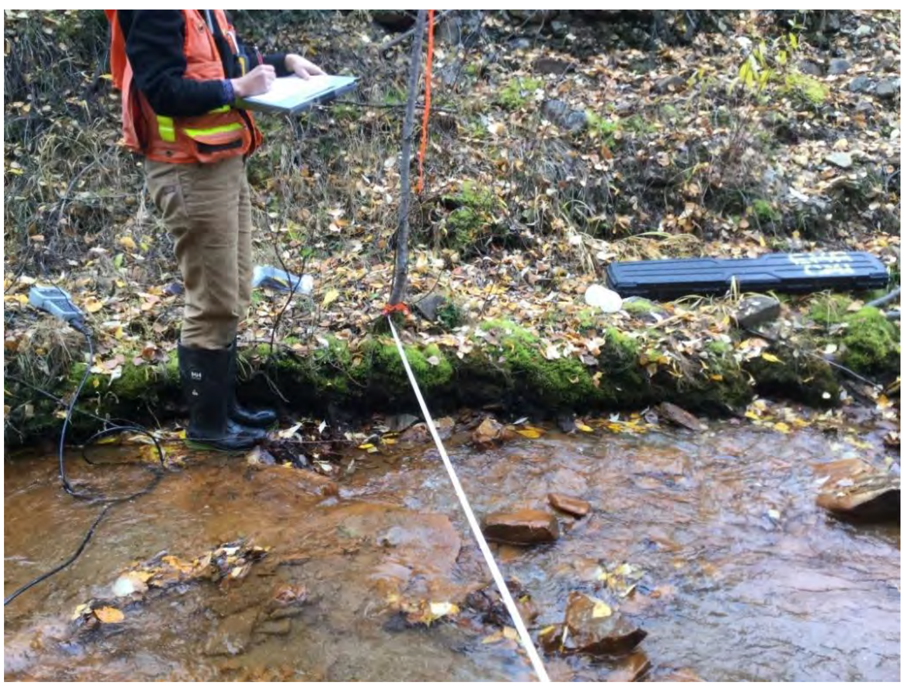


**Photo 92** Hunker Creek, KL_HU09 left bank.

**Photo 93** Hunker Creek, KL_HU09 right bank.

**Photo 94** Hunker Creek, KL_HU10 looking upstream.

**Photo 95** Hunker Creek, KL_HU10 looking downstream.

**Photo 96** Hunker Creek, KL_HU10 left bank.

**Photo 97** Hunker Creek, KL_HU10 right bank.

**Photo 98** Hunker Creek, KM10 looking upstream.

**Photo 99** Hunker Creek, KM10 looking downstream.

**Photo 100** Hunker Creek, KM10 left bank.

**Photo 101** Hunker Creek, KM10 right bank.

**Photo 102** Hunker Creek, KM10 Outflow right bank.

**Photo 102** Hunker Creek, KM10 Outflow downstream.

**Photo 103** Hunker Creek, KM20 looking upstream.

**Photo 104** Hunker Creek, KM20 looking downstream.

**Photo 105** Hunker Creek, KM20 left bank.

**Photo 106** Hunker Creek, KM20 right bank.

**Photo 107** Hunker Creek, YPS-051, looking upstream.

**Photo 108** Hunker Creek, YPS-051, looking downstream.

**Photo 109** Hunker Creek, YPS-051, left bank.

**Photo 110** Hunker Creek, YPS-051, right bank.

**Photo 111** Hunker Creek, YPS-078, looking upstream.

**Photo 112** Hunker Creek, YPS-078, looking downstream.

**Photo 113** Hunker Creek, YPS-078, left bank.

**Photo 114** Hunker Creek, YPS-078, right bank.

**Photo 115** Hunker Creek, YPS-079, looking upstream.

**Photo 116** Hunker Creek, YPS-079, looking downstream.

**Photo 117** Hunker Creek, YPS-079, left bank.

**Photo 118** Hunker Creek, YPS-079, right bank.

**Photo 119** Hunker Creek, YPS-614, looking upstream.

**Photo 120** Hunker Creek, YPS-614, looking downstream.

**Photo 121** Hunker Creek, YPS-614, left bank.

**Photo 122** Hunker Creek, YPS-614, right bank.

**Photo 102** Hunker Creek, YPS-621, looking upstream..

**Photo 122** Hunker Creek, YPS-621, looking downstream.

**Photo 102** Hunker Creek, YPS-621, left bank.

**Photo 122** Hunker Creek, YPS-621, right bank.

# APPENDIX D

## WQOM Data

# Appendix D.1 WQOM Data - 2020 Analytical Results

| Lab ID | Database ID | Column1 | Site Code | FIELD SAMPLE ID | Sample Date | Established or New Site | WQO (TSS in mg/L) | Above or Below WQO? | TSS (mg/L) | Settable Solids (mL/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| WQOM Stations | | | | | | | | | | |
| 20-0909 | WQG-20-0909 | | KL_AL01 | KL_AL01 | 25-Sep-20 | Established | 80 | Below | 6.8 | 0.0 |
| 20-0910 | WQG-20-0910 | | KL_AL02 | KL_AL02 | 25-Sep-20 | New | 200 | Below | 2.8 | 0.0 |
| 20-0383 | WQG-20-0383 | | KL_BO_AD01 (YPS-622) | YPS-A1 | 30-Jul-20 | New | 200 | Below | 13.6 | 0.0 |
| 20-0898 | WQG-20-0898 | | KL_BO_AD01 (YPS-622) | KL_BO_AD01 | 23-Sep-20 | Established | 200 | Below | 15.2 | 0.0 |
| 20-0905 | WQG-20-0905 | | KL_BO_AD01 (YPS-622) | KL_BO_AD01-2 | 23-Sep-20 | Established | 200 | Above | 725.0 | 0.3 |
| 20-0385 | WQG-20-0385 | | KL_BO_AD02 (YPS-623) | YPS-A2 | 30-Jul-20 | New | 200 | Below | 9.6 | 0.0 |
| 20-0899 | WQG-20-0899 | | KL_BO_AD02 (YPS-623) | KL_BO_AD02 | 23-Sep-20 | New | 200 | Below | 10.0 | 0.0 |
| 20-0906 | WQG-20-0906 | | KL_BO_AD02 (YPS-623) | KL_BO_AD02-2 | 23-Sep-20 | New | 200 | Above | 728.0 | 0.3 |
| 20-0386 | WQG-20-0386 | | KL_BO_AD03 (YPS-624) | YPS-A3 | 30-Jul-20 | New | 200 | Below | 2.8 | 0.0 |
| 20-0900 | WQG-20-0900 | | KL_BO_AD03 (YPS-624) | KL_BO_AD03 | 23-Sep-20 | New | 200 | Below | 2.4 | 0.0 |
| 20-0387 | WQG-20-0387 | | KL_BO_AD04 (YPS-625) | YPS-A4 | 30-Jul-20 | New | 200 | Below | 2.8 | 0.0 |
| 20-0901 | WQG-20-0901 | | KL_BO_AD04 (YPS-625) | KL_BO_AD04 | 23-Sep-20 | New | 200 | Below | 0.4 | 0.0 |
| 20-0388 | WQG-20-0388 | | KL_BO_AD05 (YPS-626) | YPS-A5 | 30-Jul-20 | New | 200 | Below | 2.0 | 0.0 |
| 20-0902 | WQG-20-0902 | | KL_BO_AD05 (YPS-626) | KL_BO_AD05 | 23-Sep-20 | New | 200 | Below | 4.4 | 0.0 |
| 20-0903 | WQG-20-0903 | | KL_BO_AD06 | KL_BO_AD06 | 23-Sep-20 | New | 200 | Below | 0.8 | 0.0 |
| 20-0897 | WQG-20-0897 | | ST_CL02 | Clear Creek | 22-Sep-20 | Established | 50 | Below | 30.4 | 0.0 |
| 20-0364 | WQG-20-0364 | | KL_HU_GO01 | KL_HU_GO01 | 29-Jul-20 | Established | 200 | Below | 5.2 | 0.0 |
| 20-0923 | WQG-20-0923 | | KL_HU_GO01 | KL_GO01 | 24-Sep-20 | Established | 200 | Below | 18.8 | 0.0 |
| 20-0371 | WQG-20-0371 | | KL_HU01 | KL_HU01 | 28-Jul-20 | Established | 80 | Above | 204.4 | 0.5 |
| 20-0914 | WQG-20-0914 | | KL_HU01 | KL_HU01 | 24-Sep-20 | Established | 80 | Above | 90.8 | 0.3 |
| 20-0370 | WQG-20-0370 | | KL_HU02 | KL_HU02 | 28-Jul-20 | Established | 80 | Above | 194.4 | 0.4 |
| 20-0915 | WQG-20-0915 | | KL_HU02 | KL_HU02 | 24-Sep-20 | Established | 80 | Above | 91.2 | 0.2 |
| 20-0369 | WQG-20-0369 | | KL_HU03 | KL_HU03 | 28-Jul-20 | Established | 200 | Below | 193.2 | 0.4 |
| 20-0916 | WQG-20-0916 | | KL_HU03 | KL_HU03 | 24-Sep-20 | Established | 200 | Below | 48.4 | 0.3 |
| 20-0368 | WQG-20-0368 | | KL_HU04 | KL_HU04 | 28-Jul-20 | Established | 200 | Above | 240.4 | 0.4 |
| 20-0917 | WQG-20-0917 | | KL_HU04 | KL_HU04 | 24-Sep-20 | Established | 200 | Below | 53.6 | 0.1 |
| 20-0366 | WQG-20-0366 | | KL_HU05 | KL_HU05 | 29-Jul-20 | Established | 200 | Below | 21.6 | 0.0 |
| 20-0922 | WQG-20-0922 | | KL_HU05 | KL_HU05 | 24-Sep-20 | Established | 200 | Below | 20.8 | 0.0 |
| 20-0365 | WQG-20-0365 | | KL_HU06 | KL_HU06 | 29-Jul-20 | Established | 200 | Below | 28.4 | 0.2 |
| 20-0924 | WQG-20-0924 | | KL_HU06 | KL_HU06 | 24-Sep-20 | Established | 200 | Below | 27.2 | 0.0 |
| 20-0361 | WQG-20-0361 | | KL_HU07 | KL_HU07 | 29-Jul-20 | Established | 200 | Below | 3.6 | 0.0 |
| 20-0928 | WQG-20-0928 | | KL_HU07 | KL_HU07 | 24-Sep-20 | Established | 200 | Below | 2.0 | 0.0 |
| 20-0360 | WQG-20-0360 | | KL_HU08 | KL_HU08 | 29-Jul-20 | Established | 200 | Below | 3.2 | 0.0 |
| 20-0929 | WQG-20-0929 | | KL_HU08 | KL_HU08 | 24-Sep-20 | Established | 200 | Below | 2.8 | 0.0 |
| 20-0362 | WQG-20-0362 | | KL_HU09 | KL_HU09 | 29-Jul-20 | Established | 200 | Below | 13.6 | 0.0 |
| 20-0930 | WQG-20-0930 | | KL_HU09 | KL_HU09 | 24-Sep-20 | Established | 200 | Below | 1.2 | 0.0 |
| 20-0931 | WQG-20-0931 | | KL_HU10 | KL_HU10 | 24-Sep-20 | New | 200 | Below | 0.8 | 0.0 |
| 20-0367 | WQG-20-0367 | | KL_HU_KM10 | Km10 | 28-Jul-20 | Established | 200 | Above | 349.6 | 0.8 |
| 20-0943 | WQG-20-0943 | | KL_HU_KM10 | KM10 | 24-Sep-20 | Established | 200 | Below | 24.4 | 0.0 |
| 20-0363 | WQG-20-0363 | | KL_HU_KM20 | Km20 | 29-Jul-20 | Established | 200 | Below | 16.8 | 0.1 |
| 20-0926 | WQG-20-0926 | | KL_HU_KM20 | KM20 | 24-Sep-20 | Established | 200 | Below | 35.6 | 0.1 |
| 20-0904 | WQG-20-0904 | | KL_BO_AD_SG01 | Stampede | 23-Sep-20 | New | 200 | Below | 0.8 | 0.0 |
| 20-0389 | WQG-20-0389 | | YN_SW01 (YPS-386) | YPS-386 | 30-Jul-20 | Established | 25 | Below | 2.0 | 0.0 |
| 20-0907 | WQG-20-0907 | | YN_SW01 (YPS-386) | YPS-386 | 23-Sep-20 | Established | 25 | Below | 1.6 | 0.0 |
| 20-0359 | WQG-20-0359 | | YN_OK01 | YN_OK01 | 31-Jul-20 | Established | 25 | Below | 6.0 | 0.0 |
| 20-0908 | WQG-20-0908 | | YN_OK01 | YN_OK01 | 23-Sep-20 | Established | 25 | Below | 5.6 | 0.0 |
| AHM Stations | | | | | | | | | | |
| 20-0375 | WQG-20-0375 | | YPS-051 | YPS-51 | 28-Jul-20 | Established | 200 | Above | 230.4 | 0.5 |
| 20-0919 | WQG-20-0919 | | YPS-051 | YPS-051 | 24-Sep-20 | Established | 200 | Below | 34.0 | 0.0 |
| 20-0377 | WQG-20-0377 | | YPS-078 | YPS-78 | 29-Jul-20 | Established | 200 | Below | 3.6 | 0.0 |
| 20-0927 | WQG-20-0927 | | YPS-078 | YPS-078 | 24-Sep-20 | Established | 200 | Below | 1.2 | 0.0 |
| 20-0378 | WQG-20-0378 | | YPS-079 | YPS-79 | 29-Jul-20 | Established | 200 | Below | 37.6 | 0.0 |
| 20-0925 | WQG-20-0925 | | YPS-079 | YPS-079 | 24-Sep-20 | Established | 200 | Below | 26.8 | 0.0 |
| 20-0379 | WQG-20-0379 | | YPS-080 | YPS-80 | 29-Jul-20 | Established | 200 | Below | 36.0 | 0.0 |
| 20-0372 | WQG-20-0372 | | YPS-544 | YPS-544 | 28-Jul-20 | Established | 80 | Above | 229.6 | 0.6 |
| 20-0380 | WQG-20-0380 | | YPS-611 | YPS-611 | 29-Jul-20 | Established | 200 | Below | 44.4 | 0.1 |
| 20-0373 | WQG-20-0373 | | YPS-612 | YPS-612 | 28-Jul-20 | Established | 200 | Below | 92.8 | 0.3 |
| 20-0374 | WQG-20-0374 | | YPS-613 | YPS-613 | 28-Jul-20 | Established | 200 | Below | 92.4 | 0.3 |
| 20-0376 | WQG-20-0376 | | YPS-614 | YPS-614 | 28-Jul-20 | Established | 50 | Above | 313.6 | 0.5 |
| 20-0921 | WQG-20-0921 | | YPS-614 | YPS-614 | 24-Sep-20 | Established | 50 | Below | 27.6 | 0.0 |
| 20-0381 | WQG-20-0381 | | YPS-621 | YPS-621 | 29-Jul-20 | Established | 200 | Below | 85.2 | 0.2 |
| 20-0918 | WQG-20-0918 | | YPS-621 | YPS-621 | 24-Sep-20 | Established | 200 | Below | 41.6 | 0.1 |

# Appendix D.1 WQOM Data - 2020 Analytical Results

| Lab ID | Database ID | Conductivity (Lab) (uS/cm) | pH (Lab) | Turbidity (Lab) (NTU) | Watershed Name | Watershed Category | Watercourse | Site Description | Habitat Suitability Classification |
|---|---|---|---|---|---|---|---|---|---|
| WQOM Stations | | | | | | | | | |
| 20-0909 | WQG-20-0909 | 346 | 8.0 | 4.0 | Klondike River | A | All Gold Creek | All Gold Creek below all mining | Moderate-Low |
| 20-0910 | WQG-20-0910 | 295 | 8.0 | 3.0 | Klondike River | A | All Gold Creek | All Gold Creek above most mining | Low |
| 20-0383 | WQG-20-0383 | 475 | 7.7 | 6.0 | Klondike River | A | Adams Creek | Adams Creek mouth | Low |
| 20-0898 | WQG-20-0898 | 619 | 7.8 | 9.0 | Klondike River | A | Adams Creek | Adams Creek mouth | Low |
| 20-0905 | WQG-20-0905 | 674 | 7.9 | 246.0 | Klondike River | A | Adams Creek | Adams Creek mouth | Low |
| 20-0385 | WQG-20-0385 | 477 | 7.7 | 4.0 | Klondike River | A | Adams Creek | Adams Creek downstream placer settling pond (PM18-006) | Low |
| 20-0899 | WQG-20-0899 | 619 | 7.8 | 9.0 | Klondike River | A | Adams Creek | Adams Creek downstream placer settling pond (PM18-006) | Low |
| 20-0906 | WQG-20-0906 | 666 | 7.8 | 81.0 | Klondike River | A | Adams Creek | Adams Creek downstream placer settling pond (PM18-006) | Low |
| 20-0386 | WQG-20-0386 | 419 | 7.7 | 0.0 | Klondike River | A | Adams Creek | Adams Creek upstream placer operation (PM10-051) | Low |
| 20-0900 | WQG-20-0900 | 537 | 7.9 | 1.0 | Klondike River | A | Adams Creek | Adams Creek upstream placer operation (PM10-051) | Low |
| 20-0387 | WQG-20-0387 | 384 | 7.8 | 0.0 | Klondike River | A | Adams Creek | Adams Creek downstream Stampede Gulch | Low |
| 20-0901 | WQG-20-0901 | 501 | 7.9 | 0.0 | Klondike River | A | Adams Creek | Adams Creek downstream Stampede Gulch | Low |
| 20-0388 | WQG-20-0388 | 214 | 7.8 | 0.0 | Klondike River | A | Adams Creek | Adams Creek upstream Hawley Gulch | Low |
| 20-0902 | WQG-20-0902 | 251 | 7.7 | 0.0 | Klondike River | A | Adams Creek | Adams Creek upstream Hawley Gulch | Low |
| 20-0903 | WQG-20-0903 | 258 | 7.8 | 0.0 | Klondike River | A | Adams Creek | Adams Creek above all mining | Low |
| 20-0897 | WQG-20-0897 | 191 | 7.9 | 36.0 | Stewart River | A | Clear Creek | Clear Creek upstream highway bridge | Moderate-Moderate |
| 20-0364 | WQG-20-0364 | 470 | 7.6 | 6.0 | Klondike River | A | Goldbottom Creek | Goldbottom Creek mouth | Low |
| 20-0923 | WQG-20-0923 | 545 | 8.0 | 20.0 | Klondike River | A | Goldbottom Creek | Goldbottom Creek mouth | Low |
| 20-0371 | WQG-20-0371 | 824 | 7.5 | 261.0 | Klondike River | A | Hunker Creek | Hunker Creek below all mining | Moderate-Low |
| 20-0914 | WQG-20-0914 | 796 | 8.3 | 133.0 | Klondike River | A | Hunker Creek | Hunker Creek below all mining | Moderate-Low |
| 20-0370 | WQG-20-0370 | 820 | 7.5 | 185.0 | Klondike River | A | Hunker Creek | Hunker Creek downstream of Henrry Gulch | Moderate-Low |
| 20-0915 | WQG-20-0915 | 802 | 8.1 | 126.0 | Klondike River | A | Hunker Creek | Hunker Creek downstream of Henrry Gulch | Moderate-Low |
| 20-0369 | WQG-20-0369 | 776 | 7.5 | 60.0 | Klondike River | A | Hunker Creek | Hunker Creek downstream of Last Chance Creek | Low |
| 20-0916 | WQG-20-0916 | 785 | 7.8 | 63.0 | Klondike River | A | Hunker Creek | Hunker Creek downstream of Last Chance Creek | Low |
| 20-0368 | WQG-20-0368 | 713 | 7.5 | 54.0 | Klondike River | A | Hunker Creek | Hunker Creek upstream of Last Chance Creek | Low |
| 20-0917 | WQG-20-0917 | 768 | 7.8 | 86.0 | Klondike River | A | Hunker Creek | Hunker Creek upstream of Last Chance Creek | Low |
| 20-0366 | WQG-20-0366 | 492 | 7.6 | 21.0 | Klondike River | A | Hunker Creek | Hunker Creek downstream of Goldbottom Creek | Low |
| 20-0922 | WQG-20-0922 | 554 | 8.0 | 20.0 | Klondike River | A | Hunker Creek | Hunker Creek downstream of Goldbottom Creek | Low |
| 20-0365 | WQG-20-0365 | 539 | 7.6 | 45.0 | Klondike River | A | Hunker Creek | Hunker Creek upstream of Goldbottom Creek | Low |
| 20-0924 | WQG-20-0924 | 562 | 8.0 | 19.0 | Klondike River | A | Hunker Creek | Hunker Creek upstream of Goldbottom Creek | Low |
| 20-0361 | WQG-20-0361 | 387 | 7.7 | 4.0 | Klondike River | A | Hunker Creek | Hunker Creek above all mining left fork | Low |
| 20-0928 | WQG-20-0928 | 393 | 7.6 | 4.0 | Klondike River | A | Hunker Creek | Hunker Creek above all mining left fork | Low |
| 20-0360 | WQG-20-0360 | 472 | 7.6 | 2.0 | Klondike River | A | Hunker Creek | Hunker Creek right fork | Low |
| 20-0929 | WQG-20-0929 | 504 | 7.9 | 0.0 | Klondike River | A | Hunker Creek | Hunker Creek right fork | Low |
| 20-0362 | WQG-20-0362 | 470 | 7.6 | 29.0 | Klondike River | A | Hunker Creek | Hunker Creek above all mining and downstream of right and left fork | Low |
| 20-0930 | WQG-20-0930 | 494 | 7.8 | 3.0 | Klondike River | A | Hunker Creek | Hunker Creek above all mining and downstream of right and left fork | Low |
| 20-0931 | WQG-20-0931 | 318 | 7.8 | 1.0 | Klondike River | A | Hunker Creek | Hunker Creek above all mining (further upstream right fork) | Low |
| 20-0367 | WQG-20-0367 | 548 | 7.6 | 102.0 | Klondike River | A | Hunker Creek | near AHM site YPS-051 | Low |
| 20-0943 | WQG-20-0943 | 615 | 7.7 | 35.0 | Klondike River | A | Hunker Creek | near AHM site YPS-051 | Low |
| 20-0363 | WQG-20-0363 | 547 | 7.6 | 31.0 | Klondike River | A | Hunker Creek | near AHM site YPS-611 | Low |
| 20-0926 | WQG-20-0926 | 555 | 7.9 | 17.0 | Klondike River | A | Hunker Creek | near AHM site YPS-611 | Low |
| 20-0904 | WQG-20-0904 | 669 | 7.8 | 0.0 | Klondike River | A | Stampede Gulch | Stampede Gulch near confluence with Adams Creek | Low |
| 20-0389 | WQG-20-0389 | 209 | 7.8 | 0.0 | Yukon River North | B | Swede Creek | Swede Creek mouth | Area of special consideration |
| 20-0907 | WQG-20-0907 | 263 | 8.0 | 0.0 | Yukon River North | B | Swede Creek | Swede Creek mouth | Area of special consideration |
| 20-0359 | WQG-20-0359 | 699 | 7.5 | 6.0 | Yukon River North | B | OK Creek | OK Creek mouth | Moderate-High |
| 20-0908 | WQG-20-0908 | 766 | 7.9 | 0.0 | Yukon River North | B | OK Creek | OK Creek mouth | Moderate-High |
| AHM Stations | | | | | | | | | |
| 20-0375 | WQG-20-0375 | 603 | 7.6 | 82.0 | Klondike River | A | Hunker Creek | Hunker Creek downstream of Hester Creek inflow | Low |
| 20-0919 | WQG-20-0919 | 640 | 7.8 | 50.0 | Klondike River | A | Hunker Creek | Hunker Creek downstream of Hester Creek inflow | Low |
| 20-0377 | WQG-20-0377 | 480 | 7.6 | 15.0 | Klondike River | A | Hunker Creek | Hunker Creek upstream of Ontario Creek | Low |
| 20-0927 | WQG-20-0927 | 502 | 7.9 | 2.0 | Klondike River | A | Hunker Creek | Hunker Creek upstream of Ontario Creek | Low |
| 20-0378 | WQG-20-0378 | 536 | 7.6 | 38.0 | Klondike River | A | Hunker Creek | Hunker Creek upstream of Gold Bottom Creek | Low |
| 20-0925 | WQG-20-0925 | 567 | 7.9 | 27.0 | Klondike River | A | Hunker Creek | Hunker Creek upstream of Gold Bottom Creek | Low |
| 20-0379 | WQG-20-0379 | 489 | 7.7 | 31.0 | Klondike River | A | Hunker Creek | Hunker Creek downstream of Gold Bottom Creek | Low |
| 20-0372 | WQG-20-0372 | 822 | 7.5 | 313.0 | Klondike River | A | Hunker Creek | Hunker Creek | Moderate-Low |
| 20-0380 | WQG-20-0380 | 539 | 7.7 | 28.0 | Klondike River | A | Hunker Creek | Hunker Creek | Low |
| 20-0373 | WQG-20-0373 | 773 | 7.5 | 80.0 | Klondike River | A | Hunker Creek | Hunker Creek | Low |
| 20-0374 | WQG-20-0374 | 725 | 7.5 | 51.0 | Klondike River | A | Hunker Creek | Hunker Creek | Low |
| 20-0376 | WQG-20-0376 | 516 | 7.6 | 129.0 | Klondike River | A | Hunker Creek | Hunker Creek | Moderate-Moderate |
| 20-0921 | WQG-20-0921 | 576 | 8.0 | 25.0 | Klondike River | A | Hunker Creek | Hunker Creek | Moderate-Moderate |
| 20-0381 | WQG-20-0381 | 701 | 7.6 | 77.0 | Klondike River | A | Hunker Creek | Hunker Creek | Low |
| 20-0918 | WQG-20-0918 | 758 | 7.7 | 68.0 | Klondike River | A | Hunker Creek | Hunker Creek | Low |

| LAB_NUMBER | SAMPLE_DATE | SITE_CODE | Water Temperature (°C) | Instantaneous DO (mg/L) | Instantaneous pH | ıntaneous Specific Conductivity (uS |
|---|---|---|---|---|---|---|
| 20-0909 | 2020-09-25 | KL_AL01 | 2.4 | 14.3 | 9.5 | 297.0 |
| 20-0910 | 2020-09-25 | KL_AL02 | 1.8 | 18.1 | 7.3 | 256.0 |
| 20-0383 | 2020-07-30 | KL_BO_AD01 | 3.5 | 10.8 | 7.8 | 436.0 |
| 20-0898 | 2020-09-23 | KL_BO_AD01 | 2.2 | 14.2 | 7.8 | 533.0 |
| 20-0905 | 2020-09-23 | KL_BO_AD01 | 5.2 | 13.9 | 7.8 | 572.0 |
| 20-0385 | 2020-07-30 | KL_BO_AD02 | 4.2 | 10.5 | 7.8 | 441.2 |
| 20-0899 | 2020-09-23 | KL_BO_AD02 | 2.4 | 15.3 | 7.7 | 534.0 |
| 20-0906 | 2020-09-23 | KL_BO_AD02 | 5.0 | 13.2 | 7.7 | 569.0 |
| 20-0386 | 2020-07-30 | KL_BO_AD03 | 4.1 | 10.5 | 7.5 | 387.5 |
| 20-0900 | 2020-09-23 | KL_BO_AD03 | 1.9 | 14.3 | 7.7 | 464.0 |
| 20-0387 | 2020-07-30 | KL_BO_AD04 | 5.2 | 10.3 | 7.7 | 359.1 |
| 20-0901 | 2020-09-23 | KL_BO_AD04 | 1.9 | 15.8 | 7.7 | 431.0 |
| 20-0388 | 2020-07-30 | KL_BO_AD05 | 4.3 | 10.3 | 7.7 | 202.9 |
| 20-0902 | 2020-09-23 | KL_BO_AD05 | 1.7 | 14.5 | 7.5 | 218.0 |
| 20-0903 | 2020-09-23 | KL_BO_AD06 | 1.5 | 12.7 | 7.2 | 213.0 |
| 20-0897 | 2020-09-22 | ST_CL02 | 4.4 | 13.0 | 7.0 | 162.0 |
| 20-0364 | 2020-07-29 | KL_HU_GO01 | 6.5 | 10.1 | 8.1 | 435.9 |
| 20-0923 | 2020-09-24 | KL_HU_GO01 | 5.5 | 16.4 | 8.2 | 465.0 |
| 20-0371 | 2020-07-28 | KL_HU01 | 10.6 | 8.5 | 7.9 | 766.0 |
| 20-0914 | 2020-09-24 | KL_HU01 | 5.4 | 14.4 | 8.3 | 687.0 |
| 20-0370 | 2020-07-28 | KL_HU02 | 10.6 | 8.5 | 8.1 | 759.0 |
| 20-0915 | 2020-09-24 | KL_HU02 | 5.3 | 13.3 | 8.3 | 688.0 |
| 20-0369 | 2020-07-28 | KL_HU03 | 9.6 | 8.7 | 7.8 | 712.0 |
| 20-0916 | 2020-09-24 | KL_HU03 | 4.9 | 15.1 | 7.9 | 675.0 |
| 20-0368 | 2020-07-28 | KL_HU04 | 8.7 | 9.4 | 7.7 | 663.0 |
| 20-0917 | 2020-09-24 | KL_HU04 | 4.8 | 14.3 | 7.9 | 657.0 |
| 20-0366 | 2020-07-29 | KL_HU05 | 7.1 | 9.8 | 8.1 | 454.6 |
| 20-0922 | 2020-09-24 | KL_HU05 | 5.6 | 14.0 | 8.1 | 475.0 |
| 20-0365 | 2020-07-29 | KL_HU06 | 8.8 | 9.0 | 8.1 | 501.4 |
| 20-0924 | 2020-09-24 | KL_HU06 | 6.1 | 13.9 | 8.2 | 481.0 |
| 20-0361 | 2020-07-29 | KL_HU07 | 5.0 | 9.5 | 7.2 | 363.4 |
| 20-0928 | 2020-09-24 | KL_HU07 | 2.5 | 13.7 | 7.4 | 336.0 |
| 20-0360 | 2020-07-29 | KL_HU08 | 4.3 | 10.4 | 7.8 | 435.3 |
| 20-0929 | 2020-09-24 | KL_HU08 | 2.3 | 17.6 | 8.3 | 416.0 |
| 20-0362 | 2020-07-29 | KL_HU09 | 7.1 | 9.5 | 7.3 | 438.3 |
| 20-0930 | 2020-09-24 | KL_HU09 | 4.2 | 16.8 | 7.8 | 423.0 |
| 20-0931 | 2020-09-24 | KL_HU10 | 2.3 | 13.1 | 7.6 | 271.0 |
| 20-0367 | 2020-07-28 | KL_HU_KM10 | 8.4 | 9.0 | 7.4 | 547.3 |
| 20-0943 | 2020-09-24 | KL_HU_KM10 | 4.8 | 13.5 | 8.0 | 527.0 |
| 20-0363 | 2020-07-29 | KL_HU_KM20 | 9.6 | 9.0 | 7.6 | 503.3 |
| 20-0926 | 2020-09-24 | KL_HU_KM20 | 5.6 | 13.6 | 8.0 | 477.0 |
| 20-0904 | 2020-09-23 | KL_BO_AD_SG01 | 3.5 | 14.9 | 7.8 | 570.0 |
| 20-0389 | 2020-07-30 | YN_SW01 | 8.9 | 9.8 | 7.4 | 200.7 |
| 20-0907 | 2020-09-23 | YN_SW01 | 4.2 | 15.8 | 7.9 | 224.0 |
| 20-0359 | 2020-07-31 | YN_OK01 | 6.8 | 9.4 | 7.8 | 648.6 |
| 20-0908 | 2020-09-23 | YN_OK01 | 2.9 | 14.1 | 8.0 | 662.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0025 | 11-Jun-19 | KL_HU_GO01 | 17.6 | 200.0 | Below | 0.0 | 592.0 | 7.4 | 8.0 |
| 19-0034 | 12-Jun-19 | KL_HU_GO01 | 76.8 | 200.0 | Below | 0.0 | 608.0 | 7.7 | 19.0 |
| 19-0098 | 12-Jun-19 | KL_HU_GO01 | 37.2 | 200.0 | Below | 0.0 | 606.0 | 8.3 | 6.0 |
| 19-0099 | 13-Jun-19 | KL_HU_GO01 | 34.4 | 200.0 | Below | 0.0 | 615.0 | 8.2 | 6.0 |
| 19-0100 | 14-Jun-19 | KL_HU_GO01 | 40.0 | 200.0 | Below | 0.0 | 622.0 | 8.2 | 8.0 |
| 19-0101 | 15-Jun-19 | KL_HU_GO01 | 38.0 | 200.0 | Below | 0.0 | 624.0 | 8.2 | 19.0 |
| 19-0102 | 16-Jun-19 | KL_HU_GO01 | 9.2 | 200.0 | Below | 0.0 | 647.0 | 8.2 | 7.0 |
| 19-0103 | 17-Jun-19 | KL_HU_GO01 | 150.8 | 200.0 | Below | 0.4 | 467.0 | 8.3 | 106.0 |
| 19-0104 | 18-Jun-19 | KL_HU_GO01 | 50.8 | 200.0 | Below | 0.1 | 450.0 | 8.3 | 37.0 |
| 19-0105 | 19-Jun-19 | KL_HU_GO01 | 196.0 | 200.0 | Below | 0.5 | 400.0 | 8.3 | 186.0 |
| 19-0106 | 20-Jun-19 | KL_HU_GO01 | 34.0 | 200.0 | Below | 0.1 | 502.0 | 8.2 | 38.0 |
| 19-0107 | 21-Jun-19 | KL_HU_GO01 | 60.4 | 200.0 | Below | 0.1 | 548.0 | 8.2 | 97.0 |
| 19-0108 | 22-Jun-19 | KL_HU_GO01 | 34.4 | 200.0 | Below | 0.0 | 598.0 | 8.2 | 51.0 |
| 19-0109 | 23-Jun-19 | KL_HU_GO01 | 8.4 | 200.0 | Below | 0.0 | 665.0 | 8.1 | 6.0 |
| 19-0110 | 24-Jun-19 | KL_HU_GO01 | 12.8 | 200.0 | Below | 0.0 | 663.0 | 8.1 | 7.0 |
| 19-0111 | 25-Jun-19 | KL_HU_GO01 | 21.6 | 200.0 | Below | 0.1 | 657.0 | 8.1 | 16.0 |
| 19-0112 | 26-Jun-19 | KL_HU_GO01 | 12.8 | 200.0 | Below | 0.1 | 671.0 | 8.1 | 17.0 |
| 19-0113 | 27-Jun-19 | KL_HU_GO01 | 6.0 | 200.0 | Below | 0.0 | 661.0 | 8.1 | 12.0 |
| 19-0114 | 28-Jun-19 | KL_HU_GO01 | 9.6 | 200.0 | Below | 0.0 | 664.0 | 8.1 | 10.0 |
| 19-0115 | 29-Jun-19 | KL_HU_GO01 | 4.4 | 200.0 | Below | 0.0 | 659.0 | 8.1 | 8.0 |
| 19-0116 | 30-Jun-19 | KL_HU_GO01 | 4.4 | 200.0 | Below | 0.0 | 691.0 | 8.1 | 5.0 |
| 19-0117 | 1-Jul-19 | KL_HU_GO01 | 10.4 | 200.0 | Below | 0.1 | 690.0 | 8.1 | 15.0 |
| 19-0118 | 2-Jul-19 | KL_HU_GO01 | 8.4 | 200.0 | Below | 0.0 | 691.0 | 8.1 | 9.0 |
| 19-0261 | 3-Jul-19 | KL_HU_GO01 | 4.0 | 200.0 | Below | 0.0 | 694.0 | 7.9 | 18.0 |
| 19-0119 | 3-Jul-19 | KL_HU_GO01 | 6.0 | 200.0 | Below | | | | |
| 19-0767 | 4-Jul-19 | KL_HU_GO01 | 6.0 | 200.0 | Below | 0.0 | 708.0 | 7.9 | 7.0 |
| 19-0768 | 5-Jul-19 | KL_HU_GO01 | 12.4 | 200.0 | Below | 0.0 | 699.0 | 7.9 | 17.0 |
| 19-0769 | 6-Jul-19 | KL_HU_GO01 | 6.4 | 200.0 | Below | 0.0 | 682.0 | 7.9 | 4.0 |
| 19-0770 | 7-Jul-19 | KL_HU_GO01 | 10.0 | 200.0 | Below | 0.0 | 689.0 | 7.9 | 8.0 |
| 19-0771 | 8-Jul-19 | KL_HU_GO01 | 4.0 | 200.0 | Below | 0.0 | 699.0 | 7.9 | 6.0 |
| 19-0772 | 9-Jul-19 | KL_HU_GO01 | 6.0 | 200.0 | Below | 0.0 | 699.0 | 7.9 | 9.0 |
| 19-0773 | 10-Jul-19 | KL_HU_GO01 | 4.8 | 200.0 | Below | 0.0 | 712.0 | 8.0 | 7.0 |
| 19-0774 | 11-Jul-19 | KL_HU_GO01 | 4.4 | 200.0 | Below | 0.0 | 699.0 | 8.0 | 3.0 |
| 19-0775 | 12-Jul-19 | KL_HU_GO01 | 74.0 | 200.0 | Below | 0.3 | 660.0 | 8.0 | 82.0 |
| 19-0776 | 13-Jul-19 | KL_HU_GO01 | 14.0 | 200.0 | Below | 0.0 | 652.0 | 8.0 | 10.0 |
| 19-0777 | 14-Jul-19 | KL_HU_GO01 | 30.4 | 200.0 | Below | 0.0 | 647.0 | 8.0 | 29.0 |
| 19-0778 | 15-Jul-19 | KL_HU_GO01 | 13.2 | 200.0 | Below | 0.0 | 676.0 | 8.0 | 10.0 |
| 19-0779 | 16-Jul-19 | KL_HU_GO01 | 327.6 | 200.0 | Above | 0.7 | 414.0 | 8.0 | 118.0 |
| 19-0780 | 17-Jul-19 | KL_HU_GO01 | 163.2 | 200.0 | Below | 0.4 | 328.0 | 8.1 | 69.0 |
| 19-0781 | 18-Jul-19 | KL_HU_GO01 | 32.4 | 200.0 | Below | 0.0 | 470.0 | 8.1 | 18.0 |
| 19-0782 | 19-Jul-19 | KL_HU_GO01 | 50.8 | 200.0 | Below | 0.1 | 530.0 | 8.1 | 56.0 |
| 19-0783 | 20-Jul-19 | KL_HU_GO01 | 54.0 | 200.0 | Below | 0.0 | 570.0 | 8.0 | 97.0 |
| 19-0784 | 21-Jul-19 | KL_HU_GO01 | 11.6 | 200.0 | Below | 0.0 | 607.0 | 8.0 | 8.0 |

## Appendix D.3 WQOM Data - 2019 Analytical Results

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0785 | 22-Jul-19 | KL_HU_GO01 | 7.2 | 200.0 | Below | 0.0 | 657.0 | 8.0 | 4.0 |
| 19-0786 | 23-Jul-19 | KL_HU_GO01 | 9.6 | 200.0 | Below | 0.0 | 667.0 | 8.0 | 8.0 |
| 19-0716 | 24-Jul-19 | KL_HU_GO01 | 6.0 | 200.0 | Below | 0.0 | 653.0 | 7.8 | 13.0 |
| 19-0787 | 24-Jul-19 | KL_HU_GO01 | 22.8 | 200.0 | Below | | 662.0 | 8.0 | 27.0 |
| 19-0990 | 25-Jul-19 | KL_HU_GO01 | 25.6 | 200.0 | Below | 0.0 | 667.0 | 7.2 | 19.0 |
| 19-0991 | 26-Jul-19 | KL_HU_GO01 | 3.2 | 200.0 | Below | 0.0 | 635.0 | 7.1 | 6.0 |
| 19-0992 | 27-Jul-19 | KL_HU_GO01 | 11.6 | 200.0 | Below | 0.0 | 645.0 | 7.0 | 13.0 |
| 19-0993 | 28-Jul-19 | KL_HU_GO01 | 8.0 | 200.0 | Below | 0.0 | 634.0 | 7.1 | 11.0 |
| 19-0994 | 29-Jul-19 | KL_HU_GO01 | 9.6 | 200.0 | Below | 0.0 | 629.0 | 7.1 | 15.0 |
| 19-0995 | 30-Jul-19 | KL_HU_GO01 | 18.8 | 200.0 | Below | 0.0 | 637.0 | 7.1 | 29.0 |
| 19-0996 | 31-Jul-19 | KL_HU_GO01 | 24.4 | 200.0 | Below | 0.0 | 655.0 | 7.2 | 15.0 |
| 19-0997 | 1-Aug-19 | KL_HU_GO01 | 5.6 | 200.0 | Below | 0.0 | 654.0 | 7.3 | 6.0 |
| 19-0998 | 2-Aug-19 | KL_HU_GO01 | 55.6 | 200.0 | Below | | 646.0 | 7.3 | 78.0 |
| 19-0999 | 3-Aug-19 | KL_HU_GO01 | 4.4 | 200.0 | Below | 0.0 | 670.0 | 7.2 | 5.0 |
| 19-1000 | 4-Aug-19 | KL_HU_GO01 | 7.2 | 200.0 | Below | 0.0 | 671.0 | 7.3 | 5.0 |
| 19-1001 | 5-Aug-19 | KL_HU_GO01 | 6.4 | 200.0 | Below | 0.0 | 683.0 | 7.3 | 6.0 |
| 19-1002 | 6-Aug-19 | KL_HU_GO01 | 8.0 | 200.0 | Below | 0.0 | 661.0 | 7.3 | 10.0 |
| 19-1003 | 7-Aug-19 | KL_HU_GO01 | 19.6 | 200.0 | Below | 0.0 | 681.0 | 7.3 | 24.0 |
| 19-1004 | 8-Aug-19 | KL_HU_GO01 | 7.2 | 200.0 | Below | 0.0 | 696.0 | 7.3 | 6.0 |
| 19-1005 | 9-Aug-19 | KL_HU_GO01 | 6.8 | 200.0 | Below | 0.0 | 665.0 | 7.3 | 9.0 |
| 19-1006 | 10-Aug-19 | KL_HU_GO01 | 4.0 | 200.0 | Below | 0.0 | 679.0 | 7.3 | 5.0 |
| 19-1007 | 11-Aug-19 | KL_HU_GO01 | 6.8 | 200.0 | Below | 0.0 | 689.0 | 7.4 | 6.0 |
| 19-1070 | 12-Aug-19 | KL_HU_GO01 | 22.0 | 200.0 | Below | 0.0 | 674.0 | 7.7 | 44.0 |
| 19-1008 | 12-Aug-19 | KL_HU_GO01 | 12.4 | 200.0 | Below | | 671.0 | 7.4 | 11.0 |
| 19-1488 | 13-Aug-19 | KL_HU_GO01 | 5.6 | 200.0 | Below | 0.0 | 681.0 | 7.6 | 681.0 |
| 19-1489 | 14-Aug-19 | KL_HU_GO01 | 6.8 | 200.0 | Below | 0.0 | 677.0 | 7.6 | 677.0 |
| 19-1490 | 15-Aug-19 | KL_HU_GO01 | 19.2 | 200.0 | Below | 0.0 | 678.0 | 7.6 | 678.0 |
| 19-1491 | 16-Aug-19 | KL_HU_GO01 | 8.8 | 200.0 | Below | 0.0 | 662.0 | 7.6 | 662.0 |
| 19-1492 | 17-Aug-19 | KL_HU_GO01 | 52.4 | 200.0 | Below | 0.0 | 632.0 | 7.5 | 632.0 |
| 19-1493 | 18-Aug-19 | KL_HU_GO01 | 8.4 | 200.0 | Below | 0.0 | 622.0 | 7.5 | 622.0 |
| 19-1494 | 19-Aug-19 | KL_HU_GO01 | 6.8 | 200.0 | Below | 0.0 | 615.0 | 7.6 | 615.0 |
| 19-1495 | 20-Aug-19 | KL_HU_GO01 | 41.6 | 200.0 | Below | 0.0 | 627.0 | 7.6 | 627.0 |
| 19-1496 | 21-Aug-19 | KL_HU_GO01 | 3.6 | 200.0 | Below | 0.0 | 646.0 | 7.6 | 646.0 |
| 19-1497 | 22-Aug-19 | KL_HU_GO01 | 8.4 | 200.0 | Below | | 671.0 | 7.6 | 671.0 |
| 19-1498 | 23-Aug-19 | KL_HU_GO01 | 24.8 | 200.0 | Below | 0.0 | 666.0 | 7.6 | 666.0 |
| 19-1499 | 24-Aug-19 | KL_HU_GO01 | 5.6 | 200.0 | Below | 0.0 | 681.0 | 7.6 | 681.0 |
| 19-1500 | 25-Aug-19 | KL_HU_GO01 | 7.6 | 200.0 | Below | 0.0 | 684.0 | 7.6 | 14.0 |
| 19-1501 | 26-Aug-19 | KL_HU_GO01 | 17.6 | 200.0 | Below | 0.0 | 675.0 | 7.6 | 29.0 |
| 19-1502 | 27-Aug-19 | KL_HU_GO01 | 2.4 | 200.0 | Below | 0.0 | 679.0 | 7.6 | 10.0 |
| 19-1503 | 28-Aug-19 | KL_HU_GO01 | 36.4 | 200.0 | Below | 0.0 | 672.0 | 7.6 | 52.0 |
| 19-1504 | 29-Aug-19 | KL_HU_GO01 | 2.4 | 200.0 | Below | 0.0 | 681.0 | 7.6 | 11.0 |
| 19-1505 | 30-Aug-19 | KL_HU_GO01 | 23.6 | 200.0 | Below | 0.0 | 671.0 | 7.6 | 31.0 |
| 19-1506 | 31-Aug-19 | KL_HU_GO01 | 2.8 | 200.0 | Below | 0.0 | 670.0 | 7.6 | 5.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-1507 | 1-Sep-19 | KL_HU_GO01 | 1.6 | 200.0 | Below | 0.0 | 683.0 | 7.6 | 4.0 |
| 19-1508 | 2-Sep-19 | KL_HU_GO01 | 8.4 | 200.0 | Below | 0.0 | 689.0 | 7.6 | 19.0 |
| 19-1509 | 3-Sep-19 | KL_HU_GO01 | 22.0 | 200.0 | Below | 0.0 | 660.0 | 7.6 | 28.0 |
| 19-1439 | 4-Sep-19 | KL_HU_GO01 | 34.4 | 200.0 | Below | 0.0 | 670.0 | 7.4 | 12.0 |
| 19-1510 | 4-Sep-19 | KL_HU_GO01 | 7.6 | 200.0 | Below | | 708.0 | 7.6 | 16.0 |
| 19-1631 | 5-Sep-19 | KL_HU_GO01 | 33.6 | 200.0 | Below | 0.0 | 684.0 | 7.7 | 38.0 |
| 19-1632 | 6-Sep-19 | KL_HU_GO01 | 10.0 | 200.0 | Below | 0.0 | 682.0 | 7.7 | 10.0 |
| 19-1633 | 7-Sep-19 | KL_HU_GO01 | 47.2 | 200.0 | Below | 0.1 | 665.0 | 7.7 | 59.0 |
| 19-1634 | 8-Sep-19 | KL_HU_GO01 | 13.2 | 200.0 | Below | 0.0 | 679.0 | 7.7 | 12.0 |
| 19-1635 | 9-Sep-19 | KL_HU_GO01 | 36.4 | 200.0 | Below | 0.1 | 705.0 | 7.7 | 47.0 |
| 19-1636 | 10-Sep-19 | KL_HU_GO01 | 12.4 | 200.0 | Below | 0.0 | 710.0 | 7.7 | 9.0 |
| 19-1637 | 11-Sep-19 | KL_HU_GO01 | 29.6 | 200.0 | Below | 0.0 | 701.0 | 7.7 | 32.0 |
| 19-1638 | 12-Sep-19 | KL_HU_GO01 | 7.2 | 200.0 | Below | 0.0 | 689.0 | 7.7 | 10.0 |
| 19-1639 | 13-Sep-19 | KL_HU_GO01 | 8.0 | 200.0 | Below | 0.0 | 682.0 | 7.7 | 6.0 |
| 19-1640 | 14-Sep-19 | KL_HU_GO01 | 19.2 | 200.0 | Below | 0.0 | 666.0 | 7.7 | 13.0 |
| 19-1515 | 23-Sep-19 | KL_HU_GO01 | 132.0 | 200.0 | Below | 0.3 | 514.0 | 7.2 | 93.0 |
| 19-0050 | 13-Jun-19 | KL_HU_KM10 | 28.0 | 200.0 | Below | 0.0 | 666.0 | 7.9 | 30.0 |
| 19-0146 | 14-Jun-19 | KL_HU_KM10 | 15.6 | 200.0 | Below | 0.0 | 686.0 | 8.2 | 19.0 |
| 19-0147 | 15-Jun-19 | KL_HU_KM10 | 8.8 | 200.0 | Below | 0.0 | 683.0 | 8.1 | 20.0 |
| 19-0148 | 16-Jun-19 | KL_HU_KM10 | 16.4 | 200.0 | Below | 0.0 | 687.0 | 8.1 | 23.0 |
| 19-0149 | 17-Jun-19 | KL_HU_KM10 | 86.0 | 200.0 | Below | 0.2 | 582.0 | 8.2 | 61.0 |
| 19-0150 | 18-Jun-19 | KL_HU_KM10 | 39.2 | 200.0 | Below | 0.2 | 537.0 | 8.2 | 53.0 |
| 19-0151 | 19-Jun-19 | KL_HU_KM10 | 78.4 | 200.0 | Below | 0.3 | 534.0 | 8.2 | 132.0 |
| 19-0152 | 20-Jun-19 | KL_HU_KM10 | 43.6 | 200.0 | Below | 0.2 | 588.0 | 8.2 | 65.0 |
| 19-0153 | 21-Jun-19 | KL_HU_KM10 | 19.6 | 200.0 | Below | 0.0 | 643.0 | 8.1 | 41.0 |
| 19-0154 | 22-Jun-19 | KL_HU_KM10 | 16.4 | 200.0 | Below | 0.0 | 675.0 | 8.1 | 35.0 |
| 19-0155 | 23-Jun-19 | KL_HU_KM10 | 9.2 | 200.0 | Below | 0.0 | 712.0 | 8.1 | 29.0 |
| 19-0156 | 24-Jun-19 | KL_HU_KM10 | 6.8 | 200.0 | Below | 0.0 | 738.0 | 8.1 | 17.0 |
| 19-0157 | 25-Jun-19 | KL_HU_KM10 | 7.6 | 200.0 | Below | 0.0 | 735.0 | 8.1 | 16.0 |
| 19-0158 | 26-Jun-19 | KL_HU_KM10 | 5.6 | 200.0 | Below | 0.0 | 742.0 | 8.1 | 25.0 |
| 19-0159 | 27-Jun-19 | KL_HU_KM10 | 15.6 | 200.0 | Below | 0.0 | 743.0 | 8.1 | 20.0 |
| 19-0160 | 28-Jun-19 | KL_HU_KM10 | 12.0 | 200.0 | Below | 0.0 | 740.0 | 8.1 | 24.0 |
| 19-0161 | 29-Jun-19 | KL_HU_KM10 | 8.0 | 200.0 | Below | 0.0 | 751.0 | 8.0 | 14.0 |
| 19-0162 | 30-Jun-19 | KL_HU_KM10 | 8.0 | 200.0 | Below | 0.0 | 752.0 | 8.0 | 8.0 |
| 19-0163 | 1-Jul-19 | KL_HU_KM10 | 11.6 | 200.0 | Below | 0.0 | 761.0 | 8.0 | 12.0 |
| 19-0256 | 2-Jul-19 | KL_HU_KM10 | 132.0 | 200.0 | Below | 0.5 | 763.0 | 7.9 | 140.0 |
| 19-0164 | 2-Jul-19 | KL_HU_KM10 | 14.8 | 200.0 | Below | | 796.0 | 8.0 | 33.0 |
| 19-0610 | 3-Jul-19 | KL_HU_KM10 | 44.8 | 200.0 | Below | 0.3 | 793.0 | 7.9 | 51.0 |
| 19-0611 | 4-Jul-19 | KL_HU_KM10 | 46.0 | 200.0 | Below | 0.3 | 792.0 | 7.9 | 34.0 |
| 19-0612 | 5-Jul-19 | KL_HU_KM10 | 50.0 | 200.0 | Below | 0.3 | 777.0 | 8.0 | 57.0 |
| 19-0613 | 6-Jul-19 | KL_HU_KM10 | 42.0 | 200.0 | Below | 0.3 | 790.0 | 8.0 | 48.0 |
| 19-0614 | 7-Jul-19 | KL_HU_KM10 | 30.4 | 200.0 | Below | 0.3 | 802.0 | 7.9 | 33.0 |
| 19-0615 | 8-Jul-19 | KL_HU_KM10 | 61.6 | 200.0 | Below | 0.4 | 806.0 | 8.0 | 81.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0616 | 9-Jul-19 | KL_HU_KM10 | 72.0 | 200.0 | Below | 0.4 | 818.0 | 7.9 | 90.0 |
| 19-0617 | 10-Jul-19 | KL_HU_KM10 | 30.4 | 200.0 | Below | 0.3 | 841.0 | 7.9 | 35.0 |
| 19-0618 | 11-Jul-19 | KL_HU_KM10 | 36.0 | 200.0 | Below | 0.3 | 806.0 | 7.9 | 40.0 |
| 19-0619 | 12-Jul-19 | KL_HU_KM10 | 68.4 | 200.0 | Below | 0.3 | 759.0 | 8.0 | 61.0 |
| 19-0620 | 13-Jul-19 | KL_HU_KM10 | 53.2 | 200.0 | Below | 0.3 | 727.0 | 8.0 | 71.0 |
| 19-0621 | 14-Jul-19 | KL_HU_KM10 | 70.0 | 200.0 | Below | 0.4 | 737.0 | 8.0 | 87.0 |
| 19-0622 | 15-Jul-19 | KL_HU_KM10 | 45.6 | 200.0 | Below | 0.3 | 749.0 | 8.0 | 55.0 |
| 19-0623 | 16-Jul-19 | KL_HU_KM10 | 146.8 | 200.0 | Below | | 667.0 | 8.0 | 153.0 |
| 19-0624 | 17-Jul-19 | KL_HU_KM10 | 396.4 | 200.0 | Above | | 455.0 | 8.1 | 274.0 |
| 19-0625 | 18-Jul-19 | KL_HU_KM10 | 62.0 | 200.0 | Below | 0.3 | 604.0 | 8.0 | 74.0 |
| 19-0626 | 19-Jul-19 | KL_HU_KM10 | 21.2 | 200.0 | Below | 0.2 | 673.0 | 7.9 | 22.0 |
| 19-0627 | 20-Jul-19 | KL_HU_KM10 | 15.6 | 200.0 | Below | 0.2 | 701.0 | 7.9 | 23.0 |
| 19-0628 | 21-Jul-19 | KL_HU_KM10 | 21.2 | 200.0 | Below | 0.2 | 732.0 | 7.9 | 25.0 |
| 19-0629 | 22-Jul-19 | KL_HU_KM10 | 16.8 | 200.0 | Below | 0.2 | 759.0 | 7.9 | 22.0 |
| 19-0712 | 23-Jul-19 | KL_HU_KM10 | 27.6 | 200.0 | Below | 0.0 | 747.0 | 7.8 | 43.0 |
| 19-0630 | 23-Jul-19 | KL_HU_KM10 | 37.2 | 200.0 | Below | | 749.0 | 7.9 | 41.0 |
| 19-1141 | 24-Jul-19 | KL_HU_KM10 | 34.8 | 200.0 | Below | 0.0 | 782.0 | 7.9 | 41.0 |
| 19-1142 | 25-Jul-19 | KL_HU_KM10 | 28.8 | 200.0 | Below | 0.0 | 748.0 | 8.0 | 35.0 |
| 19-1143 | 26-Jul-19 | KL_HU_KM10 | 18.4 | 200.0 | Below | 0.0 | 754.0 | 8.0 | 23.0 |
| 19-1144 | 27-Jul-19 | KL_HU_KM10 | 10.8 | 200.0 | Below | 0.0 | 761.0 | 7.9 | 17.0 |
| 19-1145 | 28-Jul-19 | KL_HU_KM10 | 39.2 | 200.0 | Below | 0.0 | 742.0 | 8.0 | 48.0 |
| 19-1146 | 29-Jul-19 | KL_HU_KM10 | 21.2 | 200.0 | Below | 0.0 | 748.0 | 8.0 | 30.0 |
| 19-1147 | 30-Jul-19 | KL_HU_KM10 | 16.0 | 200.0 | Below | 0.0 | 755.0 | 7.9 | 17.0 |
| 19-1148 | 31-Jul-19 | KL_HU_KM10 | 21.6 | 200.0 | Below | 0.0 | 761.0 | 7.9 | 31.0 |
| 19-1149 | 1-Aug-19 | KL_HU_KM10 | 10.4 | 200.0 | Below | 0.0 | 761.0 | 7.9 | 13.0 |
| 19-1150 | 2-Aug-19 | KL_HU_KM10 | 9.2 | 200.0 | Below | 0.0 | 769.0 | 7.9 | 10.0 |
| 19-1151 | 3-Aug-19 | KL_HU_KM10 | 18.0 | 200.0 | Below | 0.0 | 759.0 | 7.9 | 23.0 |
| 19-1152 | 4-Aug-19 | KL_HU_KM10 | 11.2 | 200.0 | Below | 0.0 | 779.0 | 7.9 | 17.0 |
| 19-1153 | 5-Aug-19 | KL_HU_KM10 | 12.4 | 200.0 | Below | 0.0 | 767.0 | 7.9 | 20.0 |
| 19-1154 | 6-Aug-19 | KL_HU_KM10 | 30.8 | 200.0 | Below | 0.1 | 798.0 | 7.9 | 42.0 |
| 19-1155 | 7-Aug-19 | KL_HU_KM10 | 15.2 | 200.0 | Below | 0.0 | 769.0 | 7.9 | 15.0 |
| 19-1156 | 8-Aug-19 | KL_HU_KM10 | 11.2 | 200.0 | Below | 0.0 | 807.0 | 7.9 | 16.0 |
| 19-1157 | 9-Aug-19 | KL_HU_KM10 | 16.4 | 200.0 | Below | 0.0 | 805.0 | 7.9 | 31.0 |
| 19-1158 | 10-Aug-19 | KL_HU_KM10 | 14.8 | 200.0 | Below | 0.0 | 789.0 | 7.9 | 18.0 |
| 19-1159 | 11-Aug-19 | KL_HU_KM10 | 55.6 | 200.0 | Below | 0.1 | 801.0 | 7.8 | 66.0 |
| 19-1073 | 12-Aug-19 | KL_HU_KM10 | 379.0 | 200.0 | Above | 0.4 | 871.0 | 7.6 | 524.0 |
| 19-1074 | 12-Aug-19 | KL_HU_KM10 | 37.6 | 200.0 | Below | 0.0 | 802.0 | 7.6 | 49.0 |
| 19-1160 | 12-Aug-19 | KL_HU_KM10 | 58.4 | 200.0 | Below | | 806.0 | 7.8 | 74.0 |
| 19-1379 | 13-Aug-19 | KL_HU_KM10 | 92.8 | 200.0 | Below | 0.3 | 851.0 | 7.4 | 128.0 |
| 19-1380 | 14-Aug-19 | KL_HU_KM10 | 24.4 | 200.0 | Below | 0.0 | 820.0 | 7.4 | 42.0 |
| 19-1381 | 15-Aug-19 | KL_HU_KM10 | 16.4 | 200.0 | Below | 0.0 | 788.0 | 7.4 | 26.0 |
| 19-1382 | 16-Aug-19 | KL_HU_KM10 | 17.2 | 200.0 | Below | 0.0 | 769.0 | 7.4 | 23.0 |
| 19-1383 | 17-Aug-19 | KL_HU_KM10 | 44.8 | 200.0 | Below | 0.1 | 725.0 | 7.5 | 26.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-1384 | 18-Aug-19 | KL_HU_KM10 | 20.0 | 200.0 | Below | 0.0 | 735.0 | 7.5 | 30.0 |
| 19-1385 | 19-Aug-19 | KL_HU_KM10 | 54.8 | 200.0 | Below | 0.2 | 749.0 | 7.5 | 54.0 |
| 19-1386 | 20-Aug-19 | KL_HU_KM10 | 10.8 | 200.0 | Below | 0.0 | 737.0 | 7.5 | 21.0 |
| 19-1387 | 21-Aug-19 | KL_HU_KM10 | 20.4 | 200.0 | Below | 0.0 | 734.0 | 7.5 | 33.0 |
| 19-1388 | 22-Aug-19 | KL_HU_KM10 | 44.0 | 200.0 | Below | | 741.0 | 7.5 | 41.0 |
| 19-1389 | 23-Aug-19 | KL_HU_KM10 | 11.2 | 200.0 | Below | 0.0 | 764.0 | 7.5 | 19.0 |
| 19-1390 | 24-Aug-19 | KL_HU_KM10 | 10.8 | 200.0 | Below | 0.0 | 779.0 | 7.5 | 15.0 |
| 19-1391 | 25-Aug-19 | KL_HU_KM10 | 10.8 | 200.0 | Below | | 775.0 | 7.5 | 20.0 |
| 19-1392 | 26-Aug-19 | KL_HU_KM10 | 11.6 | 200.0 | Below | 0.0 | 775.0 | 7.5 | 14.0 |
| 19-1393 | 27-Aug-19 | KL_HU_KM10 | 22.0 | 200.0 | Below | 0.0 | 779.0 | 7.5 | 30.0 |
| 19-1394 | 28-Aug-19 | KL_HU_KM10 | 10.0 | 200.0 | Below | 0.0 | 774.0 | 7.5 | 20.0 |
| 19-1395 | 29-Aug-19 | KL_HU_KM10 | 18.8 | 200.0 | Below | 0.0 | 780.0 | 7.5 | 26.0 |
| 19-1396 | 30-Aug-19 | KL_HU_KM10 | 22.0 | 200.0 | Below | 0.1 | 812.0 | 7.5 | 43.0 |
| 19-1397 | 31-Aug-19 | KL_HU_KM10 | 10.0 | 200.0 | Below | 0.0 | 816.0 | 7.5 | 19.0 |
| 19-1398 | 1-Sep-19 | KL_HU_KM10 | 32.4 | 200.0 | Below | 0.0 | 835.0 | 7.5 | 17.0 |
| 19-1399 | 2-Sep-19 | KL_HU_KM10 | 16.4 | 200.0 | Below | 0.0 | 813.0 | 7.5 | 25.0 |
| 19-1433 | 3-Sep-19 | KL_HU_KM10 | 20.4 | 200.0 | Below | 0.0 | 789.0 | 7.3 | 17.0 |
| 19-1400 | 3-Sep-19 | KL_HU_KM10 | 6.0 | 200.0 | Below | 0.0 | 785.0 | 7.5 | 17.0 |
| 19-1679 | 4-Sep-19 | KL_HU_KM10 | 10.0 | 200.0 | Below | 0.0 | 783.0 | 7.5 | 17.0 |
| 19-1680 | 5-Sep-19 | KL_HU_KM10 | 18.4 | 200.0 | Below | | 780.0 | 7.5 | 20.0 |
| 19-1681 | 6-Sep-19 | KL_HU_KM10 | 14.4 | 200.0 | Below | | 789.0 | 7.5 | 24.0 |
| 19-1682 | 7-Sep-19 | KL_HU_KM10 | 64.8 | 200.0 | Below | 0.3 | 802.0 | 7.5 | 71.0 |
| 19-1683 | 8-Sep-19 | KL_HU_KM10 | 24.8 | 200.0 | Below | | 772.0 | 7.6 | 35.0 |
| 19-1684 | 9-Sep-19 | KL_HU_KM10 | 10.4 | 200.0 | Below | | 796.0 | 7.6 | 27.0 |
| 19-1685 | 10-Sep-19 | KL_HU_KM10 | 20.0 | 200.0 | Below | | 803.0 | 7.6 | 33.0 |
| 19-1686 | 11-Sep-19 | KL_HU_KM10 | 26.8 | 200.0 | Below | | 787.0 | 7.6 | 42.0 |
| 19-1687 | 12-Sep-19 | KL_HU_KM10 | 28.4 | 200.0 | Below | 0.2 | 783.0 | 7.6 | 50.0 |
| 19-1688 | 13-Sep-19 | KL_HU_KM10 | 35.2 | 200.0 | Below | | 767.0 | 7.7 | 43.0 |
| 19-1689 | 14-Sep-19 | KL_HU_KM10 | 32.4 | 200.0 | Below | | 763.0 | 7.7 | 50.0 |
| 19-1690 | 15-Sep-19 | KL_HU_KM10 | 33.2 | 200.0 | Below | 0.2 | 783.0 | 7.7 | 47.0 |
| 19-1691 | 16-Sep-19 | KL_HU_KM10 | 7.6 | 200.0 | Below | | 762.0 | 7.7 | 17.0 |
| 19-1692 | 17-Sep-19 | KL_HU_KM10 | 7.6 | 200.0 | Below | 0.0 | 771.0 | 7.6 | 13.0 |
| 19-1693 | 18-Sep-19 | KL_HU_KM10 | 12.0 | 200.0 | Below | 0.0 | 775.0 | 7.6 | 23.0 |
| 19-1694 | 19-Sep-19 | KL_HU_KM10 | 20.8 | 200.0 | Below | 0.1 | 746.0 | 7.6 | 23.0 |
| 19-1695 | 20-Sep-19 | KL_HU_KM10 | 36.8 | 200.0 | Below | 0.2 | 716.0 | 7.7 | 51.0 |
| 19-1696 | 21-Sep-19 | KL_HU_KM10 | 80.4 | 200.0 | Below | | 648.0 | 7.7 | 80.0 |
| 19-1697 | 22-Sep-19 | KL_HU_KM10 | 130.4 | 200.0 | Below | | 548.0 | 7.7 | 88.0 |
| 19-1698 | 23-Sep-19 | KL_HU_KM10 | 59.6 | 200.0 | Below | | 634.0 | 7.7 | 72.0 |
| 19-1522 | 24-Sep-19 | KL_HU_KM10 | 18.8 | 200.0 | Below | 0.0 | 675.0 | 7.2 | 14.0 |
| 19-1699 | 24-Sep-19 | KL_HU_KM10 | 30.8 | 200.0 | Below | | 639.0 | 7.7 | 33.0 |
| 19-0052 | 13-Jun-19 | KL_HU_KM20 | 12.0 | 200.0 | Below | 0.0 | 608.0 | 7.9 | 15.0 |
| 19-0259 | 3-Jul-19 | KL_HU_KM20 | 10.0 | 200.0 | Below | 0.0 | 632.0 | 7.9 | 11.0 |
| 19-0537 | 4-Jul-19 | KL_HU_KM20 | 16.0 | 200.0 | Below | 0.0 | 640.0 | 8.0 | 5.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0538 | 5-Jul-19 | KL_HU_KM20 | 9.6 | 200.0 | Below | 0.0 | 639.0 | 8.0 | 8.0 |
| 19-0539 | 6-Jul-19 | KL_HU_KM20 | 6.8 | 200.0 | Below | 0.0 | 637.0 | 8.0 | 10.0 |
| 19-0540 | 7-Jul-19 | KL_HU_KM20 | 5.2 | 200.0 | Below | 0.0 | 641.0 | 8.0 | 6.0 |
| 19-0541 | 8-Jul-19 | KL_HU_KM20 | 13.6 | 200.0 | Below | 0.0 | 642.0 | 8.0 | 0.0 |
| 19-0542 | 9-Jul-19 | KL_HU_KM20 | 10.0 | 200.0 | Below | 0.0 | 652.0 | 8.0 | 5.0 |
| 19-0543 | 10-Jul-19 | KL_HU_KM20 | 17.6 | 200.0 | Below | 0.0 | 648.0 | 8.0 | 30.0 |
| 19-0544 | 11-Jul-19 | KL_HU_KM20 | 20.8 | 200.0 | Below | 0.1 | 646.0 | 8.0 | 38.0 |
| 19-0545 | 12-Jul-19 | KL_HU_KM20 | 17.6 | 200.0 | Below | 0.0 | 632.0 | 8.0 | 19.0 |
| 19-0546 | 13-Jul-19 | KL_HU_KM20 | 17.2 | 200.0 | Below | 0.0 | 634.0 | 8.0 | 19.0 |
| 19-0547 | 14-Jul-19 | KL_HU_KM20 | 8.8 | 200.0 | Below | 0.0 | 627.0 | 8.0 | 25.0 |
| 19-0548 | 15-Jul-19 | KL_HU_KM20 | 11.2 | 200.0 | Below |  | 627.0 | 8.0 | 16.0 |
| 19-0714 | 24-Jul-19 | KL_HU_KM20 | 21.6 | 200.0 | Below | 0.1 | 590.0 | 7.9 | 32.0 |
| 19-1852 | 25-Jul-19 | KL_HU_KM20 | 20.0 | 200.0 | Below |  | 620.0 | 7.8 | 30.0 |
| 19-1064 | 11-Aug-19 | KL_HU_KM20 | 69.2 | 200.0 | Below | 0.2 | 645.0 | 7.7 | 22.0 |
| 19-1180 | 12-Aug-19 | KL_HU_KM20 | 10.4 | 200.0 | Below | 0.0 | 651.0 | 7.8 | 12.0 |
| 19-1181 | 13-Aug-19 | KL_HU_KM20 | 10.8 | 200.0 | Below | 0.0 | 649.0 | 7.8 | 14.0 |
| 19-1182 | 14-Aug-19 | KL_HU_KM20 | 16.8 | 200.0 | Below | 0.0 | 643.0 | 7.8 | 23.0 |
| 19-1183 | 15-Aug-19 | KL_HU_KM20 | 28.0 | 200.0 | Below | 0.0 | 645.0 | 7.8 | 30.0 |
| 19-1184 | 16-Aug-19 | KL_HU_KM20 | 36.0 | 200.0 | Below | 0.1 | 644.0 | 7.9 | 41.0 |
| 19-1185 | 17-Aug-19 | KL_HU_KM20 | 13.6 | 200.0 | Below | 0.0 | 632.0 | 7.9 | 13.0 |
| 19-1186 | 18-Aug-19 | KL_HU_KM20 | 4.0 | 200.0 | Below | 0.0 | 642.0 | 7.9 | 12.0 |
| 19-1187 | 19-Aug-19 | KL_HU_KM20 | 28.8 | 200.0 | Below |  | 637.0 | 7.8 | 28.0 |
| 19-1188 | 20-Aug-19 | KL_HU_KM20 | 20.4 | 200.0 | Below | 0.0 | 637.0 | 7.9 | 17.0 |
| 19-1189 | 21-Aug-19 | KL_HU_KM20 | 10.4 | 200.0 | Below | 0.0 | 643.0 | 7.9 | 11.0 |
| 19-1190 | 22-Aug-19 | KL_HU_KM20 | 12.8 | 200.0 | Below |  | 642.0 | 7.9 | 19.0 |
| 19-1191 | 23-Aug-19 | KL_HU_KM20 | 12.8 | 200.0 | Below | 0.0 | 639.0 | 7.9 | 6.0 |
| 19-1192 | 24-Aug-19 | KL_HU_KM20 | 0.8 | 200.0 | Below | 0.0 | 645.0 | 7.9 | 6.0 |
| 19-1193 | 25-Aug-19 | KL_HU_KM20 | 10.4 | 200.0 | Below |  | 640.0 | 8.0 | 16.0 |
| 19-1194 | 26-Aug-19 | KL_HU_KM20 | 0.8 | 200.0 | Below | 0.0 | 646.0 | 8.0 | 5.0 |
| 19-1195 | 27-Aug-19 | KL_HU_KM20 | 3.6 | 200.0 | Below | 0.0 | 646.0 | 7.9 | 6.0 |
| 19-1196 | 28-Aug-19 | KL_HU_KM20 | 0.4 | 200.0 | Below | 0.0 | 655.0 | 7.9 | 8.0 |
| 19-1197 | 29-Aug-19 | KL_HU_KM20 | 4.0 | 200.0 | Below | 0.0 | 646.0 | 7.9 | 6.0 |
| 19-1198 | 30-Aug-19 | KL_HU_KM20 | 3.6 | 200.0 | Below | 0.0 | 644.0 | 7.9 | 5.0 |
| 19-1199 | 31-Aug-19 | KL_HU_KM20 | 10.0 | 200.0 | Below | 0.0 | 649.0 | 8.0 | 9.0 |
| 19-1200 | 1-Sep-19 | KL_HU_KM20 | 1.2 | 200.0 | Below | 0.0 | 664.0 | 8.0 | 6.0 |
| 19-1201 | 2-Sep-19 | KL_HU_KM20 | 2.8 | 200.0 | Below | 0.0 | 651.0 | 8.0 | 7.0 |
| 19-1202 | 3-Sep-19 | KL_HU_KM20 | 12.8 | 200.0 | Below | 0.0 | 655.0 | 8.0 | 5.0 |
| 19-1437 | 4-Sep-19 | KL_HU_KM20 | 22.0 | 200.0 | Below | 0.0 | 646.0 | 7.3 | 19.0 |
| 19-1203 | 4-Sep-19 | KL_HU_KM20 | 14.0 | 200.0 | Below |  | 650.0 | 8.0 | 10.0 |
| 19-1549 | 5-Sep-19 | KL_HU_KM20 | 8.0 | 200.0 | Below | 0.0 | 649.0 | 7.6 | 2.0 |
| 19-1550 | 6-Sep-19 | KL_HU_KM20 | 5.6 | 200.0 | Below | 0.0 | 653.0 | 7.6 | 6.0 |
| 19-1551 | 7-Sep-19 | KL_HU_KM20 | 2.8 | 200.0 | Below | 0.0 | 656.0 | 7.6 | 14.0 |
| 19-1552 | 8-Sep-19 | KL_HU_KM20 | 4.4 | 200.0 | Below | 0.0 | 653.0 | 7.6 | 7.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-1553 | 9-Sep-19 | KL_HU_KM20 | 4.8 | 200.0 | Below | 0.0 | 652.0 | 7.6 | 6.0 |
| 19-1554 | 10-Sep-19 | KL_HU_KM20 | 4.0 | 200.0 | Below | 0.0 | 649.0 | 7.6 | 4.0 |
| 19-1555 | 11-Sep-19 | KL_HU_KM20 | 3.6 | 200.0 | Below | 0.0 | 655.0 | 7.6 | 7.0 |
| 19-1556 | 12-Sep-19 | KL_HU_KM20 | 6.4 | 200.0 | Below | 0.0 | 649.0 | 7.7 | 8.0 |
| 19-1557 | 13-Sep-19 | KL_HU_KM20 | 6.8 | 200.0 | Below | 0.0 | 647.0 | 7.7 | 8.0 |
| 19-1558 | 14-Sep-19 | KL_HU_KM20 | 7.2 | 200.0 | Below | 0.0 | 646.0 | 7.7 | 10.0 |
| 19-1559 | 15-Sep-19 | KL_HU_KM20 | 6.0 | 200.0 | Below | 0.0 | 649.0 | 7.7 | 8.0 |
| 19-1560 | 16-Sep-19 | KL_HU_KM20 | 5.2 | 200.0 | Below | 0.0 | 649.0 | 7.7 | 8.0 |
| 19-1561 | 17-Sep-19 | KL_HU_KM20 | 4.8 | 200.0 | Below | 0.0 | 642.0 | 7.7 | 5.0 |
| 19-1562 | 18-Sep-19 | KL_HU_KM20 | 5.2 | 200.0 | Below | 0.0 | 648.0 | 7.7 | 5.0 |
| 19-1563 | 19-Sep-19 | KL_HU_KM20 | 6.8 | 200.0 | Below | 0.0 | 632.0 | 7.7 | 7.0 |
| 19-1564 | 20-Sep-19 | KL_HU_KM20 | 5.6 | 200.0 | Below | 0.0 | 632.0 | 7.8 | 6.0 |
| 19-1565 | 21-Sep-19 | KL_HU_KM20 | 6.8 | 200.0 | Below | 0.0 | 618.0 | 7.7 | 6.0 |
| 19-1566 | 22-Sep-19 | KL_HU_KM20 | 14.0 | 200.0 | Below |  | 594.0 | 7.7 | 19.0 |
| 19-1513 | 23-Sep-19 | KL_HU_KM20 | 4.8 | 200.0 | Below | 0.0 | 581.0 | 7.2 | 5.0 |
| 19-0021 | 10-Jun-19 | KL_HU01 | 9.2 | 80.0 | Below | 0.0 | 839.0 | 7.1 | 16.0 |
| 19-0362 | 11-Jun-19 | KL_HU01 | 36.8 | 80.0 | Below | 0.0 | 891.0 | 8.2 | 20.0 |
| 19-0028 | 12-Jun-19 | KL_HU01 | 32.0 | 80.0 | Below | 0.0 | 819.0 | 7.4 | 23.0 |
| 19-0363 | 12-Jun-19 | KL_HU01 | 19.6 | 80.0 | Below | 0.0 | 872.0 | 8.2 | 26.0 |
| 19-0364 | 13-Jun-19 | KL_HU01 | 18.4 | 80.0 | Below | 0.0 | 880.0 | 8.2 | 13.0 |
| 19-0365 | 14-Jun-19 | KL_HU01 | 11.2 | 80.0 | Below | 0.0 | 885.0 | 8.2 | 9.0 |
| 19-0366 | 15-Jun-19 | KL_HU01 | 13.2 | 80.0 | Below | 0.0 | 896.0 | 8.2 | 11.0 |
| 19-0367 | 16-Jun-19 | KL_HU01 | 10.4 | 80.0 | Below | 0.0 | 888.0 | 8.2 | 15.0 |
| 19-0368 | 17-Jun-19 | KL_HU01 | 21.2 | 80.0 | Below | 0.0 | 799.0 | 8.2 | 21.0 |
| 19-0369 | 18-Jun-19 | KL_HU01 | 35.6 | 80.0 | Below | 0.1 | 691.0 | 8.2 | 30.0 |
| 19-0370 | 19-Jun-19 | KL_HU01 | 38.0 | 80.0 | Below | 0.1 | 745.0 | 8.2 | 30.0 |
| 19-0371 | 20-Jun-19 | KL_HU01 | 32.8 | 80.0 | Below | 0.0 | 765.0 | 8.2 | 11.0 |
| 19-0372 | 21-Jun-19 | KL_HU01 | 16.0 | 80.0 | Below | 0.0 | 833.0 | 8.1 | 10.0 |
| 19-0373 | 22-Jun-19 | KL_HU01 | 14.0 | 80.0 | Below | 0.0 | 858.0 | 8.1 | 17.0 |
| 19-0374 | 23-Jun-19 | KL_HU01 | 10.4 | 80.0 | Below | 0.0 | 925.0 | 8.1 | 12.0 |
| 19-0375 | 24-Jun-19 | KL_HU01 | 7.2 | 80.0 | Below | 0.0 | 964.0 | 8.1 | 11.0 |
| 19-0376 | 25-Jun-19 | KL_HU01 | 9.2 | 80.0 | Below | 0.0 | 979.0 | 8.1 | 8.0 |
| 19-0377 | 26-Jun-19 | KL_HU01 | 8.8 | 80.0 | Below | 0.0 | 989.0 | 8.1 | 7.0 |
| 19-0378 | 27-Jun-19 | KL_HU01 | 10.8 | 80.0 | Below | 0.0 | 1015.0 | 8.2 | 9.0 |
| 19-0379 | 28-Jun-19 | KL_HU01 | 14.4 | 80.0 | Below | 0.0 | 1004.0 | 8.1 | 10.0 |
| 19-0380 | 29-Jun-19 | KL_HU01 | 8.8 | 80.0 | Below | 0.0 | 996.0 | 8.1 | 14.0 |
| 19-0381 | 30-Jun-19 | KL_HU01 | 10.4 | 80.0 | Below | 0.0 | 987.0 | 8.1 | 9.0 |
| 19-0382 | 1-Jul-19 | KL_HU01 | 9.6 | 80.0 | Below | 0.0 | 1025.0 | 8.1 | 7.0 |
| 19-0251 | 2-Jul-19 | KL_HU01 | 6.0 | 80.0 | Below | 0.0 | 1064.0 | 8.0 | 8.0 |
| 19-0383 | 2-Jul-19 | KL_HU01 | 9.6 | 80.0 | Below |  | 1021.0 | 8.0 | 10.0 |
| 19-0458 | 3-Jul-19 | KL_HU01 | 30.4 | 80.0 | Below | 0.0 | 994.0 | 7.7 | 7.0 |
| 19-0459 | 4-Jul-19 | KL_HU01 | 20.0 | 80.0 | Below | 0.0 | 1018.0 | 7.7 | 11.0 |
| 19-0460 | 5-Jul-19 | KL_HU01 | 24.0 | 80.0 | Below | 0.0 | 1013.0 | 7.8 | 14.0 |

## Appendix D.3 WQOM Data - 2019 Analytical Results

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0461 | 6-Jul-19 | KL_HU01 | 20.0 | 80.0 | Below | 0.0 | 1060.0 | 7.8 | 11.0 |
| 19-0462 | 7-Jul-19 | KL_HU01 | 9.6 | 80.0 | Below | 0.0 | 1057.0 | 7.8 | 10.0 |
| 19-0463 | 8-Jul-19 | KL_HU01 | 36.4 | 80.0 | Below | 0.0 | 1063.0 | 7.8 | 22.0 |
| 19-0464 | 9-Jul-19 | KL_HU01 | 24.8 | 80.0 | Below | 0.0 | 1070.0 | 7.8 | 19.0 |
| 19-0465 | 10-Jul-19 | KL_HU01 | 18.8 | 80.0 | Below | 0.0 | 1063.0 | 7.8 | 22.0 |
| 19-0466 | 11-Jul-19 | KL_HU01 | 14.0 | 80.0 | Below | 0.0 | 1087.0 | 7.9 | 18.0 |
| 19-0467 | 12-Jul-19 | KL_HU01 | 44.0 | 80.0 | Below | 0.1 | 1016.0 | 7.9 | 26.0 |
| 19-0468 | 13-Jul-19 | KL_HU01 | 36.0 | 80.0 | Below | 0.2 | 1004.0 | 7.9 | 48.0 |
| 19-0469 | 14-Jul-19 | KL_HU01 | 24.8 | 80.0 | Below | 0.2 | 981.0 | 7.9 | 31.0 |
| 19-0470 | 15-Jul-19 | KL_HU01 | 17.6 | 80.0 | Below | 0.1 | 1015.0 | 7.9 | 20.0 |
| 19-0471 | 16-Jul-19 | KL_HU01 | 98.0 | 80.0 | Above | 0.3 | 897.0 | 7.9 | 54.0 |
| 19-0472 | 17-Jul-19 | KL_HU01 | 190.4 | 80.0 | Above | 0.5 | 680.0 | 7.9 | 92.0 |
| 19-0473 | 18-Jul-19 | KL_HU01 | 124.0 | 80.0 | Above | 0.9 | 804.0 | 8.0 | 142.0 |
| 19-0474 | 19-Jul-19 | KL_HU01 | 46.8 | 80.0 | Below | 0.2 | 907.0 | 7.9 | 30.0 |
| 19-0475 | 20-Jul-19 | KL_HU01 | 39.6 | 80.0 | Below | 0.3 | 982.0 | 7.8 | 47.0 |
| 19-0476 | 21-Jul-19 | KL_HU01 | 59.2 | 80.0 | Below | 0.5 | 1005.0 | 7.8 | 69.0 |
| 19-0707 | 22-Jul-19 | KL_HU01 | 24.4 | 80.0 | Below | 0.0 | 1019.0 | 7.9 | 38.0 |
| 19-0477 | 22-Jul-19 | KL_HU01 | 55.6 | 80.0 | Below | | 1018.0 | 7.9 | 85.0 |
| 19-1117 | 23-Jul-19 | KL_HU01 | 27.2 | 80.0 | Below | 0.1 | 1024.0 | 7.8 | 36.0 |
| 19-1118 | 24-Jul-19 | KL_HU01 | 34.0 | 80.0 | Below | 0.1 | 1035.0 | 7.8 | 36.0 |
| 19-1119 | 25-Jul-19 | KL_HU01 | 40.8 | 80.0 | Below | 0.1 | 1047.0 | 7.8 | 51.0 |
| 19-1120 | 26-Jul-19 | KL_HU01 | 42.4 | 80.0 | Below | 0.1 | 1006.0 | 7.8 | 53.0 |
| 19-1121 | 27-Jul-19 | KL_HU01 | 26.8 | 80.0 | Below | 0.1 | 1054.0 | 7.9 | 41.0 |
| 19-1122 | 28-Jul-19 | KL_HU01 | 38.8 | 80.0 | Below | 0.1 | 991.0 | 7.9 | 56.0 |
| 19-1123 | 29-Jul-19 | KL_HU01 | 24.0 | 80.0 | Below | 0.1 | 1015.0 | 7.9 | 35.0 |
| 19-1124 | 30-Jul-19 | KL_HU01 | 14.8 | 80.0 | Below | 0.0 | 1024.0 | 7.9 | 25.0 |
| 19-1125 | 31-Jul-19 | KL_HU01 | 11.2 | 80.0 | Below | 0.0 | 1058.0 | 7.9 | 27.0 |
| 19-1126 | 1-Aug-19 | KL_HU01 | 14.0 | 80.0 | Below | 0.0 | 1077.0 | 7.9 | 24.0 |
| 19-1127 | 2-Aug-19 | KL_HU01 | 11.6 | 80.0 | Below | 0.0 | 1034.0 | 7.9 | 23.0 |
| 19-1128 | 3-Aug-19 | KL_HU01 | 12.8 | 80.0 | Below | 0.0 | 1043.0 | 7.9 | 25.0 |
| 19-1129 | 4-Aug-19 | KL_HU01 | 8.8 | 80.0 | Below | 0.0 | 1037.0 | 7.9 | 21.0 |
| 19-1130 | 5-Aug-19 | KL_HU01 | 7.6 | 80.0 | Below | 0.0 | 1068.0 | 7.9 | 18.0 |
| 19-1131 | 6-Aug-19 | KL_HU01 | 6.8 | 80.0 | Below | 0.0 | 1054.0 | 7.9 | 17.0 |
| 19-1132 | 7-Aug-19 | KL_HU01 | 8.8 | 80.0 | Below | 0.0 | 1044.0 | 7.9 | 21.0 |
| 19-1133 | 8-Aug-19 | KL_HU01 | 4.8 | 80.0 | Below | 0.0 | 1077.0 | 7.9 | 13.0 |
| 19-1134 | 9-Aug-19 | KL_HU01 | 8.4 | 80.0 | Below | 0.0 | 1114.0 | 7.9 | 14.0 |
| 19-1135 | 10-Aug-19 | KL_HU01 | 6.0 | 80.0 | Below | 0.0 | 1087.0 | 7.9 | 13.0 |
| 19-1066 | 11-Aug-19 | KL_HU01 | 10.4 | 80.0 | Below | 0.0 | 1039.0 | 7.6 | 17.0 |
| 19-1136 | 11-Aug-19 | KL_HU01 | 15.2 | 80.0 | Below | | 1097.0 | 7.8 | 28.0 |
| 19-1525 | 12-Aug-19 | KL_HU01 | 11.6 | 80.0 | Below | 0.0 | 1057.0 | 7.4 | 14.0 |
| 19-1526 | 13-Aug-19 | KL_HU01 | 10.0 | 80.0 | Below | 0.0 | 1055.0 | 7.4 | 17.0 |
| 19-1527 | 14-Aug-19 | KL_HU01 | 13.6 | 80.0 | Below | 0.0 | 1056.0 | 7.4 | 20.0 |
| 19-1528 | 15-Aug-19 | KL_HU01 | 15.6 | 80.0 | Below | 0.0 | 1069.0 | 7.4 | 19.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-1529 | 16-Aug-19 | KL_HU01 | 8.4 | 80.0 | Below | 0.0 | 1070.0 | 7.4 | 28.0 |
| 19-1530 | 17-Aug-19 | KL_HU01 | 12.8 | 80.0 | Below | 0.0 | 1045.0 | 7.5 | 14.0 |
| 19-1531 | 18-Aug-19 | KL_HU01 | 11.2 | 80.0 | Below | 0.0 | 986.0 | 7.5 | 17.0 |
| 19-1532 | 19-Aug-19 | KL_HU01 | 10.8 | 80.0 | Below | 0.0 | 1014.0 | 7.5 | 14.0 |
| 19-1533 | 20-Aug-19 | KL_HU01 | 10.8 | 80.0 | Below | 0.0 | 1014.0 | 7.5 | 16.0 |
| 19-1534 | 21-Aug-19 | KL_HU01 | 10.8 | 80.0 | Below | 0.0 | 1040.0 | 7.5 | 15.0 |
| 19-1535 | 22-Aug-19 | KL_HU01 | 8.0 | 80.0 | Below | 0.0 | 1046.0 | 7.5 | 12.0 |
| 19-1536 | 23-Aug-19 | KL_HU01 | 9.2 | 80.0 | Below | 0.0 | 1051.0 | 7.5 | 6.0 |
| 19-1537 | 24-Aug-19 | KL_HU01 | 4.8 | 80.0 | Below | 0.0 | 1083.0 | 7.5 | 7.0 |
| 19-1538 | 25-Aug-19 | KL_HU01 | 4.4 | 80.0 | Below | 0.0 | 1096.0 | 7.5 | 8.0 |
| 19-1539 | 26-Aug-19 | KL_HU01 | 3.6 | 80.0 | Below | 0.0 | 1111.0 | 7.5 | 5.0 |
| 19-1540 | 27-Aug-19 | KL_HU01 | 7.2 | 80.0 | Below | 0.0 | 1103.0 | 7.5 | 9.0 |
| 19-1541 | 28-Aug-19 | KL_HU01 | 2.8 | 80.0 | Below | 0.0 | 1119.0 | 7.5 | 7.0 |
| 19-1542 | 29-Aug-19 | KL_HU01 | 10.4 | 80.0 | Below | 0.0 | 1140.0 | 7.6 | 10.0 |
| 19-1543 | 30-Aug-19 | KL_HU01 | 3.2 | 80.0 | Below | 0.0 | 1130.0 | 7.5 | 8.0 |
| 19-1544 | 31-Aug-19 | KL_HU01 | 19.6 | 80.0 | Below | 0.0 | 1054.0 | 7.5 | 27.0 |
| 19-1545 | 1-Sep-19 | KL_HU01 | 4.4 | 80.0 | Below | 0.0 | 1100.0 | 7.5 | 18.0 |
| 19-1546 | 2-Sep-19 | KL_HU01 | 5.6 | 80.0 | Below | 0.0 | 1106.0 | 7.5 | 9.0 |
| 19-1428 | 3-Sep-19 | KL_HU01 | 12.0 | 200.0 | Below | 0.0 | 1124.0 | 7.4 | 9.0 |
| 19-1547 | 3-Sep-19 | KL_HU01 | 10.8 | 80.0 | Below | | 1094.0 | 7.5 | 21.0 |
| 19-1775 | 4-Sep-19 | KL_HU01 | 8.4 | 80.0 | Below | 0.0 | 1032.0 | 7.8 | 10.0 |
| 19-1776 | 5-Sep-19 | KL_HU01 | 14.4 | 80.0 | Below | 0.0 | 1006.0 | 7.8 | 12.0 |
| 19-1777 | 6-Sep-19 | KL_HU01 | 10.4 | 80.0 | Below | 0.0 | 1022.0 | 7.9 | 11.0 |
| 19-1778 | 7-Sep-19 | KL_HU01 | 24.4 | 80.0 | Below | 0.1 | 1003.0 | 7.9 | 33.0 |
| 19-1779 | 8-Sep-19 | KL_HU01 | 7.6 | 80.0 | Below | 0.0 | 1019.0 | 7.8 | 13.0 |
| 19-1780 | 9-Sep-19 | KL_HU01 | 6.4 | 80.0 | Below | 0.0 | 1054.0 | 7.8 | 10.0 |
| 19-1781 | 10-Sep-19 | KL_HU01 | 23.6 | 80.0 | Below | 0.0 | 1092.0 | 7.7 | 14.0 |
| 19-1782 | 11-Sep-19 | KL_HU01 | 7.6 | 80.0 | Below | 0.0 | 1128.0 | 7.7 | 7.0 |
| 19-1783 | 12-Sep-19 | KL_HU01 | 9.2 | 80.0 | Below | 0.0 | 1101.0 | 7.8 | 8.0 |
| 19-1784 | 13-Sep-19 | KL_HU01 | 6.0 | 80.0 | Below | 0.0 | 1114.0 | 7.8 | 6.0 |
| 19-1785 | 14-Sep-19 | KL_HU01 | 6.4 | 80.0 | Below | 0.0 | 1079.0 | 7.8 | 10.0 |
| 19-1786 | 15-Sep-19 | KL_HU01 | 19.2 | 80.0 | Below | 0.0 | 1060.0 | 7.8 | 19.0 |
| 19-1787 | 16-Sep-19 | KL_HU01 | 8.0 | 80.0 | Below | 0.0 | 1052.0 | 7.8 | 14.0 |
| 19-1788 | 17-Sep-19 | KL_HU01 | 4.4 | 80.0 | Below | 0.0 | 1056.0 | 7.8 | 10.0 |
| 19-1789 | 18-Sep-19 | KL_HU01 | 11.6 | 80.0 | Below | 0.0 | 1011.0 | 7.8 | 13.0 |
| 19-1790 | 19-Sep-19 | KL_HU01 | 32.0 | 80.0 | Below | 0.1 | 997.0 | 7.8 | 28.0 |
| 19-1791 | 20-Sep-19 | KL_HU01 | 18.8 | 80.0 | Below | 0.0 | 944.0 | 7.8 | 20.0 |
| 19-1792 | 21-Sep-19 | KL_HU01 | 36.0 | 80.0 | Below | 0.2 | 876.0 | 8.0 | 40.0 |
| 19-1793 | 22-Sep-19 | KL_HU01 | 56.0 | 80.0 | Below | 0.2 | 782.0 | 8.0 | 51.0 |
| 19-1794 | 23-Sep-19 | KL_HU01 | 39.2 | 80.0 | Below | 0.1 | 847.0 | 7.9 | 35.0 |
| 19-1518 | 24-Sep-19 | KL_HU01 | 13.2 | 80.0 | Below | 0.0 | 939.0 | 7.1 | 19.0 |
| 19-1795 | 24-Sep-19 | KL_HU01 | 46.4 | 80.0 | Below | | 837.0 | 7.9 | 40.0 |
| 19-0022 | 10-Jun-19 | KL_HU03 | 70.0 | 200.0 | Below | 0.0 | 875.0 | 7.1 | 81.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0410 | 11-Jun-19 | KL_HU03 | 50.4 | 200.0 | Below | 0.2 | 871.0 | 8.2 | 53.0 |
| 19-0029 | 12-Jun-19 | KL_HU03 | 27.2 | 200.0 | Below | 0.0 | 766.0 | 7.4 | 21.0 |
| 19-0411 | 12-Jun-19 | KL_HU03 | 81.2 | 200.0 | Below | 0.4 | 766.0 | 8.3 | 58.0 |
| 19-0412 | 13-Jun-19 | KL_HU03 | 33.6 | 200.0 | Below | 0.2 | 821.0 | 8.3 | 25.0 |
| 19-0413 | 14-Jun-19 | KL_HU03 | 32.4 | 200.0 | Below | 0.2 | 836.0 | 8.3 | 21.0 |
| 19-0414 | 15-Jun-19 | KL_HU03 | 34.8 | 200.0 | Below | 0.2 | 824.0 | 8.3 | 22.0 |
| 19-0415 | 16-Jun-19 | KL_HU03 | 30.0 | 200.0 | Below | 0.2 | 826.0 | 8.3 | 30.0 |
| 19-0416 | 17-Jun-19 | KL_HU03 | 60.8 | 200.0 | Below | 0.4 | 708.0 | 8.3 | 55.0 |
| 19-0417 | 18-Jun-19 | KL_HU03 | 66.4 | 200.0 | Below | 0.4 | 650.0 | 8.4 | 26.0 |
| 19-0418 | 19-Jun-19 | KL_HU03 | 67.6 | 200.0 | Below | 0.4 | 686.0 | 8.4 | 53.0 |
| 19-0419 | 20-Jun-19 | KL_HU03 | 61.2 | 200.0 | Below | 0.4 | 732.0 | 8.3 | 77.0 |
| 19-0420 | 21-Jun-19 | KL_HU03 | 44.0 | 200.0 | Below | 0.2 | 790.0 | 8.3 | 38.0 |
| 19-0421 | 22-Jun-19 | KL_HU03 | 35.6 | 200.0 | Below | 0.2 | 833.0 | 8.3 | 35.0 |
| 19-0422 | 23-Jun-19 | KL_HU03 | 29.2 | 200.0 | Below | 0.2 | 898.0 | 8.3 | 31.0 |
| 19-0423 | 24-Jun-19 | KL_HU03 | 28.8 | 200.0 | Below | 0.2 | 913.0 | 8.3 | 30.0 |
| 19-0424 | 25-Jun-19 | KL_HU03 | 26.0 | 200.0 | Below | 0.1 | 944.0 | 8.3 | 32.0 |
| 19-0425 | 26-Jun-19 | KL_HU03 | 38.4 | 200.0 | Below | 0.2 | 958.0 | 8.3 | 41.0 |
| 19-0426 | 27-Jun-19 | KL_HU03 | 24.4 | 200.0 | Below | 0.1 | 975.0 | 8.2 | 25.0 |
| 19-0427 | 28-Jun-19 | KL_HU03 | 18.8 | 200.0 | Below | 0.1 | 938.0 | 8.3 | 31.0 |
| 19-0428 | 29-Jun-19 | KL_HU03 | 5.6 | 200.0 | Below | 0.1 | 906.0 | 8.3 | 27.0 |
| 19-0429 | 30-Jun-19 | KL_HU03 | 46.8 | 200.0 | Below | 0.3 | 918.0 | 8.3 | 50.0 |
| 19-0430 | 1-Jul-19 | KL_HU03 | 14.0 | 200.0 | Below | 0.2 | 979.0 | 8.3 | 32.0 |
| 19-0253 | 2-Jul-19 | KL_HU03 | 12.8 | 200.0 | Below | 0.0 | 1105.0 | 7.9 | 15.0 |
| 19-0431 | 2-Jul-19 | KL_HU03 | 18.4 | 200.0 | Below |  | 1002.0 | 8.2 | 35.0 |
| 19-0682 | 3-Jul-19 | KL_HU03 | 24.4 | 200.0 | Below | 0.3 | 993.0 | 7.9 | 48.0 |
| 19-0683 | 4-Jul-19 | KL_HU03 | 29.6 | 200.0 | Below | 0.2 | 1015.0 | 7.9 | 40.0 |
| 19-0684 | 5-Jul-19 | KL_HU03 | 33.6 | 200.0 | Below | 0.3 | 1033.0 | 7.9 | 44.0 |
| 19-0685 | 6-Jul-19 | KL_HU03 | 30.8 | 200.0 | Below | 0.2 | 1060.0 | 8.0 | 36.0 |
| 19-0686 | 7-Jul-19 | KL_HU03 | 46.0 | 200.0 | Below | 0.3 | 1090.0 | 7.9 | 69.0 |
| 19-0687 | 8-Jul-19 | KL_HU03 | 49.6 | 200.0 | Below | 0.3 | 1036.0 | 7.9 | 59.0 |
| 19-0688 | 9-Jul-19 | KL_HU03 | 66.4 | 200.0 | Below | 0.3 | 1065.0 | 8.0 | 99.0 |
| 19-0689 | 10-Jul-19 | KL_HU03 | 315.6 | 200.0 | Above | 0.8 | 1092.0 | 7.9 | 283.0 |
| 19-0690 | 11-Jul-19 | KL_HU03 | 55.2 | 200.0 | Below | 0.2 | 1036.0 | 8.0 | 81.0 |
| 19-0691 | 12-Jul-19 | KL_HU03 | 289.6 | 200.0 | Above | 0.3 | 974.0 | 8.0 | 252.0 |
| 19-0692 | 13-Jul-19 | KL_HU03 | 54.4 | 200.0 | Below | 0.3 | 950.0 | 8.0 | 71.0 |
| 19-0693 | 14-Jul-19 | KL_HU03 | 52.8 | 200.0 | Below | 0.3 | 954.0 | 8.0 | 94.0 |
| 19-0694 | 15-Jul-19 | KL_HU03 | 48.4 | 200.0 | Below | 0.3 | 984.0 | 8.0 | 51.0 |
| 19-0695 | 16-Jul-19 | KL_HU03 | 280.4 | 200.0 | Above | 0.7 | 779.0 | 8.0 | 194.0 |
| 19-0696 | 17-Jul-19 | KL_HU03 | 346.0 | 200.0 | Above | 1.0 | 618.0 | 8.1 | 204.0 |
| 19-0697 | 18-Jul-19 | KL_HU03 | 126.4 | 200.0 | Below | 0.5 | 759.0 | 8.0 | 155.0 |
| 19-0698 | 19-Jul-19 | KL_HU03 | 56.8 | 200.0 | Below | 0.3 | 973.0 | 8.0 | 61.0 |
| 19-0699 | 20-Jul-19 | KL_HU03 | 87.2 | 200.0 | Below | 0.3 | 965.0 | 7.9 | 76.0 |
| 19-0700 | 21-Jul-19 | KL_HU03 | 154.4 | 200.0 | Below | 0.6 | 1004.0 | 7.9 | 163.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0701 | 22-Jul-19 | KL_HU03 | 61.6 | 200.0 | Below | 0.3 | 998.0 | 7.9 | 101.0 |
| 19-0710 | 23-Jul-19 | KL_HU03 | 21.2 | 200.0 | Below | 0.0 | 986.0 | 7.8 | 34.0 |
| 19-0702 | 23-Jul-19 | KL_HU03 | 62.8 | 200.0 | Below | | 950.0 | 7.9 | 77.0 |
| 19-1078 | 24-Jul-19 | KL_HU03 | 79.2 | 200.0 | Below | 0.0 | 1053.0 | 7.7 | 98.0 |
| 19-1079 | 25-Jul-19 | KL_HU03 | 82.0 | 200.0 | Below | 0.1 | 1031.0 | 7.8 | 124.0 |
| 19-1080 | 26-Jul-19 | KL_HU03 | 62.4 | 200.0 | Below | 0.0 | 992.0 | 7.8 | 82.0 |
| 19-1081 | 27-Jul-19 | KL_HU03 | 34.4 | 200.0 | Below | 0.0 | 1013.0 | 7.8 | 65.0 |
| 19-1082 | 28-Jul-19 | KL_HU03 | 37.6 | 200.0 | Below | 0.1 | 970.0 | 7.8 | 64.0 |
| 19-1083 | 29-Jul-19 | KL_HU03 | 28.8 | 200.0 | Below | 0.0 | 998.0 | 7.8 | 64.0 |
| 19-1084 | 30-Jul-19 | KL_HU03 | 25.2 | 200.0 | Below | 0.0 | 1042.0 | 7.8 | 51.0 |
| 19-1085 | 31-Jul-19 | KL_HU03 | 21.6 | 200.0 | Below | 0.0 | 1098.0 | 7.8 | 64.0 |
| 19-1086 | 1-Aug-19 | KL_HU03 | 61.2 | 200.0 | Below | 0.1 | 1015.0 | 7.8 | 92.0 |
| 19-1087 | 2-Aug-19 | KL_HU03 | 96.8 | 200.0 | Below | 0.2 | 1037.0 | 7.8 | 94.0 |
| 19-1088 | 3-Aug-19 | KL_HU03 | 78.8 | 200.0 | Below | 0.2 | 980.0 | 7.9 | 88.0 |
| 19-1089 | 4-Aug-19 | KL_HU03 | 40.8 | 200.0 | Below | 0.1 | 1076.0 | 7.9 | 82.0 |
| 19-1090 | 5-Aug-19 | KL_HU03 | 27.2 | 200.0 | Below | 0.0 | 1003.0 | 7.8 | 41.0 |
| 19-1091 | 6-Aug-19 | KL_HU03 | 88.8 | 200.0 | Below | 0.3 | 1021.0 | 7.8 | 113.0 |
| 19-1092 | 7-Aug-19 | KL_HU03 | 18.4 | 200.0 | Below | 0.0 | 1055.0 | 7.8 | 45.0 |
| 19-1093 | 8-Aug-19 | KL_HU03 | 17.2 | 200.0 | Below | 0.0 | 1094.0 | 7.8 | 38.0 |
| 19-1094 | 9-Aug-19 | KL_HU03 | 21.2 | 200.0 | Below | 0.0 | 1104.0 | 7.8 | 41.0 |
| 19-1095 | 10-Aug-19 | KL_HU03 | 34.8 | 200.0 | Below | 0.0 | 1097.0 | 7.8 | 53.0 |
| 19-1096 | 11-Aug-19 | KL_HU03 | 94.8 | 200.0 | Below | 0.1 | 1029.0 | 7.8 | 89.0 |
| 19-1076 | 12-Aug-19 | KL_HU03 | 39.2 | 200.0 | Below | 0.0 | 1080.0 | 7.6 | 64.0 |
| 19-1097 | 12-Aug-19 | KL_HU03 | 50.4 | 200.0 | Below | | 1064.0 | 7.8 | 80.0 |
| 19-1204 | 13-Aug-19 | KL_HU03 | 41.2 | 200.0 | Below | 0.0 | 1050.0 | 7.8 | 57.0 |
| 19-1205 | 14-Aug-19 | KL_HU03 | 116.8 | 200.0 | Below | 0.1 | 1051.0 | 7.8 | 166.0 |
| 19-1206 | 15-Aug-19 | KL_HU03 | 67.6 | 200.0 | Below | 0.2 | 1105.0 | 7.8 | 63.0 |
| 19-1207 | 16-Aug-19 | KL_HU03 | 37.2 | 200.0 | Below | 0.1 | 1051.0 | 7.8 | 57.0 |
| 19-1208 | 17-Aug-19 | KL_HU03 | 26.4 | 200.0 | Below | 0.0 | 1004.0 | 7.8 | 32.0 |
| 19-1209 | 18-Aug-19 | KL_HU03 | 24.0 | 200.0 | Below | 0.0 | 942.0 | 7.8 | 36.0 |
| 19-1210 | 19-Aug-19 | KL_HU03 | 60.4 | 200.0 | Below | 0.3 | 1009.0 | 7.8 | 77.0 |
| 19-1211 | 20-Aug-19 | KL_HU03 | 24.4 | 200.0 | Below | 0.1 | 1037.0 | 7.8 | 48.0 |
| 19-1212 | 21-Aug-19 | KL_HU03 | 36.8 | 200.0 | Below | 0.0 | 1038.0 | 7.8 | 52.0 |
| 19-1213 | 22-Aug-19 | KL_HU03 | 48.4 | 200.0 | Below | 0.2 | 1022.0 | 7.8 | 32.0 |
| 19-1214 | 23-Aug-19 | KL_HU03 | 45.6 | 200.0 | Below | 0.1 | 1084.0 | 7.7 | 42.0 |
| 19-1215 | 24-Aug-19 | KL_HU03 | 28.4 | 200.0 | Below | 0.0 | 1094.0 | 7.7 | 19.0 |
| 19-1216 | 25-Aug-19 | KL_HU03 | 6.0 | 200.0 | Below | 0.0 | 1137.0 | 7.8 | 12.0 |
| 19-1217 | 26-Aug-19 | KL_HU03 | 20.8 | 200.0 | Below | 0.0 | 1139.0 | 7.7 | 27.0 |
| 19-1218 | 27-Aug-19 | KL_HU03 | 9.6 | 200.0 | Below | 0.0 | 1128.0 | 7.7 | 25.0 |
| 19-1219 | 28-Aug-19 | KL_HU03 | 22.8 | 200.0 | Below | 0.0 | 1153.0 | 7.7 | 27.0 |
| 19-1220 | 29-Aug-19 | KL_HU03 | 11.2 | 200.0 | Below | 0.0 | 1131.0 | 7.7 | 20.0 |
| 19-1221 | 30-Aug-19 | KL_HU03 | 54.4 | 200.0 | Below | 0.0 | 1084.0 | 7.7 | 41.0 |
| 19-1222 | 31-Aug-19 | KL_HU03 | 30.0 | 200.0 | Below | 0.0 | 1101.0 | 7.7 | 37.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-1223 | 1-Sep-19 | KL_HU03 | 108.0 | 200.0 | Below | 0.2 | 1082.0 | 7.7 | 98.0 |
| 19-1224 | 2-Sep-19 | KL_HU03 | 21.6 | 200.0 | Below | 0.0 | 1076.0 | 7.7 | 36.0 |
| 19-1431 | 3-Sep-19 | KL_HU03 | 22.8 | 200.0 | Below | 0.0 | 1079.0 | 7.3 | 37.0 |
| 19-1225 | 3-Sep-19 | KL_HU03 | 26.0 | 200.0 | Below | | 1067.0 | 7.7 | 39.0 |
| 19-1703 | 4-Sep-19 | KL_HU03 | 35.2 | 200.0 | Below | 0.1 | 1037.0 | 7.5 | 36.0 |
| 19-1704 | 5-Sep-19 | KL_HU03 | 12.0 | 200.0 | Below | 0.1 | 1034.0 | 7.5 | 27.0 |
| 19-1705 | 6-Sep-19 | KL_HU03 | 21.2 | 200.0 | Below | 0.1 | 1040.0 | 7.5 | 36.0 |
| 19-1706 | 7-Sep-19 | KL_HU03 | 348.4 | 200.0 | Above | 0.8 | 993.0 | 7.6 | 233.0 |
| 19-1707 | 8-Sep-19 | KL_HU03 | 43.2 | 200.0 | Below | 0.3 | 1013.0 | 7.6 | 60.0 |
| 19-1708 | 9-Sep-19 | KL_HU03 | 30.4 | 200.0 | Below | 0.1 | 1134.0 | 7.5 | 47.0 |
| 19-1709 | 10-Sep-19 | KL_HU03 | 45.6 | 200.0 | Below | 0.2 | 1117.0 | 7.5 | 77.0 |
| 19-1710 | 11-Sep-19 | KL_HU03 | 26.8 | 200.0 | Below | 0.1 | 1135.0 | 7.5 | 52.0 |
| 19-1711 | 12-Sep-19 | KL_HU03 | 25.2 | 200.0 | Below | 0.1 | 1111.0 | 7.5 | 40.0 |
| 19-1712 | 13-Sep-19 | KL_HU03 | 31.2 | 200.0 | Below | 0.2 | 1099.0 | 7.6 | 57.0 |
| 19-1713 | 14-Sep-19 | KL_HU03 | 28.4 | 200.0 | Below | 0.2 | 1020.0 | 7.6 | 43.0 |
| 19-1714 | 15-Sep-19 | KL_HU03 | 24.0 | 200.0 | Below | 0.2 | 1023.0 | 7.6 | 41.0 |
| 19-1715 | 16-Sep-19 | KL_HU03 | 31.2 | 200.0 | Below | 0.2 | 998.0 | 7.6 | 43.0 |
| 19-1716 | 17-Sep-19 | KL_HU03 | 43.2 | 200.0 | Below | 0.2 | 983.0 | 7.6 | 60.0 |
| 19-1717 | 18-Sep-19 | KL_HU03 | 16.8 | 200.0 | Below | 0.2 | 1065.0 | 7.6 | 34.0 |
| 19-1718 | 19-Sep-19 | KL_HU03 | 108.0 | 200.0 | Below | 0.3 | 955.0 | 7.6 | 75.0 |
| 19-1719 | 20-Sep-19 | KL_HU03 | 54.0 | 200.0 | Below | 0.2 | 899.0 | 7.6 | 58.0 |
| 19-1720 | 21-Sep-19 | KL_HU03 | 84.0 | 200.0 | Below | 0.3 | 803.0 | 7.7 | 78.0 |
| 19-1721 | 22-Sep-19 | KL_HU03 | 215.2 | 200.0 | Above | 0.4 | 705.0 | 7.7 | 110.0 |
| 19-1722 | 23-Sep-19 | KL_HU03 | 77.2 | 200.0 | Below | 0.3 | 801.0 | 7.8 | 56.0 |
| 19-1524 | 24-Sep-19 | KL_HU03 | 20.4 | 200.0 | Below | 0.0 | 907.0 | 7.1 | 31.0 |
| 19-1723 | 24-Sep-19 | KL_HU03 | 190.4 | 200.0 | Below | | 856.0 | 7.7 | 192.0 |
| 19-0023 | 11-Jun-19 | KL_HU04 | 26.0 | 200.0 | Below | 0.0 | 838.0 | 7.2 | 31.0 |
| 19-0031 | 12-Jun-19 | KL_HU04 | 29.6 | 200.0 | Below | 0.0 | 759.0 | 7.7 | 16.0 |
| 19-0290 | 12-Jun-19 | KL_HU04 | 47.6 | 200.0 | Below | 0.4 | 763.0 | 8.2 | 62.0 |
| 19-0291 | 13-Jun-19 | KL_HU04 | 22.0 | 200.0 | Below | 0.2 | 818.0 | 8.2 | 33.0 |
| 19-0292 | 14-Jun-19 | KL_HU04 | 26.8 | 200.0 | Below | 0.1 | 820.0 | 8.2 | 17.0 |
| 19-0293 | 15-Jun-19 | KL_HU04 | 20.8 | 200.0 | Below | 0.2 | 822.0 | 8.2 | 28.0 |
| 19-0294 | 16-Jun-19 | KL_HU04 | 27.2 | 200.0 | Below | 0.3 | 821.0 | 8.2 | 25.0 |
| 19-0295 | 17-Jun-19 | KL_HU04 | 87.6 | 200.0 | Below | 0.4 | 698.0 | 8.2 | 54.0 |
| 19-0296 | 18-Jun-19 | KL_HU04 | 44.4 | 200.0 | Below | 0.3 | 643.0 | 8.2 | 52.0 |
| 19-0297 | 19-Jun-19 | KL_HU04 | 34.4 | 200.0 | Below | 0.4 | 677.0 | 8.2 | 64.0 |
| 19-0298 | 20-Jun-19 | KL_HU04 | 56.0 | 200.0 | Below | 0.3 | 708.0 | 8.2 | 64.0 |
| 19-0299 | 21-Jun-19 | KL_HU04 | 21.6 | 200.0 | Below | 0.2 | 783.0 | 8.2 | 27.0 |
| 19-0300 | 22-Jun-19 | KL_HU04 | 20.8 | 200.0 | Below | 0.1 | 831.0 | 8.1 | 26.0 |
| 19-0301 | 23-Jun-19 | KL_HU04 | 24.8 | 200.0 | Below | 0.1 | 894.0 | 8.1 | 12.0 |
| 19-0302 | 24-Jun-19 | KL_HU04 | 15.2 | 200.0 | Below | 0.1 | 894.0 | 8.1 | 25.0 |
| 19-0303 | 25-Jun-19 | KL_HU04 | 23.2 | 200.0 | Below | 0.0 | 948.0 | 8.2 | 28.0 |
| 19-0304 | 26-Jun-19 | KL_HU04 | 40.0 | 200.0 | Below | 0.1 | 953.0 | 8.1 | 71.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0305 | 27-Jun-19 | KL_HU04 | 22.8 | 200.0 | Below | 0.2 | 971.0 | 8.1 | 38.0 |
| 19-0306 | 28-Jun-19 | KL_HU04 | 18.4 | 200.0 | Below | 0.1 | 941.0 | 8.1 | 27.0 |
| 19-0307 | 29-Jun-19 | KL_HU04 | 19.6 | 200.0 | Below | 0.1 | 913.0 | 8.1 | 24.0 |
| 19-0308 | 30-Jun-19 | KL_HU04 | 47.2 | 200.0 | Below | 0.1 | 921.0 | 8.1 | 35.0 |
| 19-0309 | 1-Jul-19 | KL_HU04 | 17.2 | 200.0 | Below | 0.1 | 987.0 | 8.2 | 32.0 |
| 19-0255 | 2-Jul-19 | KL_HU04 | 21.6 | 200.0 | Below | 0.1 | 1060.0 | 7.9 | 35.0 |
| 19-0310 | 2-Jul-19 | KL_HU04 | 16.8 | 200.0 | Below | | 992.0 | 8.1 | 32.0 |
| 19-0634 | 3-Jul-19 | KL_HU04 | 36.8 | 200.0 | Below | 0.3 | 998.0 | 7.9 | 58.0 |
| 19-0635 | 4-Jul-19 | KL_HU04 | 17.2 | 200.0 | Below | 0.1 | 1032.0 | 7.9 | 26.0 |
| 19-0636 | 5-Jul-19 | KL_HU04 | 45.6 | 200.0 | Below | 0.3 | 1047.0 | 8.0 | 62.0 |
| 19-0637 | 6-Jul-19 | KL_HU04 | 42.8 | 200.0 | Below | 0.3 | 1049.0 | 8.0 | 58.0 |
| 19-0638 | 7-Jul-19 | KL_HU04 | 46.8 | 200.0 | Below | 0.3 | 1113.0 | 7.9 | 74.0 |
| 19-0639 | 8-Jul-19 | KL_HU04 | 54.0 | 200.0 | Below | 0.3 | 1043.0 | 7.9 | 68.0 |
| 19-0640 | 9-Jul-19 | KL_HU04 | 101.2 | 200.0 | Below | 0.4 | 1080.0 | 7.9 | 108.0 |
| 19-0641 | 10-Jul-19 | KL_HU04 | 261.2 | 200.0 | Above | 0.8 | 1100.0 | 7.9 | 260.0 |
| 19-0642 | 11-Jul-19 | KL_HU04 | 68.8 | 200.0 | Below | 0.3 | 1032.0 | 7.8 | 87.0 |
| 19-0643 | 12-Jul-19 | KL_HU04 | 69.6 | 200.0 | Below | 0.3 | 986.0 | 7.8 | 93.0 |
| 19-0644 | 13-Jul-19 | KL_HU04 | 59.2 | 200.0 | Below | 0.3 | 940.0 | 7.9 | 76.0 |
| 19-0645 | 14-Jul-19 | KL_HU04 | 65.6 | 200.0 | Below | 0.4 | 959.0 | 7.9 | 96.0 |
| 19-0646 | 15-Jul-19 | KL_HU04 | 53.6 | 200.0 | Below | 0.3 | 986.0 | 7.9 | 64.0 |
| 19-0647 | 16-Jul-19 | KL_HU04 | 197.6 | 200.0 | Below | 0.6 | 781.0 | 8.0 | 173.0 |
| 19-0648 | 17-Jul-19 | KL_HU04 | 309.2 | 200.0 | Above | 0.6 | 612.0 | 8.0 | 174.0 |
| 19-0649 | 18-Jul-19 | KL_HU04 | 98.0 | 200.0 | Below | 0.5 | 762.0 | 8.0 | 148.0 |
| 19-0650 | 19-Jul-19 | KL_HU04 | 33.2 | 200.0 | Below | 0.3 | 866.0 | 8.0 | 59.0 |
| 19-0651 | 20-Jul-19 | KL_HU04 | 57.6 | 200.0 | Below | 0.3 | 967.0 | 7.9 | 72.0 |
| 19-0652 | 21-Jul-19 | KL_HU04 | 127.6 | 200.0 | Below | 0.5 | 1012.0 | 7.9 | 133.0 |
| 19-0653 | 22-Jul-19 | KL_HU04 | 76.4 | 200.0 | Below | 0.3 | 994.0 | 7.8 | 90.0 |
| 19-0711 | 23-Jul-19 | KL_HU04 | 15.6 | 200.0 | Below | 0.1 | 984.0 | 7.8 | 36.0 |
| 19-0654 | 23-Jul-19 | KL_HU04 | 46.4 | 200.0 | Below | | 970.0 | 7.8 | 55.0 |
| 19-1014 | 24-Jul-19 | KL_HU04 | 65.6 | 200.0 | Below | 0.1 | 1055.0 | 7.5 | 70.0 |
| 19-1015 | 25-Jul-19 | KL_HU04 | 93.6 | 200.0 | Below | 0.2 | 1025.0 | 7.5 | 63.0 |
| 19-1016 | 26-Jul-19 | KL_HU04 | 71.6 | 200.0 | Below | 0.2 | 991.0 | 7.5 | 69.0 |
| 19-1017 | 27-Jul-19 | KL_HU04 | 38.8 | 200.0 | Below | 0.1 | 1015.0 | 7.5 | 50.0 |
| 19-1018 | 28-Jul-19 | KL_HU04 | 32.4 | 200.0 | Below | 0.1 | 971.0 | 7.5 | 50.0 |
| 19-1019 | 29-Jul-19 | KL_HU04 | 24.4 | 200.0 | Below | 0.1 | 999.0 | 7.5 | 44.0 |
| 19-1020 | 30-Jul-19 | KL_HU04 | 21.2 | 200.0 | Below | 0.1 | 1041.0 | 7.5 | 38.0 |
| 19-1021 | 31-Jul-19 | KL_HU04 | 37.2 | 200.0 | Below | 0.1 | 1099.0 | 7.5 | 53.0 |
| 19-1022 | 1-Aug-19 | KL_HU04 | 94.0 | 200.0 | Below | 0.4 | 1008.0 | 7.6 | 111.0 |
| 19-1023 | 2-Aug-19 | KL_HU04 | 81.2 | 200.0 | Below | 0.4 | 1039.0 | 7.6 | 76.0 |
| 19-1024 | 3-Aug-19 | KL_HU04 | 68.8 | 200.0 | Below | 0.4 | 981.0 | 7.6 | 76.0 |
| 19-1025 | 4-Aug-19 | KL_HU04 | 60.0 | 200.0 | Below | 0.4 | 1078.0 | 7.6 | 61.0 |
| 19-1026 | 5-Aug-19 | KL_HU04 | 14.4 | 200.0 | Below | 0.1 | 1006.0 | 7.6 | 29.0 |
| 19-1027 | 6-Aug-19 | KL_HU04 | 133.6 | 200.0 | Below | 0.4 | 1017.0 | 7.6 | 102.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-1028 | 7-Aug-19 | KL_HU04 | 20.0 | 200.0 | Below | 0.1 | 1047.0 | 7.6 | 24.0 |
| 19-1029 | 8-Aug-19 | KL_HU04 | 19.2 | 200.0 | Below | 0.1 | 1095.0 | 7.6 | 29.0 |
| 19-1030 | 9-Aug-19 | KL_HU04 | 15.6 | 200.0 | Below | 0.1 | 1098.0 | 7.6 | 39.0 |
| 19-1031 | 10-Aug-19 | KL_HU04 | 27.6 | 200.0 | Below | 0.1 | 1101.0 | 7.6 | 36.0 |
| 19-1032 | 11-Aug-19 | KL_HU04 | 98.4 | 200.0 | Below | 0.4 | 1029.0 | 7.7 | 99.0 |
| 19-1075 | 12-Aug-19 | KL_HU04 | 38.8 | 200.0 | Below | 0.1 | 1073.0 | 7.6 | 55.0 |
| 19-1033 | 12-Aug-19 | KL_HU04 | 62.4 | 200.0 | Below | | 1028.0 | 7.6 | 85.0 |
| 19-1432 | 3-Sep-19 | KL_HU04 | 23.2 | 200.0 | Below | 0.7 | 1085.0 | 7.3 | 5.0 |
| 19-1876 | 4-Sep-19 | KL_HU04 | 30.0 | 200.0 | Below | | 907.0 | 7.7 | 35.0 |
| 19-1877 | 4-Sep-19 | KL_HU04 | 23.2 | 200.0 | Below | | 953.0 | 7.7 | 28.0 |
| 19-1878 | 4-Sep-19 | KL_HU04 | 30.0 | 200.0 | Below | | 931.0 | 7.7 | 35.0 |
| 19-1879 | 4-Sep-19 | KL_HU04 | 22.0 | 200.0 | Below | | 959.0 | 7.7 | 27.0 |
| 19-1880 | 4-Sep-19 | KL_HU04 | 14.4 | 200.0 | Below | | 898.0 | 7.7 | 17.0 |
| 19-1881 | 4-Sep-19 | KL_HU04 | 17.2 | 200.0 | Below | | 897.0 | 7.7 | 32.0 |
| 19-1882 | 4-Sep-19 | KL_HU04 | 29.6 | 200.0 | Below | | 912.0 | 7.7 | 36.0 |
| 19-1883 | 4-Sep-19 | KL_HU04 | 18.8 | 200.0 | Below | | 924.0 | 7.8 | 29.0 |
| 19-1884 | 4-Sep-19 | KL_HU04 | 12.0 | 200.0 | Below | | 916.0 | 7.8 | 20.0 |
| 19-1885 | 4-Sep-19 | KL_HU04 | 14.0 | 200.0 | Below | | 972.0 | 7.8 | 27.0 |
| 19-1886 | 4-Sep-19 | KL_HU04 | 22.4 | 200.0 | Below | | 915.0 | 7.8 | 40.0 |
| 19-1887 | 4-Sep-19 | KL_HU04 | 36.0 | 200.0 | Below | | 913.0 | 7.8 | 46.0 |
| 19-1888 | 4-Sep-19 | KL_HU04 | 1074.8 | 200.0 | Above | | 910.0 | 7.8 | 537.0 |
| 19-1889 | 4-Sep-19 | KL_HU04 | 175.2 | 200.0 | Below | | 886.0 | 7.8 | 162.0 |
| 19-1890 | 4-Sep-19 | KL_HU04 | 44.4 | 200.0 | Below | | 891.0 | 7.8 | 50.0 |
| 19-1891 | 4-Sep-19 | KL_HU04 | 117.6 | 200.0 | Below | | 921.0 | 7.8 | 170.0 |
| 19-1892 | 4-Sep-19 | KL_HU04 | 30.8 | 200.0 | Below | | 909.0 | 7.8 | 40.0 |
| 19-1893 | 4-Sep-19 | KL_HU04 | 41.6 | 200.0 | Below | | 891.0 | 7.8 | 50.0 |
| 19-1894 | 4-Sep-19 | KL_HU04 | 45.2 | 200.0 | Below | | 919.0 | 7.8 | 54.0 |
| 19-1895 | 4-Sep-19 | KL_HU04 | 19.2 | 200.0 | Below | | 986.0 | 7.8 | 33.0 |
| 19-1896 | 4-Sep-19 | KL_HU04 | 22.8 | 200.0 | Below | | 933.0 | 7.8 | 20.0 |
| 19-1897 | 4-Sep-19 | KL_HU04 | 9.6 | 200.0 | Below | | 998.0 | 7.8 | 19.0 |
| 19-1898 | 4-Sep-19 | KL_HU04 | 42.4 | 200.0 | Below | | 986.0 | 7.8 | 42.0 |
| 19-1899 | 4-Sep-19 | KL_HU04 | 26.0 | 200.0 | Below | | 1025.0 | 7.8 | 31.0 |
| 19-1523 | 24-Sep-19 | KL_HU04 | 22.4 | 200.0 | Below | 0.1 | 900.0 | 7.1 | 30.0 |
| 19-0024 | 11-Jun-19 | KL_HU05 | 43.6 | 200.0 | Below | 0.0 | 566.0 | 7.3 | 25.0 |
| 19-0032 | 12-Jun-19 | KL_HU05 | 18.8 | 200.0 | Below | 0.0 | 579.0 | 7.8 | 7.0 |
| 19-0214 | 12-Jun-19 | KL_HU05 | 14.4 | 200.0 | Below | 0.0 | 580.0 | 8.2 | 14.0 |
| 19-0215 | 13-Jun-19 | KL_HU05 | 35.2 | 200.0 | Below | 0.2 | 582.0 | 8.2 | 20.0 |
| 19-0216 | 14-Jun-19 | KL_HU05 | 11.6 | 200.0 | Below | 0.1 | 588.0 | 8.2 | 40.0 |
| 19-0217 | 15-Jun-19 | KL_HU05 | 88.8 | 200.0 | Below | 0.1 | 583.0 | 8.2 | 48.0 |
| 19-0218 | 16-Jun-19 | KL_HU05 | 80.0 | 200.0 | Below | 0.1 | 587.0 | 8.2 | 54.0 |
| 19-0219 | 17-Jun-19 | KL_HU05 | 52.8 | 200.0 | Below | 0.4 | 494.0 | 8.2 | 132.0 |
| 19-0220 | 18-Jun-19 | KL_HU05 | 70.4 | 200.0 | Below | 0.3 | 456.0 | 8.2 | 98.0 |
| 19-0221 | 19-Jun-19 | KL_HU05 | 52.4 | 200.0 | Below | 0.3 | 434.0 | 8.2 | 193.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0222 | 20-Jun-19 | KL_HU05 | 60.4 | 200.0 | Below | 0.1 | 496.0 | 8.2 | 68.0 |
| 19-0223 | 21-Jun-19 | KL_HU05 | 37.2 | 200.0 | Below | 0.0 | 541.0 | 8.2 | 64.0 |
| 19-0224 | 22-Jun-19 | KL_HU05 | 37.2 | 200.0 | Below | 0.0 | 568.0 | 8.1 | 37.0 |
| 19-0225 | 23-Jun-19 | KL_HU05 | 54.4 | 200.0 | Below | 0.2 | 597.0 | 8.1 | 85.0 |
| 19-0226 | 24-Jun-19 | KL_HU05 | 43.2 | 200.0 | Below | 0.0 | 605.0 | 8.1 | 52.0 |
| 19-0227 | 25-Jun-19 | KL_HU05 | 29.2 | 200.0 | Below | 0.0 | 608.0 | 8.1 | 49.0 |
| 19-0228 | 26-Jun-19 | KL_HU05 | 45.6 | 200.0 | Below | 0.1 | 612.0 | 8.1 | 70.0 |
| 19-0229 | 27-Jun-19 | KL_HU05 | 67.2 | 200.0 | Below | 0.2 | 615.0 | 8.1 | 98.0 |
| 19-0230 | 28-Jun-19 | KL_HU05 | 45.2 | 200.0 | Below | 0.0 | 624.0 | 8.1 | 40.0 |
| 19-0231 | 29-Jun-19 | KL_HU05 | 9.6 | 200.0 | Below | 0.0 | 620.0 | 8.1 | 23.0 |
| 19-0232 | 30-Jun-19 | KL_HU05 | 20.8 | 200.0 | Below | 0.0 | 631.0 | 8.1 | 14.0 |
| 19-0233 | 1-Jul-19 | KL_HU05 | 30.4 | 200.0 | Below | 0.0 | 641.0 | 8.1 | 38.0 |
| 19-0234 | 2-Jul-19 | KL_HU05 | 73.2 | 200.0 | Below | 0.2 | 643.0 | 8.1 | 100.0 |
| 19-0262 | 3-Jul-19 | KL_HU05 | 152.8 | 200.0 | Below | 0.3 | 650.0 | 7.9 | 187.0 |
| 19-0235 | 3-Jul-19 | KL_HU05 | 84.0 | 200.0 | Below |  | 651.0 | 8.1 | 114.0 |
| 19-0719 | 4-Jul-19 | KL_HU05 | 85.6 | 200.0 | Below | 0.4 | 657.0 | 8.0 | 129.0 |
| 19-0720 | 5-Jul-19 | KL_HU05 | 92.8 | 200.0 | Below | 0.3 | 664.0 | 8.0 | 105.0 |
| 19-0721 | 6-Jul-19 | KL_HU05 | 36.0 | 200.0 | Below | 0.2 | 658.0 | 8.0 | 58.0 |
| 19-0722 | 7-Jul-19 | KL_HU05 | 46.4 | 200.0 | Below | 0.2 | 655.0 | 8.0 | 65.0 |
| 19-0723 | 8-Jul-19 | KL_HU05 | 93.6 | 200.0 | Below | 0.4 | 666.0 | 8.0 | 155.0 |
| 19-0724 | 9-Jul-19 | KL_HU05 | 718.8 | 200.0 | Above | 1.0 | 668.0 | 8.0 | 336.0 |
| 19-0725 | 10-Jul-19 | KL_HU05 | 63.6 | 200.0 | Below | 0.2 | 685.0 | 8.0 | 48.0 |
| 19-0726 | 11-Jul-19 | KL_HU05 | 58.0 | 200.0 | Below | 0.3 | 662.0 | 8.0 | 76.0 |
| 19-0727 | 12-Jul-19 | KL_HU05 | 105.6 | 200.0 | Below | 0.4 | 643.0 | 8.0 | 126.0 |
| 19-0728 | 13-Jul-19 | KL_HU05 | 114.8 | 200.0 | Below | 0.4 | 632.0 | 8.0 | 149.0 |
| 19-0729 | 14-Jul-19 | KL_HU05 | 87.6 | 200.0 | Below | 0.4 | 633.0 | 8.0 | 141.0 |
| 19-0730 | 15-Jul-19 | KL_HU05 | 129.2 | 200.0 | Below | 0.6 | 647.0 | 8.0 | 193.0 |
| 19-0731 | 16-Jul-19 | KL_HU05 | 255.6 | 200.0 | Above | 0.6 | 461.0 | 8.1 | 200.0 |
| 19-0732 | 17-Jul-19 | KL_HU05 | 292.8 | 200.0 | Above | 0.7 | 389.0 | 8.1 | 228.0 |
| 19-0733 | 18-Jul-19 | KL_HU05 | 76.0 | 200.0 | Below | 0.3 | 496.0 | 8.0 | 95.0 |
| 19-0734 | 19-Jul-19 | KL_HU05 | 38.0 | 200.0 | Below | 0.2 | 548.0 | 8.0 | 53.0 |
| 19-0735 | 20-Jul-19 | KL_HU05 | 21.2 | 200.0 | Below | 0.2 | 581.0 | 8.0 | 47.0 |
| 19-0736 | 21-Jul-19 | KL_HU05 | 32.4 | 200.0 | Below | 0.2 | 598.0 | 8.0 | 35.0 |
| 19-0737 | 22-Jul-19 | KL_HU05 | 30.8 | 200.0 | Below | 0.2 | 630.0 | 8.0 | 56.0 |
| 19-0738 | 23-Jul-19 | KL_HU05 | 66.8 | 200.0 | Below | 0.3 | 633.0 | 8.0 | 87.0 |
| 19-0717 | 24-Jul-19 | KL_HU05 | 18.4 | 200.0 | Below | 0.0 | 637.0 | 7.8 | 30.0 |
| 19-0739 | 24-Jul-19 | KL_HU05 | 24.0 | 200.0 | Below |  | 639.0 | 8.0 | 43.0 |
| 19-0791 | 25-Jul-19 | KL_HU05 | 42.0 | 200.0 | Below | 0.1 | 621.0 | 8.2 | 45.0 |
| 19-0792 | 26-Jul-19 | KL_HU05 | 32.8 | 200.0 | Below | 0.1 | 614.0 | 8.2 | 30.0 |
| 19-0793 | 27-Jul-19 | KL_HU05 | 38.4 | 200.0 | Below | 0.1 | 630.0 | 8.2 | 66.0 |
| 19-0794 | 28-Jul-19 | KL_HU05 | 35.2 | 200.0 | Below | 0.1 | 616.0 | 8.2 | 54.0 |
| 19-0795 | 29-Jul-19 | KL_HU05 | 14.8 | 200.0 | Below | 0.0 | 621.0 | 8.2 | 15.0 |
| 19-0796 | 30-Jul-19 | KL_HU05 | 31.6 | 200.0 | Below | 0.0 | 627.0 | 8.2 | 38.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0797 | 31-Jul-19 | KL_HU05 | 7.2 | 200.0 | Below | 0.0 | 635.0 | 8.2 | 8.0 |
| 19-0798 | 1-Aug-19 | KL_HU05 | 9.6 | 200.0 | Below | 0.0 | 637.0 | 8.2 | 15.0 |
| 19-0799 | 2-Aug-19 | KL_HU05 | 13.6 | 200.0 | Below | 0.0 | 641.0 | 8.2 | 12.0 |
| 19-0800 | 3-Aug-19 | KL_HU05 | 13.2 | 200.0 | Below | 0.0 | 634.0 | 8.2 | 12.0 |
| 19-0801 | 4-Aug-19 | KL_HU05 | 13.2 | 200.0 | Below | 0.0 | 648.0 | 8.2 | 10.0 |
| 19-0802 | 5-Aug-19 | KL_HU05 | 40.8 | 200.0 | Below | 0.0 | 646.0 | 8.2 | 42.0 |
| 19-0803 | 6-Aug-19 | KL_HU05 | 14.8 | 200.0 | Below | 0.0 | 645.0 | 8.2 | 22.0 |
| 19-0804 | 7-Aug-19 | KL_HU05 | 9.6 | 200.0 | Below | 0.0 | 638.0 | 8.2 | 9.0 |
| 19-0805 | 8-Aug-19 | KL_HU05 | 16.0 | 200.0 | Below | 0.0 | 661.0 | 8.2 | 18.0 |
| 19-0806 | 9-Aug-19 | KL_HU05 | 18.8 | 200.0 | Below | 0.0 | 645.0 | 8.2 | 23.0 |
| 19-0807 | 10-Aug-19 | KL_HU05 | 14.0 | 200.0 | Below | 0.0 | 646.0 | 8.2 | 16.0 |
| 19-0808 | 11-Aug-19 | KL_HU05 | 212.0 | 200.0 | Above | 0.4 | 653.0 | 8.2 | 398.0 |
| 19-1071 | 12-Aug-19 | KL_HU05 | 180.8 | 200.0 | Below | 0.3 | 664.0 | 7.7 | 197.0 |
| 19-0809 | 12-Aug-19 | KL_HU05 | 110.0 | 200.0 | Below |  | 653.0 | 8.2 | 192.0 |
| 19-1403 | 13-Aug-19 | KL_HU05 | 106.0 | 200.0 | Below | 0.0 | 656.0 | 7.5 | 109.0 |
| 19-1404 | 14-Aug-19 | KL_HU05 | 59.6 | 200.0 | Below | 0.0 | 657.0 | 7.6 | 56.0 |
| 19-1406 | 16-Aug-19 | KL_HU05 | 26.4 | 200.0 | Below | 0.0 | 646.0 | 7.6 | 30.0 |
| 19-1407 | 17-Aug-19 | KL_HU05 | 73.2 | 200.0 | Below | 0.0 | 645.0 | 7.7 | 55.0 |
| 19-1408 | 18-Aug-19 | KL_HU05 | 52.0 | 200.0 | Below | 0.0 | 625.0 | 7.6 | 51.0 |
| 19-1409 | 19-Aug-19 | KL_HU05 | 42.8 | 200.0 | Below | 0.0 | 624.0 | 7.7 | 40.0 |
| 19-1410 | 20-Aug-19 | KL_HU05 | 46.8 | 200.0 | Below | 0.0 | 629.0 | 7.7 | 64.0 |
| 19-1411 | 21-Aug-19 | KL_HU05 | 61.2 | 200.0 | Below | 0.0 | 636.0 | 7.7 | 73.0 |
| 19-1412 | 22-Aug-19 | KL_HU05 | 53.6 | 200.0 | Below | 0.0 | 653.0 | 7.6 | 51.0 |
| 19-1413 | 23-Aug-19 | KL_HU05 | 32.0 | 200.0 | Below | 0.0 | 655.0 | 7.6 | 36.0 |
| 19-1414 | 24-Aug-19 | KL_HU05 | 31.2 | 200.0 | Below | 0.0 | 667.0 | 7.6 | 33.0 |
| 19-1415 | 25-Aug-19 | KL_HU05 | 24.4 | 200.0 | Below | 0.0 | 655.0 | 7.6 | 36.0 |
| 19-1416 | 26-Aug-19 | KL_HU05 | 32.4 | 200.0 | Below | 0.0 | 654.0 | 7.6 | 38.0 |
| 19-1417 | 27-Aug-19 | KL_HU05 | 42.8 | 200.0 | Below | 0.0 | 660.0 | 7.6 | 53.0 |
| 19-1418 | 28-Aug-19 | KL_HU05 | 33.2 | 200.0 | Below | 0.0 | 656.0 | 7.6 | 59.0 |
| 19-1419 | 29-Aug-19 | KL_HU05 | 95.2 | 200.0 | Below | 0.0 | 662.0 | 7.6 | 85.0 |
| 19-1420 | 30-Aug-19 | KL_HU05 | 28.4 | 200.0 | Below | 0.0 | 658.0 | 7.6 | 31.0 |
| 19-1421 | 31-Aug-19 | KL_HU05 | 22.8 | 200.0 | Below | 0.0 | 661.0 | 7.6 | 23.0 |
| 19-1422 | 1-Sep-19 | KL_HU05 | 14.4 | 200.0 | Below | 0.0 | 661.0 | 7.6 | 19.0 |
| 19-1423 | 2-Sep-19 | KL_HU05 | 30.4 | 200.0 | Below | 0.0 | 659.0 | 7.6 | 39.0 |
| 19-1435 | 3-Sep-19 | KL_HU05 | 35.6 | 200.0 | Below | 0.0 | 659.0 | 7.4 | 15.0 |
| 19-1424 | 3-Sep-19 | KL_HU05 | 12.8 | 200.0 | Below | 0.0 | 655.0 | 7.6 | 17.0 |
| 19-1573 | 4-Sep-19 | KL_HU05 | 20.4 | 200.0 | Below | 0.0 | 673.0 | 7.7 | 16.0 |
| 19-1574 | 5-Sep-19 | KL_HU05 | 19.2 | 200.0 | Below | 0.0 | 671.0 | 7.7 | 15.0 |
| 19-1575 | 6-Sep-19 | KL_HU05 | 40.0 | 200.0 | Below | 0.0 | 669.0 | 7.7 | 16.0 |
| 19-1576 | 7-Sep-19 | KL_HU05 | 36.0 | 200.0 | Below | 0.1 | 661.0 | 7.7 | 47.0 |
| 19-1577 | 8-Sep-19 | KL_HU05 | 44.8 | 200.0 | Below | 0.2 | 661.0 | 7.6 | 60.0 |
| 19-1578 | 9-Sep-19 | KL_HU05 | 19.6 | 200.0 | Below | 0.0 | 681.0 | 7.6 | 25.0 |
| 19-1579 | 10-Sep-19 | KL_HU05 | 67.6 | 200.0 | Below | 0.3 | 677.0 | 7.6 | 95.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-1580 | 11-Sep-19 | KL_HU05 | 72.4 | 200.0 | Below | 0.3 | 678.0 | 7.6 | 103.0 |
| 19-1581 | 12-Sep-19 | KL_HU05 | 90.4 | 200.0 | Below | 0.5 | 671.0 | 7.6 | 145.0 |
| 19-1582 | 13-Sep-19 | KL_HU05 | 124.4 | 200.0 | Below | 0.7 | 663.0 | 7.5 | 199.0 |
| 19-1583 | 14-Sep-19 | KL_HU05 | 98.8 | 200.0 | Below | 0.5 | 656.0 | 7.5 | 131.0 |
| 19-1584 | 15-Sep-19 | KL_HU05 | 96.4 | 200.0 | Below | 0.4 | 669.0 | 7.4 | 117.0 |
| 19-1585 | 16-Sep-19 | KL_HU05 | 17.2 | 200.0 | Below | 0.0 | 668.0 | 7.4 | 22.0 |
| 19-1586 | 17-Sep-19 | KL_HU05 | 23.6 | 200.0 | Below | 0.1 | 664.0 | 7.4 | 37.0 |
| 19-1587 | 18-Sep-19 | KL_HU05 | 36.8 | 200.0 | Below | 0.4 | 652.0 | 7.4 | 105.0 |
| 19-1588 | 19-Sep-19 | KL_HU05 | 154.4 | 200.0 | Below | 0.4 | 653.0 | 7.3 | 104.0 |
| 19-1589 | 20-Sep-19 | KL_HU05 | 134.8 | 200.0 | Below | 0.2 | 632.0 | 7.4 | 65.0 |
| 19-1590 | 21-Sep-19 | KL_HU05 | 375.6 | 200.0 | Above | 0.6 | 546.0 | 7.4 | 141.0 |
| 19-1591 | 22-Sep-19 | KL_HU05 | 319.6 | 200.0 | Above | 0.6 | 470.0 | 7.4 | 144.0 |
| 19-1516 | 23-Sep-19 | KL_HU05 | 133.6 | 200.0 | Below | 0.4 | 545.0 | 7.2 | 67.0 |
| 19-1592 | 23-Sep-19 | KL_HU05 | 87.6 | 200.0 | Below | | 519.0 | 7.3 | 89.0 |
| 19-0026 | 11-Jun-19 | KL_HU06 | 56.0 | 200.0 | Below | 0.0 | 531.0 | 7.4 | 39.0 |
| 19-0035 | 12-Jun-19 | KL_HU06 | 26.0 | 200.0 | Below | 0.0 | 536.0 | 7.8 | 19.0 |
| 19-0122 | 12-Jun-19 | KL_HU06 | 60.8 | 200.0 | Below | 0.2 | 541.0 | 8.3 | 33.0 |
| 19-0123 | 13-Jun-19 | KL_HU06 | 146.0 | 200.0 | Below | 0.4 | 542.0 | 8.2 | 86.0 |
| 19-0124 | 14-Jun-19 | KL_HU06 | 131.6 | 200.0 | Below | 0.3 | 550.0 | 8.2 | 71.0 |
| 19-0125 | 15-Jun-19 | KL_HU06 | 164.8 | 200.0 | Below | 0.2 | 543.0 | 8.3 | 141.0 |
| 19-0126 | 16-Jun-19 | KL_HU06 | 103.2 | 200.0 | Below | 0.2 | 551.0 | 8.2 | 72.0 |
| 19-0127 | 17-Jun-19 | KL_HU06 | 278.4 | 200.0 | Above | 0.5 | 499.0 | 8.3 | 234.0 |
| 19-0128 | 18-Jun-19 | KL_HU06 | 198.4 | 200.0 | Below | 0.4 | 465.0 | 8.3 | 131.0 |
| 19-0129 | 19-Jun-19 | KL_HU06 | 275.6 | 200.0 | Above | 0.4 | 475.0 | 8.3 | 270.0 |
| 19-0130 | 20-Jun-19 | KL_HU06 | 165.6 | 200.0 | Below | 0.3 | 504.0 | 8.2 | 156.0 |
| 19-0131 | 21-Jun-19 | KL_HU06 | 107.2 | 200.0 | Below | 0.2 | 528.0 | 8.2 | 99.0 |
| 19-0132 | 22-Jun-19 | KL_HU06 | 45.6 | 200.0 | Below | 0.0 | 541.0 | 8.2 | 36.0 |
| 19-0133 | 23-Jun-19 | KL_HU06 | 149.6 | 200.0 | Below | 0.4 | 552.0 | 8.2 | 167.0 |
| 19-0134 | 24-Jun-19 | KL_HU06 | 142.4 | 200.0 | Below | 0.2 | 554.0 | 8.0 | 143.0 |
| 19-0135 | 25-Jun-19 | KL_HU06 | 95.2 | 200.0 | Below | 0.1 | 554.0 | 8.0 | 115.0 |
| 19-0136 | 26-Jun-19 | KL_HU06 | 138.4 | 200.0 | Below | 0.1 | 561.0 | 8.1 | 196.0 |
| 19-0137 | 27-Jun-19 | KL_HU06 | 166.4 | 200.0 | Below | 0.3 | 569.0 | 8.1 | 165.0 |
| 19-0138 | 28-Jun-19 | KL_HU06 | 95.2 | 200.0 | Below | 0.2 | 584.0 | 8.1 | 62.0 |
| 19-0139 | 29-Jun-19 | KL_HU06 | 35.6 | 200.0 | Below | 0.1 | 589.0 | 8.1 | 19.0 |
| 19-0140 | 30-Jun-19 | KL_HU06 | 49.6 | 200.0 | Below | 0.1 | 592.0 | 8.1 | 28.0 |
| 19-0141 | 1-Jul-19 | KL_HU06 | 105.6 | 200.0 | Below | 0.2 | 598.0 | 8.1 | 109.0 |
| 19-0142 | 2-Jul-19 | KL_HU06 | 205.2 | 200.0 | Above | 0.2 | 609.0 | 8.1 | 298.0 |
| 19-0260 | 3-Jul-19 | KL_HU06 | 424.4 | 200.0 | Above | 0.4 | 623.0 | 7.9 | 550.0 |
| 19-0143 | 3-Jul-19 | KL_HU06 | 270.0 | 200.0 | Above | | 616.0 | 8.0 | 338.0 |
| 19-0513 | 4-Jul-19 | KL_HU06 | 110.8 | 200.0 | Below | 0.1 | 623.0 | 8.0 | 139.0 |
| 19-0514 | 5-Jul-19 | KL_HU06 | 130.4 | 200.0 | Below | 0.3 | 626.0 | 8.0 | 202.0 |
| 19-0515 | 6-Jul-19 | KL_HU06 | 140.8 | 200.0 | Below | 0.2 | 619.0 | 8.0 | 134.0 |
| 19-0516 | 7-Jul-19 | KL_HU06 | 191.6 | 200.0 | Below | 0.5 | 617.0 | 8.0 | 240.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0517 | 8-Jul-19 | KL_HU06 | 276.0 | 200.0 | Above | 0.4 | 620.0 | 8.0 | 287.0 |
| 19-0518 | 9-Jul-19 | KL_HU06 | 262.4 | 200.0 | Above | 0.1 | 629.0 | 8.0 | 273.0 |
| 19-0519 | 10-Jul-19 | KL_HU06 | 60.0 | 200.0 | Below | 0.1 | 629.0 | 8.0 | 59.0 |
| 19-0520 | 11-Jul-19 | KL_HU06 | 114.4 | 200.0 | Below | 0.2 | 628.0 | 8.0 | 156.0 |
| 19-0521 | 12-Jul-19 | KL_HU06 | 278.0 | 200.0 | Above | 0.2 | 606.0 | 8.0 | 328.0 |
| 19-0522 | 13-Jul-19 | KL_HU06 | 194.0 | 200.0 | Below | 0.2 | 608.0 | 8.0 | 240.0 |
| 19-0523 | 14-Jul-19 | KL_HU06 | 167.2 | 200.0 | Below | 0.2 | 605.0 | 8.0 | 223.0 |
| 19-0524 | 15-Jul-19 | KL_HU06 | 231.2 | 200.0 | Above | 0.2 | 624.0 | 8.0 | 270.0 |
| 19-0525 | 16-Jul-19 | KL_HU06 | 144.4 | 200.0 | Below | 0.2 | 550.0 | 8.0 | 195.0 |
| 19-0526 | 17-Jul-19 | KL_HU06 | 377.2 | 200.0 | Above | 0.5 | 473.0 | 8.0 | 390.0 |
| 19-0527 | 18-Jul-19 | KL_HU06 | 107.2 | 200.0 | Below | 0.1 | 538.0 | 8.0 | 161.0 |
| 19-0528 | 19-Jul-19 | KL_HU06 | 24.4 | 200.0 | Below | 0.0 | 563.0 | 8.0 | 27.0 |
| 19-0529 | 20-Jul-19 | KL_HU06 | 17.6 | 200.0 | Below | 0.0 | 583.0 | 7.9 | 13.0 |
| 19-0530 | 21-Jul-19 | KL_HU06 | 45.6 | 200.0 | Below | 0.0 | 586.0 | 7.9 | 39.0 |
| 19-0531 | 22-Jul-19 | KL_HU06 | 56.4 | 200.0 | Below | 0.0 | 601.0 | 7.9 | 80.0 |
| 19-0532 | 23-Jul-19 | KL_HU06 | 217.6 | 200.0 | Above | 0.3 | 609.0 | 7.9 | 274.0 |
| 19-0715 | 24-Jul-19 | KL_HU06 | 68.4 | 200.0 | Below | 0.0 | 609.0 | 7.8 | 115.0 |
| 19-0533 | 24-Jul-19 | KL_HU06 | 36.8 | 200.0 | Below |  | 611.0 | 7.9 | 54.0 |
| 19-0863 | 25-Jul-19 | KL_HU06 | 59.2 | 200.0 | Below | 0.1 | 609.0 | 8.2 | 63.0 |
| 19-0864 | 26-Jul-19 | KL_HU06 | 65.6 | 200.0 | Below | 0.1 | 612.0 | 8.2 | 58.0 |
| 19-0865 | 27-Jul-19 | KL_HU06 | 83.6 | 200.0 | Below | 0.3 | 625.0 | 8.2 | 144.0 |
| 19-0866 | 28-Jul-19 | KL_HU06 | 52.4 | 200.0 | Below | 0.1 | 618.0 | 8.2 | 54.0 |
| 19-0867 | 29-Jul-19 | KL_HU06 | 11.2 | 200.0 | Below | 0.0 | 616.0 | 8.2 | 14.0 |
| 19-0868 | 30-Jul-19 | KL_HU06 | 23.2 | 200.0 | Below | 0.0 | 631.0 | 8.1 | 17.0 |
| 19-0869 | 31-Jul-19 | KL_HU06 | 11.2 | 200.0 | Below | 0.0 | 628.0 | 8.2 | 13.0 |
| 19-0870 | 1-Aug-19 | KL_HU06 | 11.6 | 200.0 | Below | 0.0 | 621.0 | 8.2 | 15.0 |
| 19-0871 | 2-Aug-19 | KL_HU06 | 3.6 | 200.0 | Below | 0.0 | 622.0 | 8.1 | 11.0 |
| 19-0872 | 3-Aug-19 | KL_HU06 | 26.0 | 200.0 | Below | 0.0 | 624.0 | 8.1 | 24.0 |
| 19-0873 | 4-Aug-19 | KL_HU06 | 20.8 | 200.0 | Below | 0.0 | 628.0 | 8.1 | 19.0 |
| 19-0874 | 5-Aug-19 | KL_HU06 | 74.8 | 200.0 | Below | 0.2 | 631.0 | 8.1 | 98.0 |
| 19-0875 | 6-Aug-19 | KL_HU06 | 26.4 | 200.0 | Below | 0.0 | 630.0 | 8.1 | 26.0 |
| 19-0876 | 7-Aug-19 | KL_HU06 | 10.4 | 200.0 | Below | 0.0 | 635.0 | 8.1 | 8.0 |
| 19-0877 | 8-Aug-19 | KL_HU06 | 72.0 | 200.0 | Below | 0.1 | 630.0 | 8.1 | 90.0 |
| 19-0878 | 9-Aug-19 | KL_HU06 | 34.4 | 200.0 | Below | 0.0 | 633.0 | 8.1 | 49.0 |
| 19-0879 | 10-Aug-19 | KL_HU06 | 18.4 | 200.0 | Below | 0.0 | 641.0 | 8.1 | 21.0 |
| 19-0880 | 11-Aug-19 | KL_HU06 | 966.0 | 200.0 | Above | 0.9 | 628.0 | 8.1 | 743.0 |
| 19-1069 | 12-Aug-19 | KL_HU06 | 296.4 | 200.0 | Above | 0.2 | 642.0 | 7.7 | 361.0 |
| 19-0881 | 12-Aug-19 | KL_HU06 | 328.0 | 200.0 | Above |  | 633.0 | 8.1 | 358.0 |
| 19-1331 | 13-Aug-19 | KL_HU06 | 195.6 | 200.0 | Below | 0.3 | 639.0 | 7.4 | 244.0 |
| 19-1332 | 14-Aug-19 | KL_HU06 | 113.6 | 200.0 | Below | 0.2 | 642.0 | 7.4 | 121.0 |
| 19-1333 | 15-Aug-19 | KL_HU06 | 108.4 | 200.0 | Below | 0.2 | 641.0 | 7.4 | 119.0 |
| 19-1334 | 16-Aug-19 | KL_HU06 | 64.4 | 200.0 | Below | 0.1 | 633.0 | 7.4 | 52.0 |
| 19-1335 | 17-Aug-19 | KL_HU06 | 45.6 | 200.0 | Below | 0.1 | 625.0 | 7.4 | 32.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-1336 | 18-Aug-19 | KL_HU06 | 76.0 | 200.0 | Below | 0.2 | 632.0 | 7.5 | 80.0 |
| 19-1337 | 19-Aug-19 | KL_HU06 | 141.6 | 200.0 | Below | 0.7 | 634.0 | 7.5 | 143.0 |
| 19-1338 | 20-Aug-19 | KL_HU06 | 87.6 | 200.0 | Below | 0.3 | 627.0 | 7.5 | 98.0 |
| 19-1339 | 21-Aug-19 | KL_HU06 | 127.6 | 200.0 | Below | 0.3 | 634.0 | 7.5 | 138.0 |
| 19-1340 | 22-Aug-19 | KL_HU06 | 317.6 | 200.0 | Above | | 632.0 | 7.5 | 236.0 |
| 19-1341 | 23-Aug-19 | KL_HU06 | 72.0 | 200.0 | Below | 0.2 | 637.0 | 7.4 | 71.0 |
| 19-1342 | 24-Aug-19 | KL_HU06 | 42.0 | 200.0 | Below | 0.1 | 636.0 | 7.4 | 44.0 |
| 19-1343 | 25-Aug-19 | KL_HU06 | 87.6 | 200.0 | Below | 0.3 | 644.0 | 7.5 | 84.0 |
| 19-1344 | 26-Aug-19 | KL_HU06 | 75.2 | 200.0 | Below | 0.3 | 642.0 | 7.5 | 91.0 |
| 19-1345 | 27-Aug-19 | KL_HU06 | 106.0 | 200.0 | Below | 0.3 | 639.0 | 7.5 | 122.0 |
| 19-1346 | 28-Aug-19 | KL_HU06 | 100.0 | 200.0 | Below | 0.3 | 650.0 | 7.5 | 115.0 |
| 19-1347 | 29-Aug-19 | KL_HU06 | 126.8 | 200.0 | Below | 0.4 | 647.0 | 7.4 | 133.0 |
| 19-1348 | 30-Aug-19 | KL_HU06 | 39.2 | 200.0 | Below | 0.1 | 646.0 | 7.4 | 40.0 |
| 19-1349 | 31-Aug-19 | KL_HU06 | 47.2 | 200.0 | Below | 0.1 | 647.0 | 7.5 | 42.0 |
| 19-1350 | 1-Sep-19 | KL_HU06 | 43.6 | 200.0 | Below | 0.1 | 649.0 | 7.4 | 40.0 |
| 19-1351 | 2-Sep-19 | KL_HU06 | 40.0 | 200.0 | Below | 0.1 | 649.0 | 7.5 | 35.0 |
| 19-1352 | 3-Sep-19 | KL_HU06 | 48.8 | 200.0 | Below | 0.2 | 643.0 | 7.5 | 49.0 |
| 19-1438 | 4-Sep-19 | KL_HU06 | 12.0 | 200.0 | Below | 0.0 | 648.0 | 7.4 | 9.0 |
| 19-1353 | 4-Sep-19 | KL_HU06 | 62.0 | 200.0 | Below | | 640.0 | 7.5 | 36.0 |
| 19-1607 | 5-Sep-19 | KL_HU06 | 24.4 | 200.0 | Below | 0.2 | 655.0 | 7.6 | 23.0 |
| 19-1608 | 6-Sep-19 | KL_HU06 | 20.4 | 200.0 | Below | 0.1 | 642.0 | 7.6 | 15.0 |
| 19-1609 | 7-Sep-19 | KL_HU06 | 71.6 | 200.0 | Below | 0.3 | 645.0 | 7.6 | 103.0 |
| 19-1610 | 8-Sep-19 | KL_HU06 | 72.4 | 200.0 | Below | 0.3 | 636.0 | 7.6 | 92.0 |
| 19-1611 | 9-Sep-19 | KL_HU06 | 68.4 | 200.0 | Below | 0.2 | 646.0 | 7.6 | 96.0 |
| 19-1612 | 10-Sep-19 | KL_HU06 | 125.6 | 200.0 | Below | 0.4 | 646.0 | 7.6 | 196.0 |
| 19-1613 | 11-Sep-19 | KL_HU06 | 135.2 | 200.0 | Below | 0.4 | 645.0 | 7.6 | 212.0 |
| 19-1614 | 12-Sep-19 | KL_HU06 | 224.0 | 200.0 | Above | 0.5 | 627.0 | 7.6 | 336.0 |
| 19-1615 | 13-Sep-19 | KL_HU06 | 245.2 | 200.0 | Above | 0.3 | 626.0 | 7.6 | 278.0 |
| 19-1616 | 14-Sep-19 | KL_HU06 | 238.4 | 200.0 | Above | 0.3 | 626.0 | 7.6 | 349.0 |
| 19-1617 | 15-Sep-19 | KL_HU06 | 210.4 | 200.0 | Above | 0.8 | 644.0 | 7.6 | 187.0 |
| 19-1618 | 16-Sep-19 | KL_HU06 | 36.8 | 200.0 | Below | 0.0 | 644.0 | 7.6 | 37.0 |
| 19-1619 | 17-Sep-19 | KL_HU06 | 68.8 | 200.0 | Below | 0.0 | 640.0 | 7.6 | 88.0 |
| 19-1620 | 18-Sep-19 | KL_HU06 | 103.2 | 200.0 | Below | 0.2 | 639.0 | 7.6 | 87.0 |
| 19-1621 | 19-Sep-19 | KL_HU06 | 89.2 | 200.0 | Below | 0.2 | 625.0 | 7.7 | 79.0 |
| 19-1622 | 20-Sep-19 | KL_HU06 | 39.6 | 200.0 | Below | 0.0 | 629.0 | 7.7 | 32.0 |
| 19-1623 | 21-Sep-19 | KL_HU06 | 95.2 | 200.0 | Below | 0.1 | 594.0 | 7.7 | 62.0 |
| 19-1624 | 22-Sep-19 | KL_HU06 | 87.2 | 200.0 | Below | 0.1 | 557.0 | 7.7 | 53.0 |
| 19-1514 | 23-Sep-19 | KL_HU06 | 18.4 | 200.0 | Below | 0.0 | 574.0 | 7.2 | 16.0 |
| 19-1625 | 23-Sep-19 | KL_HU06 | 226.4 | 200.0 | Above | | 600.0 | 7.7 | 150.0 |
| 19-0027 | 11-Jun-19 | KL_HU09 | 7.2 | 200.0 | Below | 0.0 | 509.0 | 7.5 | 5.0 |
| 19-0036 | 12-Jun-19 | KL_HU09 | 6.4 | 200.0 | Below | 0.0 | 596.0 | 7.7 | 16.0 |
| 19-0190 | 12-Jun-19 | KL_HU09 | 14.4 | 200.0 | Below | 0.0 | 515.0 | 8.2 | 18.0 |
| 19-0191 | 13-Jun-19 | KL_HU09 | 10.8 | 200.0 | Below | 0.0 | 515.0 | 8.1 | 4.0 |

## Appendix D.3 WQOM Data - 2019 Analytical Results

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-0192 | 14-Jun-19 | KL_HU09 | 40.0 | 200.0 | Below | 0.0 | 521.0 | 8.1 | 27.0 |
| 19-0193 | 15-Jun-19 | KL_HU09 | 26.8 | 200.0 | Below | 0.0 | 518.0 | 8.1 | 16.0 |
| 19-0194 | 16-Jun-19 | KL_HU09 | 32.4 | 200.0 | Below | 0.0 | 517.0 | 8.1 | 35.0 |
| 19-0195 | 17-Jun-19 | KL_HU09 | 60.0 | 200.0 | Below | 0.1 | 356.0 | 8.2 | 35.0 |
| 19-0196 | 18-Jun-19 | KL_HU09 | 18.0 | 200.0 | Below | 0.0 | 286.0 | 8.2 | 14.0 |
| 19-0197 | 19-Jun-19 | KL_HU09 | 21.6 | 200.0 | Below | 0.0 | 377.0 | 8.2 | 17.0 |
| 19-0198 | 20-Jun-19 | KL_HU09 | 78.7 | 200.0 | Below | 0.0 | 465.0 | 8.1 | 23.0 |
| 19-0199 | 21-Jun-19 | KL_HU09 | 21.6 | 200.0 | Below | 0.0 | 500.0 | 8.1 | 25.0 |
| 19-0200 | 22-Jun-19 | KL_HU09 | 18.4 | 200.0 | Below | 0.0 | 516.0 | 8.1 | 8.0 |
| 19-0201 | 23-Jun-19 | KL_HU09 | 6.0 | 200.0 | Below | 0.0 | 528.0 | 8.1 | 9.0 |
| 19-0202 | 24-Jun-19 | KL_HU09 | 20.0 | 200.0 | Below | 0.0 | 535.0 | 8.1 | 9.0 |
| 19-0203 | 25-Jun-19 | KL_HU09 | 8.4 | 200.0 | Below | 0.0 | 534.0 | 8.1 | 7.0 |
| 19-0204 | 26-Jun-19 | KL_HU09 | 16.4 | 200.0 | Below | 0.0 | 547.0 | 8.1 | 9.0 |
| 19-0205 | 27-Jun-19 | KL_HU09 | 10.8 | 200.0 | Below | 0.0 | 557.0 | 8.0 | 11.0 |
| 19-0206 | 28-Jun-19 | KL_HU09 | 18.0 | 200.0 | Below | 0.0 | 565.0 | 8.0 | 9.0 |
| 19-0207 | 29-Jun-19 | KL_HU09 | 10.4 | 200.0 | Below | 0.0 | 566.0 | 8.0 | 14.0 |
| 19-0208 | 30-Jun-19 | KL_HU09 | 16.0 | 200.0 | Below | 0.0 | 570.0 | 8.1 | 7.0 |
| 19-0209 | 1-Jul-19 | KL_HU09 | 8.0 | 200.0 | Below | 0.0 | 570.0 | 8.0 | 10.0 |
| 19-0210 | 2-Jul-19 | KL_HU09 | 16.4 | 200.0 | Below | 0.0 | 573.0 | 8.0 | 10.0 |
| 19-0258 | 3-Jul-19 | KL_HU09 | 3.2 | 200.0 | Below | 0.0 | 581.0 | 8.0 | 4.0 |
| 19-0211 | 3-Jul-19 | KL_HU09 | 11.2 | 200.0 | Below |  | 578.0 | 8.0 | 11.0 |
| 19-0743 | 4-Jul-19 | KL_HU09 | 6.4 | 200.0 | Below | 0.0 | 591.0 | 7.1 | 10.0 |
| 19-0744 | 5-Jul-19 | KL_HU09 | 8.8 | 200.0 | Below | 0.0 | 580.0 | 7.0 | 12.0 |
| 19-0745 | 6-Jul-19 | KL_HU09 | 8.0 | 200.0 | Below | 0.0 | 589.0 | 7.0 | 9.0 |
| 19-0746 | 7-Jul-19 | KL_HU09 | 5.6 | 200.0 | Below | 0.0 | 592.0 | 7.0 | 6.0 |
| 19-0747 | 8-Jul-19 | KL_HU09 | 8.8 | 200.0 | Below | 0.0 | 586.0 | 7.0 | 9.0 |
| 19-0748 | 9-Jul-19 | KL_HU09 | 13.2 | 200.0 | Below | 0.0 | 593.0 | 7.0 | 14.0 |
| 19-0749 | 10-Jul-19 | KL_HU09 | 3.2 | 200.0 | Below | 0.0 | 591.0 | 7.0 | 8.0 |
| 19-0750 | 11-Jul-19 | KL_HU09 | 4.8 | 200.0 | Below | 0.0 | 586.0 | 7.1 | 3.0 |
| 19-0751 | 12-Jul-19 | KL_HU09 | 6.8 | 200.0 | Below | 0.0 | 569.0 | 7.1 | 5.0 |
| 19-0752 | 13-Jul-19 | KL_HU09 | 8.0 | 200.0 | Below | 0.0 | 569.0 | 7.2 | 13.0 |
| 19-0753 | 14-Jul-19 | KL_HU09 | 5.6 | 200.0 | Below | 0.0 | 574.0 | 7.2 | 12.0 |
| 19-0754 | 15-Jul-19 | KL_HU09 | 9.6 | 200.0 | Below | 0.0 | 582.0 | 7.2 | 14.0 |
| 19-0755 | 16-Jul-19 | KL_HU09 | 461.2 | 200.0 | Above | 1.0 | 491.0 | 7.3 | 307.0 |
| 19-0756 | 17-Jul-19 | KL_HU09 | 131.6 | 200.0 | Below |  | 427.0 | 7.4 | 108.0 |
| 19-0757 | 18-Jul-19 | KL_HU09 | 18.8 | 200.0 | Below | 0.0 | 498.0 | 7.3 | 15.0 |
| 19-0758 | 19-Jul-19 | KL_HU09 | 13.2 | 200.0 | Below | 0.0 | 533.0 | 7.3 | 14.0 |
| 19-0759 | 20-Jul-19 | KL_HU09 | 6.4 | 200.0 | Below | 0.0 | 558.0 | 7.4 | 7.0 |
| 19-0760 | 21-Jul-19 | KL_HU09 | 4.8 | 200.0 | Below | 0.0 | 567.0 | 7.4 | 4.0 |
| 19-0761 | 22-Jul-19 | KL_HU09 | 6.0 | 200.0 | Below | 0.0 | 567.0 | 7.4 | 7.0 |
| 19-0713 | 23-Jul-19 | KL_HU09 | 1.6 | 200.0 | Below | 0.0 | 578.0 | 7.9 | 6.0 |
| 19-0762 | 23-Jul-19 | KL_HU09 | 10.8 | 200.0 | Below |  | 572.0 | 7.4 | 13.0 |
| 19-1038 | 24-Jul-19 | KL_HU09 | 12.4 | 200.0 | Below | 0.0 | 574.0 | 7.9 | 25.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-1039 | 25-Jul-19 | KL_HU09 | 6.4 | 200.0 | Below | 0.0 | 566.0 | 7.9 | 19.0 |
| 19-1040 | 26-Jul-19 | KL_HU09 | 12.4 | 200.0 | Below | 0.0 | 567.0 | 7.9 | 16.0 |
| 19-1041 | 27-Jul-19 | KL_HU09 | 19.2 | 200.0 | Below | 0.0 | 567.0 | 7.9 | 17.0 |
| 19-1042 | 28-Jul-19 | KL_HU09 | 16.8 | 200.0 | Below | 0.0 | 564.0 | 7.9 | 31.0 |
| 19-1043 | 29-Jul-19 | KL_HU09 | 6.0 | 200.0 | Below | 0.0 | 568.0 | 7.9 | 6.0 |
| 19-1044 | 30-Jul-19 | KL_HU09 | 3.6 | 200.0 | Below | 0.0 | 572.0 | 7.9 | 7.0 |
| 19-1045 | 31-Jul-19 | KL_HU09 | 10.8 | 200.0 | Below | 0.0 | 564.0 | 7.9 | 17.0 |
| 19-1046 | 1-Aug-19 | KL_HU09 | 5.2 | 200.0 | Below | 0.0 | 569.0 | 7.9 | 11.0 |
| 19-1047 | 2-Aug-19 | KL_HU09 | 14.8 | 200.0 | Below | 0.0 | 570.0 | 7.9 | 13.0 |
| 19-1048 | 3-Aug-19 | KL_HU09 | 4.8 | 200.0 | Below | 0.0 | 571.0 | 7.9 | 10.0 |
| 19-1049 | 4-Aug-19 | KL_HU09 | 6.4 | 200.0 | Below | 0.0 | 572.0 | 7.9 | 5.0 |
| 19-1050 | 5-Aug-19 | KL_HU09 | 1.6 | 200.0 | Below | 0.0 | 575.0 | 7.9 | 7.0 |
| 19-1051 | 6-Aug-19 | KL_HU09 | 10.8 | 200.0 | Below | 0.0 | 573.0 | 7.9 | 16.0 |
| 19-1052 | 7-Aug-19 | KL_HU09 | 6.4 | 200.0 | Below | 0.0 | 576.0 | 7.9 | 11.0 |
| 19-1053 | 8-Aug-19 | KL_HU09 | 4.8 | 200.0 | Below | 0.0 | 578.0 | 7.9 | 7.0 |
| 19-1054 | 9-Aug-19 | KL_HU09 | 4.4 | 200.0 | Below | 0.0 | 577.0 | 7.9 | 8.0 |
| 19-1055 | 10-Aug-19 | KL_HU09 | 11.2 | 200.0 | Below | 0.0 | 576.0 | 7.9 | 18.0 |
| 19-1056 | 11-Aug-19 | KL_HU09 | 10.4 | 200.0 | Below | 0.0 | 575.0 | 7.9 | 27.0 |
| 19-1068 | 12-Aug-19 | KL_HU09 | 5.2 | 200.0 | Below | 0.0 | 581.0 | 7.8 | 6.0 |
| 19-1057 | 12-Aug-19 | KL_HU09 | 20.4 | 200.0 | Below | | 574.0 | 7.9 | 32.0 |
| 19-1355 | 13-Aug-19 | KL_HU09 | 10.4 | 200.0 | Below | 0.0 | 581.0 | 7.5 | 15.0 |
| 19-1356 | 14-Aug-19 | KL_HU09 | 15.2 | 200.0 | Below | 0.0 | 579.0 | 7.5 | 27.0 |
| 19-1357 | 15-Aug-19 | KL_HU09 | 17.6 | 200.0 | Below | 0.0 | 583.0 | 7.5 | 22.0 |
| 19-1358 | 16-Aug-19 | KL_HU09 | 4.8 | 200.0 | Below | 0.0 | 576.0 | 7.5 | 14.0 |
| 19-1359 | 17-Aug-19 | KL_HU09 | 5.2 | 200.0 | Below | 0.0 | 569.0 | 7.5 | 6.0 |
| 19-1360 | 18-Aug-19 | KL_HU09 | 2.8 | 200.0 | Below | 0.0 | 577.0 | 7.5 | 3.0 |
| 19-1361 | 19-Aug-19 | KL_HU09 | 8.0 | 200.0 | Below | | 578.0 | 7.5 | 10.0 |
| 19-1362 | 20-Aug-19 | KL_HU09 | 1.6 | 200.0 | Below | 0.0 | 578.0 | 7.5 | 2.0 |
| 19-1363 | 21-Aug-19 | KL_HU09 | 4.4 | 200.0 | Below | 0.0 | 576.0 | 7.4 | 5.0 |
| 19-1364 | 22-Aug-19 | KL_HU09 | 10.8 | 200.0 | Below | | 579.0 | 7.4 | 7.0 |
| 19-1365 | 23-Aug-19 | KL_HU09 | 0.8 | 200.0 | Below | 0.0 | 580.0 | 7.4 | 3.0 |
| 19-1366 | 24-Aug-19 | KL_HU09 | 3.6 | 200.0 | Below | 0.0 | 578.0 | 7.4 | 3.0 |
| 19-1367 | 25-Aug-19 | KL_HU09 | 2.0 | 200.0 | Below | 0.0 | 578.0 | 7.4 | 3.0 |
| 19-1368 | 26-Aug-19 | KL_HU09 | 1.2 | 200.0 | Below | 0.0 | 579.0 | 7.4 | 2.0 |
| 19-1369 | 27-Aug-19 | KL_HU09 | 1.2 | 200.0 | Below | 0.0 | 579.0 | 7.4 | 0.0 |
| 19-1370 | 28-Aug-19 | KL_HU09 | 4.8 | 200.0 | Below | 0.0 | 580.0 | 7.4 | 7.0 |
| 19-1371 | 29-Aug-19 | KL_HU09 | 2.0 | 200.0 | Below | 0.0 | 579.0 | 7.4 | 0.0 |
| 19-1372 | 30-Aug-19 | KL_HU09 | 2.4 | 200.0 | Below | 0.0 | 581.0 | 7.4 | 3.0 |
| 19-1373 | 31-Aug-19 | KL_HU09 | 0.8 | 200.0 | Below | 0.0 | 582.0 | 7.4 | 3.0 |
| 19-1374 | 1-Sep-19 | KL_HU09 | 0.8 | 200.0 | Below | 0.0 | 581.0 | 7.4 | 3.0 |
| 19-1375 | 2-Sep-19 | KL_HU09 | 1.6 | 200.0 | Below | 0.0 | 582.0 | 7.4 | 2.0 |
| 19-1376 | 3-Sep-19 | KL_HU09 | 3.6 | 200.0 | Below | 0.0 | 581.0 | 7.4 | 7.0 |
| 19-1436 | 4-Sep-19 | KL_HU09 | 2.0 | 200.0 | Below | 0.0 | 582.0 | 7.4 | 5.0 |

| Lab ID | Sample Date | Site ID | TSS (mg/L) | WQO (TSS in mg/L) | Above or Below WQO? | Settable Solids (mL/L) | Conductivity (uS/cm) | pH | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|
| 19-1377 | 4-Sep-19 | KL_HU09 | 3.6 | 200.0 | Below | | 584.0 | 7.4 | 5.0 |
| 19-1828 | 5-Sep-19 | KL_HU09 | 2.0 | 200.0 | Below | 0.0 | 578.0 | 7.6 | 5.0 |
| 19-1829 | 6-Sep-19 | KL_HU09 | 2.8 | 200.0 | Below | 0.0 | 579.0 | 7.6 | 4.0 |
| 19-1830 | 7-Sep-19 | KL_HU09 | 1.2 | 200.0 | Below | 0.0 | 578.0 | 7.6 | 3.0 |
| 19-1831 | 8-Sep-19 | KL_HU09 | 1.2 | 200.0 | Below | 0.0 | 579.0 | 7.7 | 2.0 |
| 19-1832 | 9-Sep-19 | KL_HU09 | 1.2 | 200.0 | Below | 0.0 | 578.0 | 7.7 | 4.0 |
| 19-1833 | 10-Sep-19 | KL_HU09 | 1.6 | 200.0 | Below | 0.0 | 578.0 | 7.7 | 5.0 |
| 19-1834 | 11-Sep-19 | KL_HU09 | 0.8 | 200.0 | Below | 0.0 | 578.0 | 7.7 | 3.0 |
| 19-1835 | 12-Sep-19 | KL_HU09 | 1.6 | 200.0 | Below | 0.0 | 578.0 | 7.7 | 5.0 |
| 19-1836 | 13-Sep-19 | KL_HU09 | 2.4 | 200.0 | Below | 0.0 | 578.0 | 7.7 | 5.0 |
| 19-1837 | 14-Sep-19 | KL_HU09 | 3.6 | 200.0 | Below | 0.0 | 578.0 | 7.7 | 4.0 |
| 19-1838 | 15-Sep-19 | KL_HU09 | 0.8 | 200.0 | Below | 0.0 | 580.0 | 7.7 | 4.0 |
| 19-1839 | 16-Sep-19 | KL_HU09 | 2.0 | 200.0 | Below | 0.0 | 582.0 | 7.7 | 3.0 |
| 19-1840 | 17-Sep-19 | KL_HU09 | 2.4 | 200.0 | Below | 0.0 | 578.0 | 7.7 | 4.0 |
| 19-1841 | 18-Sep-19 | KL_HU09 | 3.2 | 200.0 | Below | 0.0 | 572.0 | 7.7 | 9.0 |
| 19-1842 | 19-Sep-19 | KL_HU09 | 4.4 | 200.0 | Below | 0.0 | 556.0 | 7.7 | 17.0 |
| 19-1843 | 20-Sep-19 | KL_HU09 | 4.0 | 200.0 | Below | 0.0 | 561.0 | 7.8 | 7.0 |
| 19-1844 | 21-Sep-19 | KL_HU09 | 42.4 | 200.0 | Below | 0.4 | 502.0 | 7.8 | 95.0 |
| 19-1845 | 22-Sep-19 | KL_HU09 | 6.4 | 200.0 | Below | 0.0 | 468.0 | 7.8 | 16.0 |
| 19-1512 | 23-Sep-19 | KL_HU09 | 6.8 | 200.0 | Below | 0.0 | 511.0 | 7.2 | 8.0 |
| 19-1846 | 23-Sep-19 | KL_HU09 | 14.8 | 200.0 | Below | | 494.0 | 7.8 | 32.0 |

# APPENDIX E

## Detailed Benthic Invertebrate Data

**Project: Adaptive Management 2020**
Yukon Territory Government (YTG)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site: | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 |
| Sample: | YPS-544 | YPS-612 rep1 | YPS-612 rep2 | YPS-612 rep3 | YPS-613 | YPS-051 | YPS-614 | YPS-078 | YPS-079 | YPS-080 | YPS-611 | YPS-621 |
| Sample Collection Date: | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 29-Jul-20 | 29-Jul-20 | 29-Jul-20 | 29-Jul-20 | 29-Jul-20 |
| CC#: | CC210204 | CC210205 | CC210206 | CC210207 | CC210208 | CC210209 | CC210210 | CC210211 | CC210212 | CC210213 | CC210214 | CC210215 |
| **Richness Measures** | | | | | | | | | | | | |
| Species Richness | 23 | 17 | 21 | 24 | 24 | 41 | 29 | 34 | 24 | 27 | 25 | 27 |
| EPT Richness | 2 | 4 | 4 | 6 | 3 | 9 | 8 | 12 | 7 | 9 | 10 | 10 |
| Ephemeroptera Richness | 1 | 2 | 2 | 3 | 2 | 3 | 3 | 5 | 2 | 4 | 4 | 4 |
| Plecoptera Richness | | 1 | 1 | 2 | 1 | 3 | 1 | 5 | 3 | 2 | 3 | 3 |
| Trichoptera Richness | 1 | 1 | 1 | 1 | | 3 | 4 | 2 | 2 | 3 | 3 | 3 |
| Chironomidae Richness | 8 | 9 | 8 | 10 | 10 | 14 | 9 | 9 | 12 | 10 | 7 | 7 |
| Oligochaeta Richness | 1 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 |
| Non-Chiro. Non-Olig. Richness | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **Abundance Measures** | | | | | | | | | | | | |
| Corrected Abundance | 198 | 1050 | 916 | 1364 | 381 | 219 | 220 | 384 | 484 | 315 | 1955 | 1044 |
| EPT Abundance | 2 | 21 | 34 | 68 | 6 | 35 | 44 | 273 | 27 | 71 | 600 | 248 |
| | | | | | | | | | | | | |
| **Dominance Measures** | | | | | | | | | | | | |
| 1st Dominant Taxon | Orthocladius complex | Orthocladius complex | Orthocladius complex | Orthocladius complex | Orthocladius complex | Orthocladius complex | Orthocladius complex | Baetis | Orthocladius complex | Orthocladius complex | Orthocladius complex | Orthocladius complex |
| 1st Dominant Abundance | 129 | 752 | 619 | 891 | 294 | 86 | 73 | 107 | 180 | 140 | 601 | 455 |
| 2nd Dominant Taxon | Micropsectra | Eukiefferiella | Eukiefferiella | Diamesa | Pagastia | Eukiefferiella | Lumbriculidae | Baetis bicaudatus | Eukiefferiella | Diamesa | Eukiefferiella | Baetis |
| 2nd Dominant Abundance | 28 | 119 | 119 | 111 | 18 | 22 | 31 | 88 | 144 | 42 | 501 | 138 |
| 3rd Dominant Taxon | Enchytraeus | Diamesa | Diamesa | Eukiefferiella | Micropsectra | Baetis | Eukiefferiella | Cinygmula | Diamesa | Eukiefferiella | Baetis | Eukiefferiella |
| 3rd Dominant Abundance | 10 | 81 | 72 | 111 | 12 | 19 | 28 | 26 | 101 | 31 | 206 | 86 |
| % 1 Dominant Taxon | 65.00% | 71.60% | 67.54% | 65.34% | 77.10% | 39.31% | 33.09% | 27.77% | 37.21% | 44.55% | 30.75% | 43.56% |
| % 2 Dominant Taxon | 14.13% | 11.37% | 12.99% | 8.13% | 4.84% | 9.95% | 14.09% | 23.01% | 29.82% | 13.37% | 25.64% | 13.22% |
| % 3 Dominant Taxon | 5.05% | 7.73% | 7.91% | 8.13% | 3.22% | 8.68% | 12.76% | 6.82% | 20.94% | 9.90% | 10.54% | 8.21% |
| Percent Dominance | 84.19% | 90.71% | 88.43% | 81.60% | 85.15% | 57.93% | 59.95% | 57.60% | 87.97% | 67.82% | 66.93% | 64.99% |
| | | | | | | | | | | | | |
| **Community Composition** | | | | | | | | | | | | |
| % Ephemeroptera | 0.51% | 1.43% | 2.62% | 3.23% | 1.31% | 13.24% | 15.00% | 61.72% | 4.13% | 9.21% | 20.46% | 19.16% |
| % Plecoptera | | 0.29% | 0.22% | 0.88% | 0.26% | 1.37% | 0.45% | 7.55% | 0.62% | 0.63% | 4.25% | 2.01% |
| % Trichoptera | 0.51% | 0.29% | 0.87% | 0.88% | | 1.37% | 4.55% | 1.82% | 0.83% | 12.70% | 5.98% | 2.59% |
| % EPT | 1.01% | 2.00% | 3.71% | 4.99% | 1.57% | 15.98% | 20.00% | 71.09% | 5.58% | 22.54% | 30.69% | 23.75% |
| % Diptera | 87.37% | 96.00% | 92.58% | 92.96% | 95.01% | 78.54% | 63.18% | 24.74% | 93.80% | 75.87% | 66.29% | 66.67% |
| % Oligochaeta | 5.05% | 2.00% | 2.73% | 1.76% | 2.62% | 2.74% | 14.09% | 1.30% | 0.21% | 0.63% | 0.31% | 7.28% |
| % Baetidae | 0.51% | 1.43% | 2.62% | 2.93% | 1.31% | 12.79% | 13.18% | 50.78% | 4.13% | 6.35% | 19.54% | 18.58% |
| % Chironomidae | 85.35% | 95.43% | 91.70% | 90.03% | 91.60% | 72.15% | 59.09% | 13.42% | 93.39% | 71.75% | 60.26% | 61.49% |
| % Odonata | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **Functional Group Composition** | | | | | | | | | | | | |
| % Predators | 6.06% | 0.57% | 1.42% | 2.35% | 3.94% | 6.39% | 5.45% | 9.44% | 1.45% | 14.29% | 12.33% | 9.34% |
| % Shredder-Herbivores | | | | 1.47% | 0.26% | 0.91% | 1.82% | 7.55% | 1.81% | 0.96% | 4.57% | 0.29% |
| % Collector-Gatherers | 90.22% | 87.19% | 84.28% | 85.99% | 93.11% | 78.59% | 74.49% | 61.02% | 66.43% | 68.17% | 54.45% | 79.43% |
| % Scrapers | 2.02% | | | 0.29% | | 1.37% | 3.64% | 11.88% | | 5.71% | 0.61% | 0.57% |
| % Macrophyte-Herbivore | | | | | | | | | | | | 0.29% |
| % Collector-Filterer | 1.70% | 0.29% | | 0.60% | 0.27% | 0.95% | | 2.50% | | | 2.40% | |
| % Omnivore | | 11.66% | 13.86% | 9.01% | 2.42% | 10.86% | 14.13% | 7.35% | 30.31% | 10.55% | 25.64% | 9.65% |
| % Parasite | | | | | | | | | | | | |
| % Piercer-Herbivore | | | | | | | | | | | | |
| % Gatherer | | | | | | | | | | | | |
| % Unclassified | | 0.29% | 0.44% | 0.29% | | 0.91% | 0.47% | 0.26% | | 0.32% | | 0.43% |

**Project: Adaptive Management 2020**
Yukon Territory Government (YTG)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

| Site: | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample: | YPS-544 | YPS-612 rep1 | YPS-612 rep2 | YPS-612 rep3 | YPS-613 | YPS-051 | YPS-614 | YPS-078 | YPS-079 | YPS-080 | YPS-611 | YPS-621 |
| Sample Collection Date: | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 29-Jul-20 | 29-Jul-20 | 29-Jul-20 | 29-Jul-20 | 29-Jul-20 |
| CC#: | CC210204 | CC210205 | CC210206 | CC210207 | CC210208 | CC210209 | CC210210 | CC210211 | CC210212 | CC210213 | CC210214 | CC210215 |
| | | | | | | | | | | | | |
| **Functional Group Richness** | | | | | | | | | | | | |
| Predators Richness | 9 | 2 | 5 | 5 | 7 | 9 | 7 | 8 | 5 | 6 | 8 | 10 |
| Shredder-Herbivores Richness | | | | 2 | 1 | 2 | 4 | 5 | 6 | 3 | 4 | 1 |
| Collector-Gatherers Richness | 11 | 11 | 12 | 12 | 14 | 20 | 12 | 13 | 11 | 10 | 9 | 10 |
| Scrapers Richness | 2 | | | 1 | | 3 | 3 | 3 | | 4 | 1 | 2 |
| MH Richness | | | | | | | | | | | | 1 |
| CF Richness | 1 | 1 | | 1 | 1 | 2 | | 2 | | | 2 | |
| OM Richness | | 2 | 2 | 2 | 1 | 3 | 2 | 2 | 2 | 3 | 1 | 2 |
| PA Richness | | | | | | | | | | | | |
| Piercer-Herbivore Richness | | | | | | | | | | | | |
| Gatherer Richness | | | | | | | | | | | | |
| Unclassified | | 1 | 2 | 1 | | 2 | 1 | 1 | | 1 | | 1 |
| | | | | | | | | | | | | |
| **EPA Functional Group Composition** | | | | | | | | | | | | |
| % Predators | | | | | | | | | | | | |
| % Parasite | | | | | | | | | | | | |
| % Collector-Gatherers | | | | | | | | | | | | |
| % Collector-Filterer | | | | | | | | | | | | |
| % Macrophyte-Herbivore | | | | | | | | | | | | |
| % Xylophage | | | | | | | | | | | | |
| % Scraper | | | | | | | | | | | | |
| % Shredder | | | | | | | | | | | | |
| % Piercer | | | | | | | | | | | | |
| % Omnivore | | | | | | | | | | | | |
| % Unclassified | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **EPA Functional Group Richness** | | | | | | | | | | | | |
| Predators | | | | | | | | | | | | |
| Parasite | | | | | | | | | | | | |
| Collector-Gatherers | | | | | | | | | | | | |
| Collector-Filterer | | | | | | | | | | | | |
| Macrophyte-Herbivore | | | | | | | | | | | | |
| Xylophage | | | | | | | | | | | | |
| Scraper | | | | | | | | | | | | |
| Shredder | | | | | | | | | | | | |
| Piercer | | | | | | | | | | | | |
| Omnivore | | | | | | | | | | | | |
| Unclassified | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **SAFIT Functional Group Composition** | | | | | | | | | | | | |
| % Predators | | | | | | | | | | | | |
| % Parasite | | | | | | | | | | | | |
| % Collector-Gatherers | | | | | | | | | | | | |
| % Collector-Filterer | | | | | | | | | | | | |
| % Macrophyte-Herbivore | | | | | | | | | | | | |
| % Periphyton-Herbivore | | | | | | | | | | | | |
| % Scraper | | | | | | | | | | | | |
| % Shredder | | | | | | | | | | | | |
| % Omnivore | | | | | | | | | | | | |
| % Unclassified | | | | | | | | | | | | |
| | | | | | | | | | | | | |

**Project: Adaptive Management 2020**
Yukon Territory Government (YTG)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

| Site: | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample: | YPS-544 | YPS-612 rep1 | YPS-612 rep2 | YPS-612 rep3 | YPS-613 | YPS-051 | YPS-614 | YPS-078 | YPS-079 | YPS-080 | YPS-611 | YPS-621 |
| Sample Collection Date: | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 28-Jul-20 | 29-Jul-20 | 29-Jul-20 | 29-Jul-20 | 29-Jul-20 | 29-Jul-20 |
| CC#: | CC210204 | CC210205 | CC210206 | CC210207 | CC210208 | CC210209 | CC210210 | CC210211 | CC210212 | CC210213 | CC210214 | CC210215 |
| **SAFIT Functional Group Richness** | | | | | | | | | | | | |
| Predators | | | | | | | | | | | | |
| Parasite | | | | | | | | | | | | |
| Collector-Gatherers | | | | | | | | | | | | |
| Collector-Filterer | | | | | | | | | | | | |
| Macrophyte-Herbivore | | | | | | | | | | | | |
| Periphyton-Herbivore | | | | | | | | | | | | |
| Scraper | | | | | | | | | | | | |
| Shredder | | | | | | | | | | | | |
| Omnivore | | | | | | | | | | | | |
| Unclassified | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **EPA Habitat Composition** | | | | | | | | | | | | |
| % Clinger | | | | | | | | | | | | |
| % Climber | | | | | | | | | | | | |
| % Sprawler | | | | | | | | | | | | |
| % Burrower | | | | | | | | | | | | |
| % Swimmer | | | | | | | | | | | | |
| % Diver | | | | | | | | | | | | |
| % Skater | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **EPA Habitat Richness** | | | | | | | | | | | | |
| Clinger | | | | | | | | | | | | |
| Climber | | | | | | | | | | | | |
| Sprawler | | | | | | | | | | | | |
| Burrower | | | | | | | | | | | | |
| Swimmer | | | | | | | | | | | | |
| Diver | | | | | | | | | | | | |
| Skater | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **Voltinism Composition** | | | | | | | | | | | | |
| % Univoltine | | 0.29% | 0.22% | 0.59% | 1.05% | 0.91% | 0.45% | 3.40% | 0.41% | 0.63% | 0.97% | 1.15% |
| % Semivoltine | | | | | | | | 5.73% | | 0.32% | 1.32% | |
| % Multivoltine | | 0.86% | 2.18% | 2.44% | 0.79% | 9.13% | 5.91% | 28.88% | 3.58% | 4.76% | 12.02% | 13.22% |
| | | | | | | | | | | | | |
| **Voltinism Richness** | | | | | | | | | | | | |
| Univoltine | | 1 | 1 | 1 | 2 | 1 | 1 | 3 | 2 | 1 | 2 | 2 |
| Semivoltine | | | | | | | | 1 | | 1 | 1 | |
| Multivoltine | | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 1 |
| | | | | | | | | | | | | |
| **Diversity/Evenness Measures** | | | | | | | | | | | | |
| Shannon-Weiner H' (log 10) | 0.63 | 0.49 | 0.55 | 0.65 | 0.50 | 1.08 | 1.01 | 1.09 | 0.70 | 0.89 | 0.94 | 0.92 |
| Shannon-Weiner H' (log 2) | 2.10 | 1.63 | 1.84 | 2.17 | 1.66 | 3.60 | 3.35 | 3.61 | 2.33 | 2.96 | 3.12 | 3.06 |
| Shannon-Weiner H' (log e) | 1.45 | 1.13 | 1.28 | 1.51 | 1.15 | 2.50 | 2.32 | 2.50 | 1.62 | 2.05 | 2.16 | 2.12 |
| Simpson's Index (D) | 0.44 | 0.53 | 0.48 | 0.44 | 0.60 | 0.18 | 0.16 | 0.15 | 0.27 | 0.24 | 0.18 | 0.23 |
| Simpson's Index of Diversity (1 - D) | 0.56 | 0.47 | 0.52 | 0.56 | 0.40 | 0.82 | 0.84 | 0.85 | 0.73 | 0.76 | 0.82 | 0.77 |
| Simpson's Reciprocal Index (1/D) | 2.25 | 1.88 | 2.08 | 2.26 | 1.67 | 5.55 | 6.23 | 6.86 | 3.68 | 4.24 | 5.44 | 4.43 |
| | | | | | | | | | | | | |
| **Biotic Indices** | | | | | | | | | | | | |
| Hilsenhoff Biotic Index | 6.40 | 6.10 | 6.14 | 5.88 | 5.93 | 5.59 | 5.75 | 4.39 | 6.21 | 4.90 | 5.63 | 5.61 |

**Project: Adaptive Management 2020**
Yukon Territory Government (YTG)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553


| Site: | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample: | YPS-A1 rep1 | YPS-A1 rep2 | YPS-A1 rep3 | YPS-A2 | YPS-A3 | YPS-A4 | YPS-A5 rep1 | YPS-A5 rep2 | YPS-A5 rep3 | YPS-386 |
| Sample Collection Date: | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 |
| CC#: | CC210216 | CC210217 | CC210218 | CC210219 | CC210220 | CC210221 | CC210222 | CC210223 | CC210224 | CC210225 |
| **Richness Measures** | | | | | | | | | | |
| Species Richness | 31 | 27 | 21 | 29 | 23 | 30 | 31 | 17 | 30 | 33 |
| EPT Richness | 8 | 8 | 10 | 10 | 6 | 9 | 8 | 8 | 9 | 17 |
| Ephemeroptera Richness | 4 | 4 | 4 | 5 | 3 | 3 | 4 | 4 | 4 | 7 |
| Plecoptera Richness | 4 | 4 | 6 | 5 | 3 | 5 | 3 | 4 | 4 | 7 |
| Trichoptera Richness | | | | | | 1 | 1 | | 1 | 3 |
| Chironomidae Richness | 10 | 8 | 5 | 10 | 8 | 7 | 8 | 4 | 7 | 8 |
| Oligochaeta Richness | 2 | 1 | | 2 | 1 | 1 | 1 | | 1 | 2 |
| Non-Chiro. Non-Olig. Richness | | | | | | | | | | |
| | | | | | | | | | | |
| **Abundance Measures** | | | | | | | | | | |
| Corrected Abundance | 537 | 387 | 262 | 282 | 896 | 1640 | 2000 | 1356 | 1884 | 2136 |
| EPT Abundance | 101 | 70 | 46 | 91 | 51 | 110 | 140 | 94 | 184 | 1175 |
| | | | | | | | | | | |
| **Dominance Measures** | | | | | | | | | | |
| 1st Dominant Taxon | Diamesa | Diamesa | Diamesa | Diamesa | Diamesa | Diamesa | Diamesa | Diamesa | Diamesa | Simulium |
| 1st Dominant Abundance | 194 | 196 | 106 | 64 | 401 | 529 | 920 | 557 | 639 | 438 |
| 2nd Dominant Taxon | Lappodiamesa | Orthocladius complex | Lappodiamesa | Chironomidae | Gymnopais | Lumbriculidae | Eukiefferiella | Gymnopais | Gymnopais | Cinygmula |
| 2nd Dominant Abundance | 64 | 23 | 24 | 39 | 92 | 275 | 305 | 287 | 364 | 322 |
| 3rd Dominant Taxon | Orthocladius complex | Heptageniidae | Orthocladius complex | Cinygmula | Prosimulium/Helodon | Eukiefferiella | Gymnopais | Eukiefferiella | Eukiefferiella | Acentrella |
| 3rd Dominant Abundance | 58 | 21 | 24 | 32 | 86 | 256 | 290 | 223 | 255 | 300 |
| % 1 Dominant Taxon | 36.21% | 50.67% | 40.53% | 22.82% | 44.75% | 32.28% | 45.99% | 41.05% | 33.92% | 20.51% |
| % 2 Dominant Taxon | 11.99% | 5.94% | 9.31% | 13.91% | 10.23% | 16.77% | 15.24% | 21.14% | 19.30% | 15.06% |
| % 3 Dominant Taxon | 10.74% | 5.43% | 9.31% | 11.37% | 9.58% | 15.62% | 14.50% | 16.45% | 13.51% | 14.04% |
| Percent Dominance | 58.94% | 62.04% | 59.15% | 48.10% | 64.55% | 64.67% | 75.72% | 78.64% | 66.73% | 49.61% |
| | | | | | | | | | | |
| **Community Composition** | | | | | | | | | | |
| % Ephemeroptera | 9.87% | 11.11% | 10.31% | 19.86% | 2.68% | 2.13% | 4.45% | 3.32% | 4.46% | 43.63% |
| % Plecoptera | 8.94% | 6.98% | 7.25% | 12.41% | 3.01% | 4.27% | 2.00% | 3.61% | 4.14% | 8.47% |
| % Trichoptera | | | | | | 0.30% | 0.55% | | 1.17% | 2.90% |
| % EPT | 18.81% | 18.09% | 17.56% | 32.27% | 5.69% | 6.71% | 7.00% | 6.93% | 9.77% | 55.01% |
| % Diptera | 78.77% | 80.62% | 82.06% | 63.12% | 92.75% | 72.26% | 89.00% | 92.77% | 87.74% | 43.02% |
| % Oligochaeta | 1.30% | 0.26% | | 2.13% | 0.56% | 16.77% | 0.30% | | 0.32% | 1.12% |
| % Baetidae | 3.54% | 4.65% | 2.67% | 5.67% | 0.89% | 1.83% | 3.35% | 2.73% | 2.07% | 15.22% |
| % Chironomidae | 71.68% | 73.39% | 66.27% | 51.71% | 66.74% | 57.62% | 69.50% | 68.22% | 62.58% | 15.82% |
| % Odonata | | | | | | | | | | |
| | | | | | | | | | | |
| **Functional Group Composition** | | | | | | | | | | |
| % Predators | 1.87% | 2.84% | 10.39% | 4.63% | 5.80% | 3.05% | 2.25% | 0.29% | 0.93% | 13.11% |
| % Shredder-Herbivores | 9.12% | 6.98% | 6.11% | 12.41% | 3.35% | 4.27% | 2.85% | 3.61% | 4.46% | 5.24% |
| % Collector-Gatherers | 69.40% | 71.56% | 63.46% | 44.52% | 60.19% | 61.82% | 59.86% | 54.49% | 55.92% | 35.33% |
| % Scrapers | 11.49% | 10.32% | 13.41% | 19.83% | 11.46% | 7.66% | 15.05% | 21.73% | 19.62% | 20.79% |
| % Macrophyte-Herbivore | | | | | | | | | | |
| % Collector-Filterer | 0.26% | 0.28% | 0.77% | 0.42% | 9.97% | 5.15% | 2.50% | 3.42% | 4.32% | 20.51% |
| % Omnivore | 7.49% | 6.99% | 5.48% | 2.50% | 9.23% | 15.62% | 15.79% | 16.45% | 14.12% | 4.75% |
| % Parasite | | | | | | | | | | |
| % Piercer-Herbivore | | | | | | | | | | |
| % Gatherer | | | | | | | | | | |
| % Unclassified | 0.37% | 1.03% | 0.38% | 15.68% | | 2.44% | 1.70% | | 0.64% | 0.28% |

**Project: Adaptive Management 2020**
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scottfinlayson@cordilleraconsulting.ca
250-494-7553

| Site: | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample: | YPS-A1 rep1 | YPS-A1 rep2 | YPS-A1 rep3 | YPS-A2 | YPS-A3 | YPS-A4 | YPS-A5 rep1 | YPS-A5 rep2 | YPS-A5 rep3 | YPS-386 |
| Sample Collection Date: | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 |
| CC#: | CC210216 | CC210217 | CC210218 | CC210219 | CC210220 | CC210221 | CC210222 | CC210223 | CC210224 | CC210225 |
| | | | | | | | | | | |
| **Functional Group Richness** | | | | | | | | | | |
| Predators Richness | 4 | 3 | 5 | 2 | 2 | 6 | 4 | 1 | 2 | 9 |
| Shredder-Herbivores Richness | 5 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 |
| Collector-Gatherers Richness | 14 | 10 | 6 | 13 | 10 | 11 | 14 | 5 | 14 | 14 |
| Scrapers Richness | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| MH Richness | | | | | | | | | | |
| CF Richness | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 1 |
| OM Richness | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 2 |
| PA Richness | | | | | | | | | | |
| Piercer-Herbivore Richness | | | | | | | | | | |
| Gatherer Richness | | | | | | | | | | |
| Unclassified | 2 | 4 | 1 | 3 | | 2 | 2 | | 2 | 1 |
| | | | | | | | | | | |
| **EPA Functional Group Composition** | | | | | | | | | | |
| % Predators | | | | | | | | | | |
| % Parasite | | | | | | | | | | |
| % Collector-Gatherers | | | | | | | | | | |
| % Collector-Filterer | | | | | | | | | | |
| % Macrophyte-Herbivore | | | | | | | | | | |
| % Xylophage | | | | | | | | | | |
| % Scraper | | | | | | | | | | |
| % Shredder | | | | | | | | | | |
| % Piercer | | | | | | | | | | |
| % Omnivore | | | | | | | | | | |
| % Unclassified | | | | | | | | | | |
| | | | | | | | | | | |
| **EPA Functional Group Richness** | | | | | | | | | | |
| Predators | | | | | | | | | | |
| Parasite | | | | | | | | | | |
| Collector-Gatherers | | | | | | | | | | |
| Collector-Filterer | | | | | | | | | | |
| Macrophyte-Herbivore | | | | | | | | | | |
| Xylophage | | | | | | | | | | |
| Scraper | | | | | | | | | | |
| Shredder | | | | | | | | | | |
| Piercer | | | | | | | | | | |
| Omnivore | | | | | | | | | | |
| Unclassified | | | | | | | | | | |
| | | | | | | | | | | |
| **SAFIT Functional Group Composition** | | | | | | | | | | |
| % Predators | | | | | | | | | | |
| % Parasite | | | | | | | | | | |
| % Collector-Gatherers | | | | | | | | | | |
| % Collector-Filterer | | | | | | | | | | |
| % Macrophyte-Herbivore | | | | | | | | | | |
| % Periphyton-Herbivore | | | | | | | | | | |
| % Scraper | | | | | | | | | | |
| % Shredder | | | | | | | | | | |
| % Omnivore | | | | | | | | | | |
| % Unclassified | | | | | | | | | | |
| | | | | | | | | | | |

**Project: Adaptive Management 2020**
Yukon Territory Government (YTG)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

| Site: | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample: | YPS-A1 rep1 | YPS-A1 rep2 | YPS-A1 rep3 | YPS-A2 | YPS-A3 | YPS-A4 | YPS-A5 rep1 | YPS-A5 rep2 | YPS-A5 rep3 | YPS-386 |
| Sample Collection Date: | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 | 30-Jul-20 |
| CC#: | CC210216 | CC210217 | CC210218 | CC210219 | CC210220 | CC210221 | CC210222 | CC210223 | CC210224 | CC210225 |
| **SAFIT Functional Group Richness** | | | | | | | | | | |
| Predators | | | | | | | | | | |
| Parasite | | | | | | | | | | |
| Collector-Gatherers | | | | | | | | | | |
| Collector-Filterer | | | | | | | | | | |
| Macrophyte-Herbivore | | | | | | | | | | |
| Periphyton-Herbivore | | | | | | | | | | |
| Scraper | | | | | | | | | | |
| Shredder | | | | | | | | | | |
| Omnivore | | | | | | | | | | |
| Unclassified | | | | | | | | | | |
| | | | | | | | | | | |
| **EPA Habitat Composition** | | | | | | | | | | |
| % Clinger | | | | | | | | | | |
| % Climber | | | | | | | | | | |
| % Sprawler | | | | | | | | | | |
| % Burrower | | | | | | | | | | |
| % Swimmer | | | | | | | | | | |
| % Diver | | | | | | | | | | |
| % Skater | | | | | | | | | | |
| | | | | | | | | | | |
| **EPA Habitat Richness** | | | | | | | | | | |
| Clinger | | | | | | | | | | |
| Climber | | | | | | | | | | |
| Sprawler | | | | | | | | | | |
| Burrower | | | | | | | | | | |
| Swimmer | | | | | | | | | | |
| Diver | | | | | | | | | | |
| Skater | | | | | | | | | | |
| | | | | | | | | | | |
| **Voltinism Composition** | | | | | | | | | | |
| % Univoltine | 0.37% | 0.78% | 0.39% | 1.06% | 0.89% | 0.91% | 1.10% | | 2.68% | 1.17% |
| % Semivoltine | 2.42% | | 1.53% | 4.26% | | | 0.30% | | | 0.56% |
| % Multivoltine | 3.33% | 3.72% | 1.53% | 1.89% | 1.23% | 1.52% | 2.63% | 2.40% | 1.49% | 21.40% |
| | | | | | | | | | | |
| **Voltinism Richness** | | | | | | | | | | |
| Univoltine | 1 | 1 | 1 | 1 | 1 | 2 | 2 | | 2 | 1 |
| Semivoltine | 1 | | 1 | 1 | | | 1 | | | 1 |
| Multivoltine | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 |
| | | | | | | | | | | |
| **Diversity/Evenness Measures** | | | | | | | | | | |
| Shannon-Weiner H' (log 10) | 1.02 | 0.90 | 0.95 | 1.17 | 0.88 | 1.01 | 0.85 | 0.76 | 0.93 | 1.17 |
| Shannon-Weiner H' (log 2) | 3.40 | 2.98 | 3.15 | 3.90 | 2.91 | 3.34 | 2.84 | 2.51 | 3.10 | 3.88 |
| Shannon-Weiner H' (log e) | 2.36 | 2.06 | 2.19 | 2.70 | 2.02 | 2.32 | 1.97 | 1.74 | 2.15 | 2.69 |
| Simpson's Index (D) | 0.17 | 0.27 | 0.20 | 0.10 | 0.24 | 0.17 | 0.26 | 0.25 | 0.19 | 0.10 |
| Simpson's Index of Diversity (1 - D) | 0.83 | 0.73 | 0.80 | 0.90 | 0.76 | 0.83 | 0.74 | 0.75 | 0.81 | 0.90 |
| Simpson's Reciprocal Index (1/D) | 5.90 | 3.66 | 5.09 | 10.04 | 4.24 | 5.99 | 3.83 | 4.00 | 5.27 | 9.68 |
| | | | | | | | | | | |
| **Biotic Indices** | | | | | | | | | | |
| Hilsenhoff Biotic Index | 4.01 | 4.48 | 3.63 | 3.98 | 4.25 | 5.12 | 4.47 | 4.37 | 4.18 | 4.08 |

# APPENDIX F

## Stream Flow Measurements

## APPENDIX F Stream Flow Measurements

| Site ID | Date | Channel Width (m) | Channel Depth (m) | Channel Velocity (m/s) | Discharge (m3/s) |
|---|---|---|---|---|---|
| | | Wetted | Mean | Mean | Run |
| KL_AL01 | 25/09/2020 | 1.4 | 0.2 | 0.5 | 0.7 |
| KL_AL02 | 25/09/2020 | 0.6 | 0.2 | 0.3 | 0.2 |
| KL_BO_AD_SG01 | 23/09/2020 | 0.2 | 0.1 | 0.2 | 0.0 |
| KL_BO_AD01 (YPS-622) | 30/07/2020 | 4.0 | 0.2 | 0.5 | 0.2 |
| KL_BO_AD01 (YPS-622) | 23/09/2020 | 0.4 | 0.1 | 0.2 | 0.1 |
| KL_BO_AD02 (YPS-623) | 30/07/2020 | 2.5 | 0.2 | 0.5 | 0.2 |
| KL_BO_AD02 (YPS-623) | 23/09/2020 | 0.4 | 0.1 | 0.6 | 0.2 |
| KL_BO_AD03 (YPS-624) | 30/07/2020 | 3.8 | 0.1 | 0.4 | 0.2 |
| KL_BO_AD03 (YPS-624) | 23/09/2020 | 0.7 | 0.1 | 0.3 | 0.1 |
| KL_BO_AD04 (YPS-625) | 30/07/2020 | 3.2 | 0.1 | 0.3 | 0.1 |
| KL_BO_AD04 (YPS-625) | 23/09/2020 | 0.5 | 0.1 | 0.2 | 0.1 |
| KL_BO_AD05 (YPS-626) | 30/07/2020 | 2.3 | 0.2 | 0.1 | 0.1 |
| KL_BO_AD05 (YPS-626) | 23/09/2020 | 0.5 | 0.1 | 0.3 | 0.1 |
| KL_BO_AD06 | 23/09/2020 | 0.3 | 0.1 | 0.3 | 0.1 |
| KL_HU_KM10 | 24/09/2020 | 1.2 | 0.1 | 0.5 | 0.4 |
| KL_HU_KM20 (YPS-611) | 24/09/2020 | 0.5 | 0.2 | 0.3 | 0.2 |
| KL_HU01 | 24/09/2020 | Too deep to safely collect measurement | | | |
| KL_HU02 | 24/09/2020 | 1.4 | 0.1 | 0.7 | 0.7 |
| KL_HU03 | 24/09/2020 | 1.3 | 0.2 | 0.4 | 0.4 |
| KL_HU04 | 24/09/2020 | 1.4 | 0.2 | 0.5 | 0.6 |
| KL_HU05 | 24/09/2020 | 0.5 | 0.1 | 0.4 | 0.2 |
| KL_HU06 | 24/09/2020 | 0.9 | 0.1 | 0.4 | 0.2 |
| KL_HU07 | 24/09/2020 | 0.2 | 0.1 | 0.3 | 0.0 |
| KL_HU08 | 24/09/2020 | 0.3 | 0.1 | 0.4 | 0.1 |
| KL_HU09 | 24/09/2020 | 0.5 | 0.1 | 0.4 | 0.1 |
| KL_HU10 | 24/09/2020 | 0.2 | 0.0 | 0.1 | 0.0 |
| ST_CL02 | 22/09/2020 | 2.2 | 0.4 | 0.8 | 4.0 |
| YN_SW01 (YPS-386) | 30/07/2020 | 22.5 | 0.4 | 0.8 | 5.9 |
| YN_SW01 (YPS-386) | 23/09/2020 | 2.2 | 0.4 | 0.5 | 2.8 |
| YPS-051 | 29/07/2020 | 7.7 | 0.2 | 0.4 | 0.4 |
| YPS-051 | 24/09/2020 | 1.5 | 0.1 | 0.6 | 0.7 |
| YPS-078 | 29/07/2020 | 2.9 | 0.1 | 0.2 | 0.1 |
| YPS-078 | 24/09/2020 | 0.7 | 0.1 | 0.4 | 0.1 |
| YPS-079 | 29/07/2020 | 4.2 | 0.1 | 0.5 | 0.2 |
| YPS-079 | 24/09/2020 | 0.8 | 0.1 | 0.5 | 0.2 |
| YPS-080 | 29/07/2020 | 4.2 | 0.3 | 0.3 | 0.3 |
| YPS-544 | 29/07/2020 | 6.1 | 0.3 | 0.4 | 0.6 |
| YPS-611 | 29/07/2020 | 3.1 | 0.1 | 0.4 | 0.2 |
| YPS-612 | 29/07/2020 | 7.8 | 0.2 | 0.5 | 0.6 |
| YPS-613 | 29/07/2020 | 8.0 | 0.2 | 0.4 | 0.4 |
| YPS-614 | 29/07/2020 | 5.2 | 0.2 | 0.4 | 0.4 |
| YPS-614 | 24/09/2020 | 0.8 | 0.2 | 0.5 | 0.4 |
| YPS-621 | 29/07/2020 | 8.0 | 0.2 | 0.3 | 0.4 |
| YPS-621 | 24/09/2020 | 1.1 | 0.1 | 0.7 | 0.5 |

# APPENDIX G

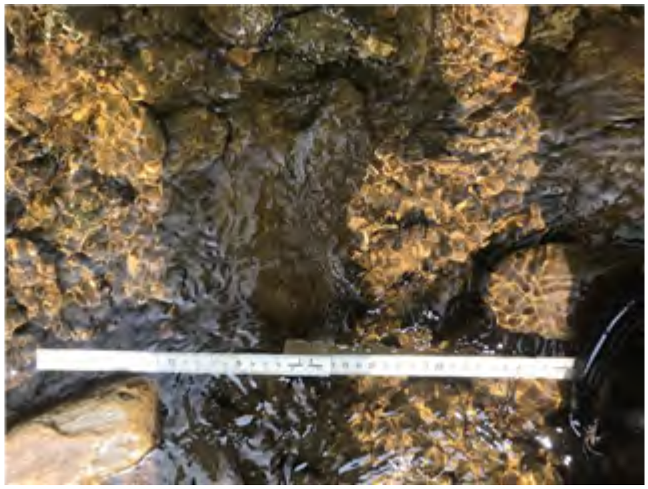
## CABIN Exports

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-625 |
| **Sampling Date** | Jul 30 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.92786 N, 139.37286 W |
| **Altitude** | 512 |
| **Local Basin Name** | Adams Creek |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream



Substrate
Up Stream (No image found)

## Metrics

| Name | YPS-625 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 60.4 | |
| **% Ephemeroptera** | 2.2 | |
| **% EPT Individuals** | 6.4 | |
| **% Plecoptera** | 3.8 | |
| **% Tricoptera** | 0.3 | |
| **Total Abundance** | 1595.0 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.6 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 12.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-626 |
| **Sampling Date** | Jul 30 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.92561 N, 139.40014 W |
| **Altitude** | 569 |
| **Local Basin Name** | Adams Creek |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-626 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 72.0 | |
| **% Ephemeroptera** | 4.6 | |
| **% EPT Individuals** | 7.2 | |
| **% Plecoptera** | 2.0 | |
| **% Tricoptera** | 0.6 | |
| **Total Abundance** | 659.3 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.4 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 12.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-626 [Q2] |
| **Sampling Date** | Jul 30 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.92561 N, 139.40014 W |
| **Altitude** | 569 |
| **Local Basin Name** | Adams Creek |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-626 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 68.3 | |
| **% Ephemeroptera** | 3.4 | |
| **% EPT Individuals** | 7.1 | |
| **% Plecoptera** | 3.7 | |
| **% Tricoptera** | 0.0 | |
| **Total Abundance** | 452.8 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.5 | |
| **Simpson's Evenness** | 0.3 | |
| **Total No. of Taxa** | 6.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-626 [Q3] |
| **Sampling Date** | Jul 30 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.92561 N, 139.40014 W |
| **Altitude** | 569 |
| **Local Basin Name** | Adams Creek |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream


Substrate


Up Stream

## Metrics

| Name | YPS-626 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 64.4 | |
| **% Ephemeroptera** | 4.6 | |
| **% EPT Individuals** | 9.4 | |
| **% Plecoptera** | 3.6 | |
| **% Tricoptera** | 1.2 | |
| **Total Abundance** | 620.4 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.5 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 10.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-051 |
| **Sampling Date** | Jul 28 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.99178 N, 139.03414 W |
| **Altitude** | 0 |
| **Local Basin Name** | Hunker Creek downstream of Hester Creek inflow |
| | Klondike River |
| **Stream Order** | 4 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-051 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 73.8 | |
| **% Ephemeroptera** | 13.6 | |
| **% EPT Individuals** | 16.4 | |
| **% Plecoptera** | 1.4 | |
| **% Tricoptera** | 1.4 | |
| **Total Abundance** | 219.0 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.4 | |
| **Simpson's Evenness** | 0.1 | |
| **Total No. of Taxa** | 19.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-078 |
| **Sampling Date** | Jul 29 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.92239 N, 138.88406 W |
| **Altitude** | 588 |
| **Local Basin Name** | Hunker Creek upstream of Ontario Cr. |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-078 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 13.7 | |
| **% Ephemeroptera** | 63.7 | |
| **% EPT Individuals** | 73.4 | |
| **% Plecoptera** | 7.8 | |
| **% Tricoptera** | 1.9 | |
| **Total Abundance** | 384.0 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.7 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 13.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-079 |
| **Sampling Date** | Jul 29 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.96169 N, 138.95608 W |
| **Altitude** | 470 |
| **Local Basin Name** | Hunker Creek upstream of Gold Bottom Cr. |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream

Substrate

Up Stream

### Metrics

| Name | YPS-079 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 93.8 | |
| **% Ephemeroptera** | 4.1 | |
| **% EPT Individuals** | 5.6 | |
| **% Plecoptera** | 0.6 | |
| **% Tricoptera** | 0.8 | |
| **Total Abundance** | 484.0 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.1 | |
| **Simpson's Evenness** | 0.1 | |
| **Total No. of Taxa** | 8.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-080 |
| **Sampling Date** | Jul 29 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.96833 N, 138.98242 W |
| **Altitude** | 474 |
| **Local Basin Name** | Hunker Creek downstream of Gold Bottom Cr. |
| | Klondike River |
| **Stream Order** | 4 |

Across Reach

Down Stream


Substrate


Up Stream

## Metrics

| Name | YPS-080 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 72.0 | |
| **% Ephemeroptera** | 9.2 | |
| **% EPT Individuals** | 22.6 | |
| **% Plecoptera** | 0.6 | |
| **% Tricoptera** | 12.7 | |
| **Total Abundance** | 315.0 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.5 | |
| **Simpson's Evenness** | 0.1 | |
| **Total No. of Taxa** | 13.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-386 |
| **Sampling Date** | Jul 30 2020 |
| **Know Your Watershed Basin** | Central Yukon |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 64.02528 N, 139.57403 W |
| **Altitude** | 383 |
| **Local Basin Name** | Swede Creek |
| | Yukon River North |
| **Stream Order** | 4 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-386 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 15.9 | |
| **% Ephemeroptera** | 44.0 | |
| **% EPT Individuals** | 55.5 | |
| **% Plecoptera** | 8.6 | |
| **% Tricoptera** | 2.9 | |
| **Total Abundance** | 2137.5 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.9 | |
| **Simpson's Evenness** | 0.5 | |
| **Total No. of Taxa** | 14.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-544 |
| **Sampling Date** | Jul 28 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 64.02911 N, 139.17797 W |
| **Altitude** | 364 |
| **Local Basin Name** | Hunker Creek |
| | Klondike River |
| **Stream Order** | 4 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-544 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 87.6 | |
| **% Ephemeroptera** | 0.5 | |
| **% EPT Individuals** | 1.0 | |
| **% Plecoptera** | 0.0 | |
| **% Tricoptera** | 0.5 | |
| **Total Abundance** | 198.0 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.2 | |
| **Simpson's Evenness** | 0.1 | |
| **Total No. of Taxa** | 11.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-611 |
| **Sampling Date** | Jul 29 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.94950 N, 138.90628 W |
| **Altitude** | 530 |
| **Local Basin Name** | Hunker Creek |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-611 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 60.2 | |
| **% Ephemeroptera** | 20.5 | |
| **% EPT Individuals** | 30.7 | |
| **% Plecoptera** | 4.2 | |
| **% Tricoptera** | 6.0 | |
| **Total Abundance** | 1952.9 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.6 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 12.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-612 |
| **Sampling Date** | Jul 28 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 64.01369 N, 139.09247 W |
| **Altitude** | 375 |
| **Local Basin Name** | Hunker Creek |
| | Klondike River |
| **Stream Order** | 4 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-612 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 95.7 | |
| **% Ephemeroptera** | 1.4 | |
| **% EPT Individuals** | 1.7 | |
| **% Plecoptera** | 0.0 | |
| **% Tricoptera** | 0.3 | |
| **Total Abundance** | 350.5 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.1 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 7.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-612 [Q2] |
| **Sampling Date** | Jul 28 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 64.01369 N, 139.09247 W |
| **Altitude** | 375 |
| **Local Basin Name** | Hunker Creek |
| | Klondike River |
| **Stream Order** | 4 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-612 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 91.8 | |
| **% Ephemeroptera** | 2.7 | |
| **% EPT Individuals** | 3.6 | |
| **% Plecoptera** | 0.0 | |
| **% Tricoptera** | 0.8 | |
| **Total Abundance** | 306.7 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.2 | |
| **Simpson's Evenness** | 0.1 | |
| **Total No. of Taxa** | 10.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-612 [Q3] |
| **Sampling Date** | Jul 28 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 64.01369 N, 139.09247 W |
| **Altitude** | 375 |
| **Local Basin Name** | Hunker Creek |
| | Klondike River |
| **Stream Order** | 4 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-612 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 90.0 | |
| **% Ephemeroptera** | 3.2 | |
| **% EPT Individuals** | 5.0 | |
| **% Plecoptera** | 0.9 | |
| **% Tricoptera** | 0.9 | |
| **Total Abundance** | 454.7 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.2 | |
| **Simpson's Evenness** | 0.1 | |
| **Total No. of Taxa** | 13.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-613 |
| **Sampling Date** | Jul 28 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 64.01153 N, 139.08914 W |
| **Altitude** | 394 |
| **Local Basin Name** | Hunker Creek |
| | Klondike River |
| **Stream Order** | 4 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-613 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 92.1 | |
| **% Ephemeroptera** | 1.3 | |
| **% EPT Individuals** | 1.6 | |
| **% Plecoptera** | 0.3 | |
| **% Tricoptera** | 0.0 | |
| **Total Abundance** | 381.0 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.2 | |
| **Simpson's Evenness** | 0.1 | |
| **Total No. of Taxa** | 11.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-614 |
| **Sampling Date** | Jul 28 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.98244 N, 139.01711 W |
| **Altitude** | 430 |
| **Local Basin Name** | Hunker Creek |
| | Klondike River |
| **Stream Order** | 4 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-614 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 59.9 | |
| **% Ephemeroptera** | 15.2 | |
| **% EPT Individuals** | 20.3 | |
| **% Plecoptera** | 0.5 | |
| **% Tricoptera** | 4.6 | |
| **Total Abundance** | 220.0 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.6 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 16.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-621 |
| **Sampling Date** | Jul 29 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 64.00867 N, 139.07967 W |
| **Altitude** | 404 |
| **Local Basin Name** | Hunker Creek |
| | Klondike River |
| **Stream Order** | 4 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

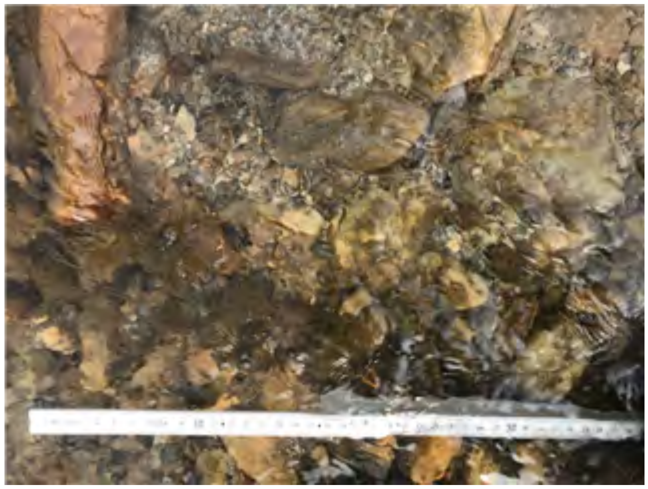
| Name | YPS-621 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 61.8 | |
| **% Ephemeroptera** | 19.3 | |
| **% EPT Individuals** | 23.8 | |
| **% Plecoptera** | 2.0 | |
| **% Tricoptera** | 2.5 | |
| **Total Abundance** | 1041.2 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.6 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 14.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-622 |
| **Sampling Date** | Jul 30 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.93389 N, 139.33192 W |
| **Altitude** | 503 |
| **Local Basin Name** | Adams Creek |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream



Substrate

Up Stream

## Metrics

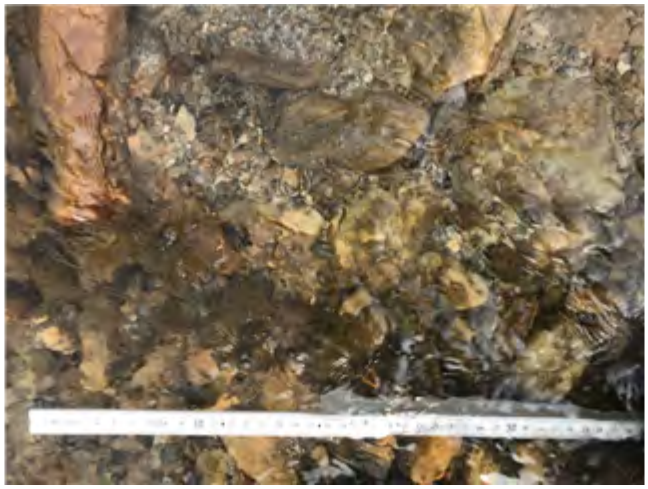
| Name | YPS-622 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 73.0 | |
| **% Ephemeroptera** | 10.1 | |
| **% EPT Individuals** | 19.2 | |
| **% Plecoptera** | 9.1 | |
| **% Tricoptera** | 0.0 | |
| **Total Abundance** | 177.3 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.5 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 10.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-622 [Q2] |
| **Sampling Date** | Jul 30 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.93389 N, 139.33192 W |
| **Altitude** | 503 |
| **Local Basin Name** | Adams Creek |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream



Substrate

Up Stream

## Metrics

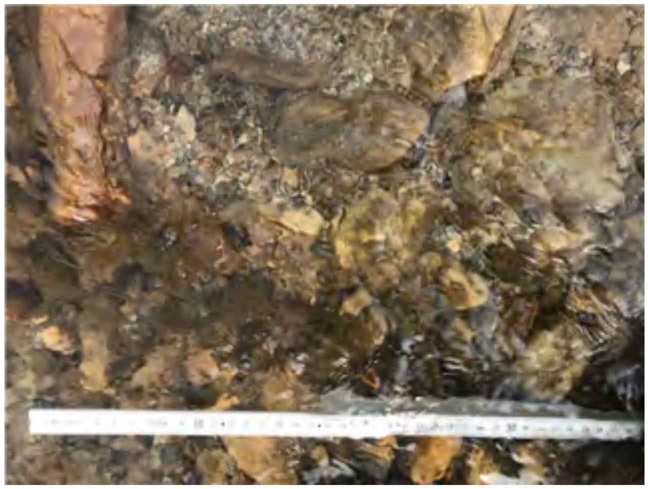
| Name | YPS-622 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 74.2 | |
| **% Ephemeroptera** | 11.2 | |
| **% EPT Individuals** | 18.3 | |
| **% Plecoptera** | 7.0 | |
| **% Tricoptera** | 0.0 | |
| **Total Abundance** | 129.0 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.4 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 10.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-622 [Q3] |
| **Sampling Date** | Jul 30 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.93389 N, 139.33192 W |
| **Altitude** | 503 |
| **Local Basin Name** | Adams Creek |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream



Substrate

Up Stream

## Metrics

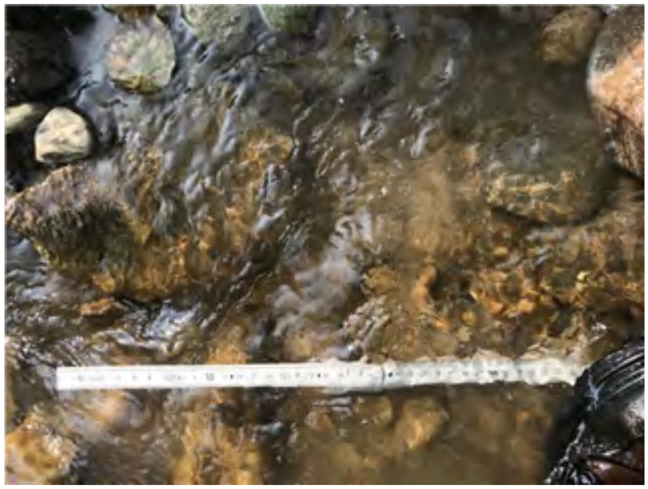
| Name | YPS-622 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 66.4 | |
| **% Ephemeroptera** | 10.4 | |
| **% EPT Individuals** | 17.8 | |
| **% Plecoptera** | 7.3 | |
| **% Tricoptera** | 0.0 | |
| **Total Abundance** | 87.3 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.5 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 11.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-623 |
| **Sampling Date** | Jul 30 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.93300 N, 139.33442 W |
| **Altitude** | 476 |
| **Local Basin Name** | Adams Creek |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream



Substrate

Up Stream

## Metrics

| Name | YPS-623 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 52.9 | |
| **% Ephemeroptera** | 20.4 | |
| **% EPT Individuals** | 33.2 | |
| **% Plecoptera** | 12.8 | |
| **% Tricoptera** | 0.0 | |
| **Total Abundance** | 282.0 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.7 | |
| **Simpson's Evenness** | 0.3 | |
| **Total No. of Taxa** | 11.0 | |

## Site Description

| | |
|---|---|
| **Study Name** | Yukon Territory - AHM |
| **Site** | YPS-624 |
| **Sampling Date** | Jul 30 2020 |
| **Know Your Watershed Basin** | Klondike |
| **Province / Territory** | Yukon Territories |
| **Terrestrial Ecological Classification** | Boreal Cordillera EcoZone<br>Klondike Plateau EcoRegion |
| **Coordinates (decimal degrees)** | 63.92958 N, 139.35997 W |
| **Altitude** | 493 |
| **Local Basin Name** | Adams Creek |
| | Klondike River |
| **Stream Order** | 3 |

Across Reach

Down Stream

Substrate

Up Stream

## Metrics

| Name | YPS-624 | Predicted Group Reference Mean ±SD |
|---|---|---|
| **Bray-Curtis Distance** | -- | -- |
| **Number Of Individuals** | | |
| **% Chironomidae** | 67.4 | |
| **% Ephemeroptera** | 2.7 | |
| **% EPT Individuals** | 5.8 | |
| **% Plecoptera** | 3.0 | |
| **% Tricoptera** | 0.0 | |
| **Total Abundance** | 891.9 | |
| **Richness** | | |
| **Simpson's Diversity** | 0.5 | |
| **Simpson's Evenness** | 0.2 | |
| **Total No. of Taxa** | 10.0 | |