Holden Mine Site

Performance Standards Verification
2022 Annual Compliance Assessment Report

Appendix F
2022 Biomonitoring Report

DRAFT

CONFLUENCE
ENVIRONMENTAL COMPANY

Rio Tinto Holden Mine Remediation Project

BIOMONITORING REPORT 2022

Prepared for:

Rio Tinto

January 2023

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Rio Tinto Holden Mine Remediation Project
BIOMONITORING REPORT 2022

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
Agencies	U.S. Forest Service, U.S. Environmental Protection Agency, Washington State Department of Ecology, and the Confederated Tribes and Bands of the Yakama Nation (the natural resource trustee agencies)
ABA	Aquatic Biology Associates
ACAR	Annual Compliance Assessment Report
ANOVA	Analysis of variance
Ecology	Washington State Department of Ecology
EPT	Ephemeroptera, Plecoptera, Trichoptera
EPT/EPT+C	Ratio of EPT to EPT + Chironomidae
ft^2	square foot
HBI	Hilsenhoff Biotic Index
HUC	Hydrologic Unit Code
LWM	Large woody material
µm	micrometer
µS/cm	microsiemens/centimeter
mg/L	milligrams per liter
mm	millimeter
MTI	Metals Tolerance Index
mV	millivolt
NTU	nephelometric turbidity unit
ORP	oxidation/reduction potential
Site	Holden Mine Remediation Project site
SOP	standard operating procedure
USFS	U.S. Forest Service
YOY	Young of the year

EXECUTIVE SUMMARY

This Biomonitoring Report discusses the results of late summer 2022 benthic macroinvertebrate, fish, and habitat surveys on Railroad Creek at Holden Mine located in Chelan County, Washington. The Holden Mine Remediation Project site (Site) is a former underground copper mine, located on the eastern slope of the Cascade Mountains in Chelan County, Washington. Baseline sampling of fish and benthic macroinvertebrate communities in Railroad Creek occurred in 2010 and 2011, prior to the start of remediation activities in 2013. The 2022 biomonitoring data represent the fifth year of biomonitoring following remedy implementation in 2018.

Benthic macroinvertebrate and fish sampling occurred between August 18 and 21, 2022, following standard operating procedures detailed in the final Performance Standards Verification Plan (Floyd|Snider 2020a). Benthic macroinvertebrate sampling was conducted at the following 7 stations in Railroad Creek: RC-6, RC-1, RC-4, RC-2 (SG-7), RC 10 (SG-20), SG-9, and SG-12. Consistent with the recommendations in the 2020 Annual Compliance Assessment Report (Floyd|Snider 2021) SG-9 and SG-12R were used again as alternative stations to the historical stations RC-5A and RC-15.

Out of the 7 total stations sampled, 2 are reference locations (RC-6 and RC-1) that are indicative of the effects of natural environmental variability on the benthic macroinvertebrate community structure in Railroad Creek. These stations are located upstream of the Site and have not been influenced by mining or remediation. These stations are referred to as "reference stations." The remaining 5 stations are distributed downstream from the reference stations. These stations, which are adjacent to and downstream of the Site, are referred to as "Site stations." The Site stations are further characterized as occurring in a habitat disturbance zone (RC-4), a metals impact zone (RC-2 and SG-9), and a recovery zone (SG-12R and RC-10).

Habitat data were collected concurrent with the benthic macroinvertebrate sampling to characterize relevant water quality and physical habitat parameters and to provide context for the benthic macroinvertebrate results. Water quality parameters, including temperature, dissolved oxygen, and pH, showed no clear trends between the reference and Site stations. Observed variation was likely related to station-specific and temporal factors, such as ambient temperature, solar exposure, and influence from tributary inputs. Physical data, including substrate, depth, and flow velocity, were similar within and between stations, with the expected level of variability typical of mountain stream environments.

The benthic macroinvertebrate community was sampled at each of the 7 stations by collecting 15 replicate samples distributed throughout the 100-meter station length. Each replicate was collected by agitating the substrate within a 1-square-foot quadrat for 2 minutes. The replicate samples were then pooled for laboratory analysis. Sixteen biological metrics were used to assess the health of the benthic macroinvertebrate community at each station. The 2022 data from the

Site stations were then compared to the data from the reference stations utilizing the same biological metrics calculated in prior years. The metrics are grouped into the following categories: (1) productivity, (2) richness, (3) trophic/habit, (4) composition, and (5) tolerance. For productivity, richness, trophic/habit, and composition metrics, an increasing metric corresponds to decreasing stress; for the tolerance metric an increasing metric indicates increasing stress.

The fish sampling protocol was modified during the 2022 biomonitoring field effort due to high flows in Railroad Creek, which prevented the installation of block nets at the upstream and downstream station ends. In coordination with the Agencies, and to accommodate the Site conditions, the fish surveys were completed at all stations without block nets in a single pass. Because the fish could not be isolated within the sampling area, a required component of the sampling protocol for fish population studies, a fish abundance estimate could not be calculated. Although a population level assessment could not be conducted, the 2022 fish sampling provided qualitative data on species presence and size.

Overall, the 2022 benthic macroinvertebrate metrics are similar between the Site and reference stations and indicate an improvement compared to the baseline conditions. All Site stations met reference station target thresholds for all but one richness metric and there were no significant differences between the site stations and both reference stations for any of the productivity, trophic/habit, composition, and tolerance metrics. The conclusions of the 2022 evaluation of the benthic macroinvertebrate community are as follows:

- Productivity Metric: There were no statistically significant differences in total abundance between the Site and reference stations in 2022.
- Richness Metrics: All Site stations met the 80% threshold for 4 out of the 5 richness metrics. RC-2, SG-9, and SG-12R did not meet the 80% threshold for Trichoptera richness. Richness results from 2022 reinforce overall upward trends across all the richness metrics from 2010 and 2011 baseline values.
- Trophic/Habit Metrics: There were no significant differences between Site and reference stations for the trophic/habit metrics. The overall community composition and distribution of trophic strategies and habits in the benthic macroinvertebrate community align with expectations for cold-water mountain stream systems.
- Composition Metrics: There were no significant differences between any Site station and both reference stations for the composition metrics. Trends for these metrics continue to increase from baseline values.
- Tolerance Metrics: There were no significant differences between Site and reference stations for the tolerance metrics. These metrics generally indicate good to excellent stream quality across all stations.

Benthic macroinvertebrate metric results were most strongly correlated with the mean percentage of boulders (the direction of the correlation depended on the metric; refer to Table 12). The correlation was also strong for embeddedness level, which is largely driven by the amount of smaller particle sizes in a system (i.e., gravels and fine sediments). More small-grained sediments would lead to higher levels of embeddedness by filling spaces within the larger cobble and boulder substrate classes. Many benthic taxa can be adversely affected by the reduction in benthic habitat complexity caused by inputs of fine sediments and increased embeddedness. Findings are generally consistent with observations from previous years, as well as predicted responses based on known tolerance levels for different taxa groups; however, while the correlation between embeddedness and richness metrics was positive in 2022, it was negative in past monitoring years. The benthic community structure in Railroad Creek is likely influenced by natural environmental variability, particularly climatically-driven changes in flow/discharge rates, described in detail in Appendix F. The 2015 Wolverine fire also likely continues to influence watershed processes that generate and transport fine sediments through Railroad Creek, indicating that stream substrate conditions are likely to vary over time as a result of factors independent of Site remediation.

A total of 46 fish were collected and measured from the 7 sampling stations during the 2022 sampling event, and another 69 fish were observed but evaded capture (Table 17). Of the collected fish, only 1 cutthroat-rainbow trout hybrid was observed, with the remaining fish identified as cutthroat or young of the year. Overall, a range of fish size classifications consistent with previous years' sampling were documented in 2022.

Overall, the results of the 2022 biomonitoring, particularly the aggregate of benthic macroinvertebrate metric trends, indicate continued improvement of downstream conditions in Railroad Creek following site remediation.

1.0 INTRODUCTION

The Holden Mine Remediation Project site (Site) is a former underground copper mine, located in the eastern Cascade Mountains in Chelan County, Washington. Railroad Creek is a mid-sized mountain stream originating near the Lyman Glacier, located at approximately 6,500 feet in elevation, and flows in an easterly direction 21.8 miles to Lake Chelan, at 1,100 feet in elevation (USFWS 2004). The Site is near the midpoint of the watershed approximately 11 miles upstream of Lake Chelan. Contaminant leaching from tailings piles left from past mining activities adversely impacted water quality in the vicinity of the Site, including in Railroad Creek.

The Record of Decision issued in 2012 outlined a remedy with the following action objectives: (1) prevent releases of contaminants from the Site into surface water by containing, collecting, and treating impacted groundwater, and (2) prevent future releases of tailings into Railroad Creek (USFS 2012a). A full description of the Site and the selected remedy are provided in the Record of Decision (USFS 2012a). The components of the selected remedy designed to achieve these action objectives are as follows:

- Containment, collection, and treatment of groundwater;
- Consolidation and capping of tailings, waste rock, and some impacted soils;
- *In situ* soil remediation in selected areas;
- Surface water and sediment cleanup actions (including modification of the Railroad Creek channel); and
- Institutional controls.

The remedial actions are divided into 2 phases. Phase 1 began in 2013 and was determined by the U.S. Forest Service (USFS), U.S. Environmental Protection Agency, Washington State Department of Ecology (Ecology) (collectively, the Agencies), in coordination with the Confederated Tribes and Bands of the Yakama Nation, to be substantially complete as of December 31, 2018. Phase 1 is still being monitored to measure the success of the remedial actions. Phase 2 is under evaluation and may include an additional section of groundwater barrier wall and/or a collection system upgradient of the barrier, pending the overall findings of Phase 1 monitoring.

This report summarizes the results of benthic macroinvertebrate, fish, and habitat monitoring conducted in Railroad Creek in August 2022, which is the fifth year of biomonitoring following implementation of the Phase 1 remedial action in 2018. The Phase 1 remedial action included channel and habitat alterations in Railroad Creek and in the floodplain and riparian areas adjacent to the Holden Mine tailings piles. These alterations produced both temporary and permanent impacts on stream habitats within and between stations included in the biomonitoring effort, resulting in potential responses within the benthic macroinvertebrate and fish populations in the stream.

The macroinvertebrate and fish communities in Railroad Creek were surveyed in 2010 and 2011 to establish a pre-implementation baseline and provide benchmarks against which to evaluate remediation success (MWH 2012a, 2012b). These surveys were repeated during Phase 1 remedy implementation in 2015 and 2016 (Table 1; Stantec 2016, 2017) and in 2018, 2019, 2020, and 2021, after Phase 1 implementation was completed (Arcadis 2019, Confluence 2020, 2021, 2022). Each of the post-baseline monitoring events occurred after the 2015 Wolverine fire, meaning fire effects on instream habitat conditions must also be considered when interpreting results. Approximately one-half of the Lower Railroad Creek subwatershed (U.S. Geological Survey Hydrologic Unit Code [HUC] 170200090204) was classified as moderate to high soil burn severity (BAER 2015). The Upper Railroad Creek subwatershed (HUC 1700200090203) was impacted to a lesser degree, with approximately 7% of total area classified as moderate or high soil burn severity. Habitat conditions at all biomonitoring stations were impacted by post-fire changes in hydrology and sediment delivery, with the effects increasing on a downstream gradient.

Additional details regarding habitat alterations associated with the Phase 1 remedial action and the Wolverine fire can be found in previous biomonitoring reports (Confluence 2020, 2021).

The sampling and analysis methods used in the 2022 biomonitoring event are described in Section 2.0. In coordination with the Agencies, the fish sampling protocol was modified during the 2022 biomonitoring field effort due to high flows in Railroad Creek, which prevented the installation of block nets at the upstream and downstream station ends. Because the fish could not be isolated within the sampling area, a critical component for the fish population depletion model, the Seber-LeCren fish abundance estimate, could not be calculated. Although a population level assessment could not be conducted, the 2022 fish sampling provided qualitative data on species presence and size. The results of the 2022 biomonitoring event are presented in Section 3.0.

Tables and figures supporting the narrative are presented at the end of this report. Appendices A through E provide field data sheets, raw taxonomic data, photos, and supplemental information.

2.0 SAMPLING AND ANALYSIS METHODS

Benthic macroinvertebrate, fish, and habitat surveys were conducted according to the standard operating procedures (SOPs) provided in the final Performance Standards Verification Plan (Floyd|Snider 2020a). The surveys were conducted over 100-meter reaches centered on each of 7 biomonitoring stations from August 18 through August 21, 2022 (Figure 1).

The surveys were conducted at the following 7 stations in Railroad Creek: RC-6, RC-1, RC-4, RC-2(SG-7), RC 10(SG-20), SG-9, and SG-12R. Consistent with the sampling conducted in 2020, and consistent with the recommendations in the 2020 Annual Compliance Assessment Report (ACAR; Floyd|Snider 2021), SG-9 and SG-12R were used again as alternative locations to the historical locations RC-5A and RC-15E due to high water levels. Based on the conditions observed at these historical stations the last several years, it is likely that conditions at these stations will remain unsafe for sampling due to changes in river morphology; therefore, it is recommended that SG-9 and SG-12R replace stations RC-5A and RC-15.

Two of the 7 sample stations are reference locations (RC-6 and RC-1) that are indicative of the effects of natural environmental variability on the benthic macroinvertebrate community structure in Railroad Creek. These stations are located upstream of the Site and have not been influenced by mining or remediation. These stations are referred to as "reference stations." The remaining 5 stations are distributed downstream from the reference stations and are referred to as "Site stations." The Site stations have been influenced by mining or remediation and are further characterized as occurring in a habitat disturbance zone (RC-4), a metals impact zone (RC-2 and SG-9), and a recovery zone (SG-12R and RC-10). Figure 1 shows the locations of the 2022 biomonitoring stations, as well as historical stations RC-5A and RC-15.

The specific methods for conducting the benthic macroinvertebrate, fish, and habitat surveys are summarized in the remainder of this section.

2.1 Habitat

Collection of habitat data helps to provide context for the benthic macroinvertebrate results. Correlation between habitat parameters and biological data indicates that habitat characteristics may influence the structure of the community independent of potential contamination effects. Prior to benthic macroinvertebrate sampling at each station, habitat units were mapped consistent with the USFS Stream Inventory Handbook: Level I and II (USFS 2012b, Appendix A). The habitat evaluation included identification of stream characteristics (including station gradient, approximate wetted area, habitat type, average water depth and velocity, instream woody debris, and riparian vegetation); collection of water quality data; and estimation of substrate conditions. Water quality data were collected with a YSI ProDSS water quality meter. Flow information was collected with an OTT MF Pro flow meter and a top setting wading rod. Photographs of the substrate at each benthic macroinvertebrate sample replicate

location were also taken and are provided in Appendix B. Specific data collected included the following:

- Water quality metrics
  - Temperature
  - Dissolved oxygen
  - pH
  - Conductivity
  - Turbidity
- Physical habitat metrics
  - Habitat type (cascade, riffle, or run)
  - Current velocity (at the bottom and at 60% water depth)
  - Water depth
  - Sediment staining
  - Embeddedness
  - Percent sand (0.06 to 2 mm)
  - Percent gravel (2 to 64 mm)
  - Percent cobble (64 to 256 mm)
  - Ferricrete accumulation

The substrate type (e.g., sand, gravel, cobble) and embeddedness habitat metrics were correlated with benthic macroinvertebrate metrics at the single station replicate level. Depending on the distribution of the metrics, either a Pearson (for a parametric distribution) or Spearman's (non-parametric distribution) correlation coefficient was calculated. Results of the habitat correlation are provided in Section 3.2.

2.2 Benthic Macroinvertebrates

Methods used to conduct the benthic macroinvertebrate survey are described in the following sections.

2.2.1 Benthic Macroinvertebrate Sampling

Benthic macroinvertebrate sampling methods in the SOPs are based on the protocols described by the Pacific Northwest Aquatic Monitoring Partnership as adopted in Ecology (2010) guidance. Fifteen replicate macroinvertebrate samples were collected in fast-water habitats (i.e., riffles and glides) distributed over each 100-meter-long station. Replicate sample locations were distributed throughout the station as determined by fast-water habitat composition with suitable depths and adequate accessibility for the crew members collecting the sample (i.e., locations with deep or very fast water were avoided due to safety and feasibility considerations). Global positioning system coordinates were collected at each replicate sampling location.

Each sample was collected from the substrate within a 1-square-foot (ft^2) quadrat placed on the streambed with the upper right corner on the georeferenced replicate location, identified by a lead sinker adorned with a colorful bobber. One field crew member held the quadrat firmly on the bottom, while a second crew member held a D-frame kick net with 500-micrometer (μm) mesh perpendicular to the streamflow just downstream of the quadrat. The first crew member dislodged macroinvertebrates by manually agitating sediment within the quadrat down to a target depth of 15 centimeters for a timed period of 2 minutes. A small brush was used to release clinging specimens from larger stones and debris (Ecology 2010).

After collection, the kick net was taken to a suitable processing area outside of the stream and the sample was concentrated at the bottom of the net using rinse water from the stream. The sample was then transferred to a plastic tray with a partial sieve (500 μm) using rinse water. Large debris, such as stones or wood particles, were inspected for specimens and removed from the sample to the extent practicable. Once the sample was sufficiently rinsed, sorted, and concentrated in the corner of the tray, it was washed into a sample bottle using 95% ethanol. The kick net, brushes, and sieve tray were closely inspected, and remaining specimens were captured and transferred to the sample bottle with tweezers. The sample container was then filled with 95% ethanol to minimize air bubbles.

2.2.2 Sample Processing and Chain of Custody

Consistent with the SOPs, each sample bottle received a chain of custody label identifying the station, name, year, replicate number, and "BI" to indicate a benthic macroinvertebrate sample (e.g., RC-1-2020-08BI). Matching chain of custody labels for each replicate location were included on the field form and in the accompanying substrate photos to identify the associated habitat data. At the end of each sampling event, the individual sample bottles were wrapped with plastic film and placed in individual zip-top bags to prevent leakage. The sample bottles were then placed together into large zip-top bags, 1 for each station, for transport to the Confluence Environmental Company office in Seattle, Washington.

The bagged samples and labeled field forms were packaged and delivered to Aquatic Biology Associates (ABA) in Corvallis, Oregon, for taxonomic identification. ABA used the Pacific Northwest Aquatic Monitoring Partnership, Level 2 standard for taxonomic effort and nomenclature. This is consistent with identification standards required by Ecology for biomonitoring projects. The only deviation from the identification standard was that segmented worms (Oligochaeta) were identified to Class, instead of the lowest practical level. This is consistent with the "merge rule" specified in Ecology (2010) guidance.

2.2.3 Data Analysis

Sixteen biological metrics grouped into 5 categories were calculated from the raw benthic macroinvertebrate data and summarized by ABA as part of their standard processing output.

The metrics were calculated in accordance with the SOPs (Floyd|Snider 2020a) and consistent with prior years' metrics selected for evaluation. The results for these metrics are discussed in Section 3.0. A biological metric is an expression of a biological community attribute that responds to human disturbance in a predictable fashion. Each metric describes a different aspect or function of community structure. The metrics presented in this report are listed below by category:

- Productivity
  - Abundance
- Richness
  - Total richness
  - Ephemeroptera (E), Plecoptera (P), Trichoptera (T) index, or EPT index
  - Plecoptera richness
  - Trichoptera richness
  - Clinger richness
- Trophic/Habit
  - % Shredders
  - % Clingers
  - % Collector-Filterers
  - Ratio of scrapers to scrapers + filtering collectors
- Composition
  - Percent contribution of dominant taxon
  - % Ephemeroptera
  - Ratio of EPT to EPT + Chironomidae (EPT/EPT+C)[1]
- Tolerance
  - Hilsenhoff Biotic Index (HBI)
  - Metals Tolerance Index (MTI)
  - % Tolerant taxa

All metrics except richness metrics were evaluated for differences between reference and Site stations using an analysis of variance (ANOVA) test and post hoc pairwise comparisons. Prior to performing the ANOVA test, metrics were evaluated for normality using the Shapiro-Wilks and Brown-Forsythe tests. Normally distributed (parametric) metrics were evaluated using a standard 1-way ANOVA test. Non-parametric metric median values were evaluated using the Kruskal-Wallis Rank Sum test. Where differences were observed with 95% confidence (alpha =

1 The metric nomenclature for this ratio has been updated from EPTC to EPT/EPT+C to be consistent with the literature. The EPT/EPT+C ratio is calculated using the same equation as the EPTC ratio reported in the 2019 ACAR (Floyd|Snider 2020b).

0.05), pairwise tests between reference and Site stations were performed using the Tukey test (parametric) or Dunn's test (non-parametric), with p-values adjusted to account for multiple comparisons. If a metric at a Site station differed from both reference stations with 95% confidence (statistically significant), the difference is discussed in Section 3.2. Site stations with metrics that did not differ significantly or that differed from only 1 reference station (statistically non-significant) are not discussed in detail in this report.

Because richness metrics are calculated for the entire station rather than for each replicate, station means or medians are not available and single-year data do not allow for an ANOVA. These metrics were instead evaluated by comparing the metric values calculated for the Site stations to 80% of the mean of the reference station richness values (referred to hereafter as the 80% threshold). The 80% threshold represents the target richness recovery goal for Site stations, per guidance from Ecology (1997). Results of the benthic macroinvertebrate monitoring are discussed in Section 3.2.

2.3 Fish

Methods used to conduct the fish survey are described in the following sections.

2.3.1 Fish Sampling

The fish sampling protocol was modified during the 2022 biomonitoring field effort due to high flows in Railroad Creek, which prevented the installation of block nets at the upstream and downstream station ends. In previous years, block nets with < 1/4-inch mesh were installed at the upstream and downstream ends of each 100-meter station by anchoring the nets to the substrate using a combination of metal T-posts and native substrate (i.e., cobbles). In 2022, the flows were too high to secure the bottom of the net to the substrate, leaving a large gap between the substrate and the net and thus resulting in a failure to isolate the sampling area. In coordination with the Agencies, and to accommodate the Site conditions, the fish sampling was completed at all stations in a single pass without block nets. A single pass was conducted instead of two-passes to avoid sampling bias potentially resulting from fish leaving or entering the sample station due to the lack of isolation.

Fish sampling was completed in 7, 100-meter stations in Railroad Creek using 2 Smith-Root (Models LR24 and LR-20) backpack electroshockers, generally following the electroshocking protocol outlined in Thurow et al. (2004), Roni and Fayram (2000), and Peterson and Wollrab (1999).

The sampling team consisted of 2 crews, each with 1 electroshocker and 2 to 3 netters. The team also included 1 fish handler, who placed the netted fish in a bucket. Together, the 2 crews conducted a complete survey of all aquatic habitat within the 100-meter station. The 2 crews began their survey at the downstream end, with 1 crew focusing on the right bank and the other crew focusing on the left bank. From the downstream end, the 2 crews proceeded upstream,

electroshocking fish, netting them, and placing them into buckets fitted with aerators. Fish were netted and removed from the electrical field immediately upon galvanotaxis. The crews attempted to remain roughly in line with each other, while ensuring the full wetted width was sampled, as they maneuvered upstream to avoid missing fish that may have passed between them.

Water quality data were also collected prior to fish sampling to select appropriate electroshocker settings. Measured parameters included temperature, conductivity, dissolved oxygen, and pH. Initial settings used were as follows:

- Pulse Width: 500 microseconds
- Pulse Frequency: 40 Hertz
- Duty Cycle: 12%
- Volts: 800

Voltage was adjusted between 500 and 900 volts, pulse frequency was adjusted between 30 and 40 Hz, and duty cycle was adjusted between 12% and 15%, depending on water conditions and the observed response of fish. Pulse width remained constant across all sampling stations.

During the single pass, captured fish were held in aerated buckets until processing. Collected fish were periodically transferred from buckets carried by the fish handler to streamside coolers outfitted with aerators to keep the density of collected fish low. Young of the year (YOY) were kept segregated from other size classes to avoid predation on the smaller size classes.

The flow conditions encountered by the sampling team in 2022 posed a substantial challenge to fish capture efficiency. Optimal fish holding water was largely inaccessible due to depth and the force of the flow, and maneuvering capture nets quickly enough in high flows was quite difficult. Consequently, the sampling team recorded observations of fish that evaded capture, to the extent feasible, in addition to captured fish.

2.3.2 Sample Processing

All fish were processed after the completion of the pass and released just downstream of the downstream end of the station. Fish were lightly anesthetized for measurement by placing 2 or 3 fish into water with dissolved Alka-Seltzer © tablets until the fish could be safely handled. Each fish was identified to species, when possible; the YOY lack the necessary features for visual identification and are therefore grouped by size class for the remainder of this report. Fork length (to the nearest millimeter [mm]) and weight (to the nearest tenth of a gram) measurements were recorded for each specimen. Photographs were taken of representative individuals of each species. Following measurement, fish were placed in a separate cooler filled with clean stream water and at least 2 aerators for recovery prior to release back to the stream.

2.3.3 Data Analysis

In previous years, fish abundance estimates were calculated for each station using either the Seber-LeCren 2-pass removal method (Seber and Le Cren 1967) or the multi-pass method, with the special case for 3 passes (Seber and Whale 1970). Because the fish could not be isolated within the sampling area, a required component of the sampling protocol for fish population studies, a fish abundance estimate could not be calculated. Although a population level assessment could not be conducted, the 2022 fish sampling provided qualitative data on species presence and size. Fish counts were summarized by sampling station and by type (i.e., cutthroat trout, cutthroat-rainbow trout hybrid, or YOY, which cannot be identified to species). Additionally, fork length was used to evaluate size and age class. Fork length can be used as a general proxy for fish age. Evaluation of the measured fork lengths can aid in the understanding of the size or age classes that make up the broader fish population in Railroad Creek and how those age classes are distributed within and between stations.

3.0 INVESTIGATION RESULTS

This section summarizes biomonitoring data collected and analyzed in 2022. Benthic macroinvertebrate metrics were calculated and compared across the 7 stations sampled in 2022. Fish survey data were also summarized and compared with data from past years. Where differences between Site and reference stations were identified, trends through time were assessed. Where appropriate, correlation coefficients between benthic macroinvertebrate and habitat data were calculated to evaluate relationships between habitat parameters and the benthic macroinvertebrate metric results. Any deviations from previously described methods or variations that impact direct comparisons through time are also discussed. Field forms and calibration logs are included in Appendix A, and a photo log of representative habitat at the stations and benthic macroinvertebrate replicate locations is provided in Appendix B.

3.1 Habitat

Habitat metrics were collected at all station prior to benthic macroinvertebrate sampling. Defining features of each station are detailed in Table 2, average water quality parameters measured at each station are provided in Table 3, and average physical habitat data are provided in Table 4.

In general, all stations were dominated by fast turbulent (i.e., riffle) and fast non-turbulent (i.e., glide/run) water, with scour pools of various sizes present along banks and occasionally formed mid-channel by large woody material (LWM) or boulders. Average water depths, velocity, and areas of available habitat, as approximated using wetted widths, measured in 2022 were similar to past years of post-remedial sampling, with minor fluctuations expected in a dynamic mountain stream. LWM numbers were catalogued in each station and ranged from 3 measured in RC-2 to 65 measured in SG-9, which was 3 times greater than all other stations. Most stations included some overhanging riparian vegetation, though RC-2 had very little and overhanging vegetation at RC-4 was primarily limited to the left bank. Riparian vegetation was generally sparse along the riprap on the left banks of both RC-2 and RC-4. In contrast, RC-10, SG-9, and SG-12R all included a combination of overhanging vegetation, deeper pools, LWM, and side channels to provide habitat complexity.

Water quality parameters, including temperature, dissolved oxygen, pH, oxidation/reduction potential (ORP), conductivity, and turbidity were measured at each station alongside the benthic macroinvertebrate samples. In 2022, temperature ranged from 11.9 degrees Celsius (°C) at RC-10 to 13.4°C at RC-1; dissolved oxygen ranged from 9.6 milligrams per liter (mg/L) at RC-2 to 10.0 mg/L at RC-10; pH ranged from 7.0 at SG-9 and SG-12 to 7.2 at RC-2; and turbidity ranged from 1.2 nephelometric turbidity units (NTU) at RC-2 and SG-12R to 2.0 NTU at SG-9. ORP exhibited the most variation of all parameters measured, ranging from 70.1 millivolts (mV) at SG-12R to 154.9 mV at RC-6. Conductivity also exhibited variation, with mean values ranging from 24.4 microsiemens per centimeter (µS/cm) at RC-6 to 90.5 µS/cm at SG-12R; however, the high value

at SG-12R is potentially the result of a calibration error. Excluding potentially erroneous values, the mean for SG-12R was 47.5 µS/cm, which is more consistent with other stations. In general, water quality data were consistent within and between stations, and measured parameters exhibited no clear downstream trends. Average water quality parameters measured at each station are provided in Table 3.

Table 4 presents physical habitat data, including average depth, flow velocity, substrate size class, and percent embedded depth. Similar to water quality data, the substrate data are consistent within and between stations with some variability associated with the channel planform, gradient, and habitat type at each replicate location. Similar to past years of monitoring, substrate conditions were relatively uniform, which is a function of both the creek environment and the targeted glide and riffle habitats sampled at each station for macroinvertebrate replicates. Most of the stream substrate fell within the gravel (2-64 mm diameter) or cobble (64-256 mm diameter) size ranges, with boulder-sized substrate (>256 mm diameter) occasionally to commonly present. Fine sediments (<2 mm diameter) were observed at trace levels at most stations. The highest percentage of fines was found at SG-9 (11%), while no fines were found at RC-4. Mean embedded depth ranged from 12% at SG-12R to 30% at RC-6. No noticeable downstream trends in substrate data were observed during the 2022 monitoring event. A summary description of the habitat characteristics for each station is provided in Appendix A.

3.2 Benthic Macroinvertebrates

Sixteen biological metrics were calculated from the benthic macroinvertebrate data at each monitoring station in accordance with the SOPs and consistent with prior years' metrics selected for evaluation (Floyd|Snider 2020a). Benthic macroinvertebrate metrics represent different functions within the biological community and generally respond to human disturbance in predictable ways. Metrics in this report are grouped into the following categories based on these functions: productivity, richness, trophic/habit, composition, and tolerance. Explanations of each metric and its relevance are provided in the sections below. Field data forms can be found in Appendix A. The benthic macroinvertebrate photo log and raw taxonomic data are included in Appendices B and C, respectively.

The documented response of each of these metrics and associated taxa to impacts from metals, according to a review of available literature, and the environmental significance of the response are summarized below and detailed further in Appendix D. Natural environmental variation (seasonality, storm events, debris inputs, fire, etc.) and changes in elevation must also be considered when analyzing macroinvertebrate metrics (Clements 1994). Sources of natural environmental variability are discussed in detail in Appendix F.

In 2022, the macroinvertebrate metrics largely do not conform to a normal data distribution; only 2 of the 11 metrics evaluated met normality assumptions. Differences between stations for

those metrics that did not meet normality assumptions were evaluated using the non-parametric Kruskal-Wallis Rank Sum test. Where differences were observed between stations with 95% confidence (p-value <0.05), pairwise comparisons were performed using Dunn's test, with the p-value adjusted to control the false discovery rate, using the Benjamini-Yekutieli adjustment. For metrics with significant pairwise comparisons between reference and Site stations, further details regarding results over time are included to evaluate against baseline conditions.

As stated above, the richness metrics are not able to be evaluated statistically evaluated and were therefore assessed relative to the 80% threshold value.

No significant differences between any Site station and both reference stations were identified for any of the metrics assessed in the statistical evaluation. For the richness metrics, 2 of the 5 Site stations (RC-4 and SG-10) met the 80% threshold for all 5 of the richness metrics, while the other 3 Site stations (RC-2, SG-9, and SG-12R) met the 80% threshold for all richness metrics except Trichoptera richness.

Metric results for each station and statistical comparisons between stations are discussed further in the following sections. Table 5 provides the results of comparisons between reference and Site stations.

3.2.1 Productivity Metric

Total abundance per ft^2 is the only metric used in this report to characterize macroinvertebrate community productivity. The quartile distribution of replicate abundance per ft^2 for each station is presented in Figure 2, and mean abundance per ft^2 for each station is presented in Table 6.

Macroinvertebrate abundance in cold, oligotrophic mountain streams commonly ranges from about 90 to 450 individuals per ft^2, and variation within and between stations can be large when comparing a single standing crop estimate between years (Wisseman 2020). Although abundance can be inhibited by metals pollution, the metric is inherently variable and is not always a reliable indicator of metals impacts (Karr and Chu 1997). The natural variability inherent to the metric must be considered before making inferences from the data for a single year. Refer to Appendix F for a discussion of sources of natural variability.

Mean total abundance at Site stations ranged from 71 (RC-2) to 137 (SG-9) individuals per ft^2. Reference stations had mean total abundance values of 47 and 121 individuals per ft^2. There were no statistically significant differences in total abundance between the Site and reference stations in 2022 (Table 5). Additionally, mean total abundance was within the expected range for a cold, oligotrophic mountain stream at most stations, except RC-6 (a reference station), RC-2, and RC-10. However, in general, trends over time for both Site and reference stations continue to increase from baseline (Appendix E, Figure E.1).

3.2.2 Richness Metrics

Richness metrics characterize the benthic macroinvertebrate community structure. These metrics can be useful indicators of exposure to various forms of disturbance. In general, higher richness values are observed in habitats that have not been compromised by external stressors. The richness metrics presented in this report include total taxa richness, EPT index, Plecoptera richness, Trichoptera richness, and clinger richness. These metrics were calculated for each station and represent total taxa counts based on the highest practicable level of identification.

Each of the composite metrics (i.e., the richness metrics other than total taxa richness) represents types or groups of taxa that are characteristically found in specific habitat types and have varying degrees of sensitivity to human disturbance and/or pollution, as well as natural environmental variability. For example, the majority of Ephemeroptera (i.e., mayflies) are grazers, and many taxa are sensitive to metals and other pollutants. Many Plecoptera taxa (e.g., stoneflies) are predators or shredders and therefore sensitive to changes in sedimentation and organic litter, respectively. Trichoptera (i.e., caddisflies) display a range of specialized trophic and habit strategies, and taxa richness tends to decrease with reduced habitat complexity.

The 2022 metric values for Site stations were compared to the 80% threshold for the reference stations. Results are summarized in Tables 7 and 8 and Figures 3 through 9. Figure 3 displays the EPT index as a component of total taxa richness. Figures 4 through 8 display 2022 values for the richness metrics evaluated for each station relative to the 80% threshold. Figure 9 displays Trichoptera richness metric values over time for each station. The metric, evaluation method, and station ID for those stations that did not meet the 80% threshold are presented in Table 5.

Two of the 5 Site stations (RC-4 and SG-10) met the 80% target threshold for all 5 of the richness metrics, and Site stations RC-2, SG-9, and SG-12R met the 80% threshold for all the richness metrics except Trichoptera richness. These 5 richness metrics are inherently interdependent; for example, total richness is made up in large part of EPT richness, as illustrated in Figure 3. Therefore, although Site stations RC-2, SG-9, and SG-12R did not meet the target threshold for Trichoptera richness, in general, taxa richness at these stations is similar to taxa richness at the reference stations. The similarity of the results for richness metrics across stations indicates that habitat quality is similar across stations and suggests that Site stations are showing characteristics of recovery relative to reference stations.

The findings based on the richness metrics are as follows:

- Total taxa richness was similar across all Site and reference stations, ranging from 66 to 80 (Table 7). All stations met the 80% threshold for total taxa richness. Total taxa richness values generally increased from baseline measurements and are consistent with prior years, which reinforces the overall upward trend over time for the total taxa richness metric (Appendix E, Figure E.2,). Total taxa richness is sensitive to metals pollution, as

the introduction of chemical pollutants can narrow the range of species that a stream is able to support (Reif 2012).

- EPT taxa made up approximately 50% or more of all taxa present at a given station in 2022 (Figure 3). The values for the EPT index were similar across all Site and reference stations, ranging from 36 to 46 taxa. While RC-2 and RC-10 did not meet the 80% threshold in 2021, all stations met the 80% threshold for EPT taxa richness in 2022 (Figure 5). Like total taxa richness, the EPT taxa metric is sensitive to metals pollution. Metals contamination can result in a reduction of EPT taxa due to the associated changes in water chemistry and food availability (Normandeau Associates 2012). The 2022 results for this metric reinforce the general upward trend in EPT taxa richness across all stations.

- Plecoptera richness was similar across all Site and reference stations; all stations met the 80% threshold. The range of Plecoptera richness values across stations observed in 2022 (13 to 17 taxa) is generally consistent with the range observed in previous years. The majority of stations exhibited increases in Plectoptera richness between 2021 and 2022, which is consistent with the overall upward trend from baseline values for both Site and reference stations. Plecoptera richness has been shown to decrease in response to metals due to associated changes in water chemistry and food resources (Clements et al. 2000, Fore 2002), and Plecopterans are typically the first to disappear in response to human influences such as metal pollution (Puget Sound Stream Benthos 2020a).

- Trichoptera richness has varied over time, but all continuously sampled stations had values in 2022 that were greater than or equal to baseline values in 2010 and 2011 (Table 8 and Figure 9). Additionally, the range or variation of the data across stations (9 taxa) is consistent with the range observed in 2021 (9 taxa). Trichoptera richness increased from 2021 to 2022 at 2 Site stations (SG-9 and RC-2). Trichoptera richness decreased or stayed the same from 2021 to 2022 at 3 Site stations (RC-4, SG-12R, and RC-10). RC-2, SG-9, and SG-12R did not meet the 80% threshold for Trichoptera richness. At RC-2, the number of taxa in 2022 (11) still represents a substantial increase from the baseline value in 2010 (3). SG-9 and SG-12R are only in their third year of sampling, so trends over time cannot be effectively evaluated. Trichoptera richness has been reported to have a variable response to metals (Clements 1994, Roline 1988), which is enabled in part by the variation in trophic strategies and habits within the Trichoptera order. Habitat complexity is an important variable to consider when evaluating Trichoptera richness as an indicator of metal pollution due to the potential for confounding factors. Although the data have been variable, the trends for both Site and reference stations continue to increase over time (Figure 9).

- Clinger richness was similar across all Site and reference stations, ranging from 32 to 38 (Table 7). Multiple Site stations exhibited increases in clinger richness from 2021 to 2022; trends from baseline values for both Site and reference stations continue upward. All stations met the 80% threshold for clinger richness. Clingers are found across multiple orders (including Ephemeroptera, Trichoptera, and Diptera) and typically occupy the interstitial spaces between cobble and gravel due to physical adaptations that allow them to hold onto smooth/slick substrates in fast-moving water. Because of these adaptations and sensitivity to finer sediments filling in the interstitial spaces, clinger richness is considered to be more reflective of substrate conditions than of metals pollution (Karr and Chu 1997).

3.2.3 Trophic/Habit Metrics

Trophic and feeding habit metrics used in this report include percent filterers by abundance, percent shredders by abundance, percent clingers by abundance, and the ratio of scrapers to scrapers plus filterers. These metrics quantify a range of trophic/habit strategies represented in the benthic macroinvertebrate community and the relative abundance of specialist versus generalist feeders. These metrics can be used to characterize general invertebrate community structure for a given environment and indicate changes in community structure that are related to disturbance. For example, shredders typically co-dominate with filterers higher in a stream system where coarse organic matter is more abundant, while the dominance shifts to filterers downstream where the nutrient regime shifts toward fine particulate organic matter (Vannote et al. 1980). Scrapers and shredders are specialized feeders that are more sensitive to changes in environmental conditions, while filterers as a group are generalist feeders and are more tolerant of environmental variability. Clingers are also specialized feeders, and taxa in this category tend to be sensitive to fine sediments. The ratio of specialized feeders to generalist feeders tends to decrease with exposure to pollution and disturbance-related environmental stressors and is an indicator of these kinds of effects.

Table 9 presents average trophic and feeding habit values for each Site and reference station weighted by relative abundance. Median metric values for the Site stations were statistically compared to median metric values for the reference stations, due to the non-parametric nature of the data. The results of this comparison are presented in Table 5. No Site stations were significantly different from either reference station for any of the trophic/habit metrics. The overall trends for the trophic/habit metrics at all stations over time are shown in Figures E.6 through E.9 (Appendix E).

The findings based on the results are as follows:

- Percentages of shredders ranged from 3.11% to 8.54% (Figure 10, Table 9). Statistical analysis showed no significant differences between any Site station and either reference station. As noted above, shredders are specialized feeders and typically rely on coarse

organic matter. Thus, the percent shredders metric is more reflective of riparian conditions and is not necessarily a reliable indicator of metals pollution (Cummins et al. 1989, Kerans and Karr 1994). Percent shredders at Site and reference stations have been variable over time, but trends are relatively stable, when considering variance in the data (Appendix E, Figure E.6; Table 9).

- The percentage of clingers ranged from 42% to 61% (Figure 11, Table 9). Statistical analysis showed no significant differences between any Site station and either reference station. This metric is primarily influenced by fine sediments within the system and is not as indicative of metals contamination (Karr and Chu 1997).

- The percentage of collector-filterer taxa was low (between 0.37% and 3.68%) across all stations in 2022 (Figure 12, Table 9), which is consistent with expected community structure in an oligotrophic mountain stream environment. Statistical analysis showed no significant differences between any Site station and either reference station.

- The ratio of scrapers to scrapers plus filterers was high across all stations, ranging from 0.91 to 0.99, showing a predominance of scrapers relative to filterers in the system (Figure 13, Table 9). Statistical analysis showed no significant differences between any Site station and either reference station.

3.2.4 Composition Metrics

The metrics quantifying the composition of the benthic macroinvertebrate community include percent contribution of the dominant taxon, percent Ephemeroptera, and the EPT/EPT+C ratio. EPT/EPT+C is the ratio of EPT (pollution sensitive) abundance divided by the sum of EPT abundance and Chironomidae (pollution-tolerant midges) taxa abundance. These metrics provide a measure of community diversity and potential indicators of environmental stress. The percent contribution of the dominant taxon typically increases as community diversity decreases and can be an indicator of environmental stress, particularly metals (Karr and Chu 1997). Percent Ephemeroptera tends to decrease with increasing stress (Wiseman 2003). Ephemeroptera are sensitive to most types of human influence, so a lower percentage can indicate that community structure has been impacted by contamination, disturbance, or other environmental stressors (Puget Sound Stream Benthos 2020a). However, some Ephemeroptera families are relatively tolerant of metals, and in cases where large numbers of these tolerant taxa are present, a high percentage of Ephemeroptera may not always indicate healthy stream conditions (Clements and Kiffney 1994). The EPT/EPT+C ratio has also been shown to decrease in response to stress, as the abundance of more-tolerant chironomids increases relative to the abundance of more-sensitive EPT taxa (McGuire 2009).

There were no statistically significant differences in percent contribution of the dominant taxon, percent Ephemeroptera, or the EPT/EPT+C ratio between any Site station and both reference

stations in 2022 (Table 5). Average composition metric values weighted by abundance are presented in Table 10, and the data are displayed in Figures 14 through 16. Percent dominant taxa, percent Ephemeroptera, and the EPT/EPT+C ratio over time are shown in Figures E.10, E.11, and E.12, respectively (Appendix E).

The general findings based on the composition metrics are as follows:

- Percent contribution of the dominant taxon ranged from 18% to 25% at the Site stations and was 18% at both reference stations (Table 10 and Figure 14). Metric values increase with environmental stress. Statistical analysis showed no significant differences among Site stations or between any Site station and either reference station.

- Percent Ephemeroptera ranged from 37% to 47% at the Site stations and from 46% to 55% at the reference stations (Table 10 and Figure 15). Metric values decrease in response to environmental stress. Statistical analysis showed no significant differences among Site stations or between any Site station and either reference station.

- The EPT/EPT+C ratio ranged from 0.63 to 0.74 at the Site stations and from 0.81 to 0.87 at the reference stations (Table 10 and Figure 16). Metric values decrease in response to environmental stress, due to the greater abundance of more-tolerant chironomids as compared to the more-sensitive EPT taxa (McGuire 2009). Statistical results indicated no one Site station differed significantly from both reference stations.

3.2.5 Tolerance Metrics

Tolerance metrics include the HBI, the MTI, and percent tolerant taxa by abundance. These metrics provide information about the prevalence of disturbance- and pollution-tolerant species in the benthic macroinvertebrate community. The HBI is scored on a scale from 0 to 10, with higher values indicating a higher proportion of the community is composed of organic pollution–tolerant organisms (Puget Sound Stream Benthos 2020b). Like the HBI, the MTI is scored on a scale from 0 to 10, and higher values indicate that a greater proportion of the community is composed of metals-tolerant organisms (Puget Sound Stream Benthos 2020c). It is important to note that the MTI metric was developed for the Clark Fork River basin (Ingman et al. 1990; McGuire 1987, 1989), a large river system that differs in community composition from Railroad Creek. Metals tolerance values are only available for some taxa in Railroad Creek, meaning that the MTI may not accurately represent the actual distribution of tolerant versus intolerant taxa. The percent tolerant taxa metric is based on an ordinal taxa tolerance rating scale developed by ABA that considers the sensitivity of representative taxa to water temperature and dissolved oxygen levels, with higher percentages representing increasing levels of pollution tolerance.

HBI, MTI, and percent tolerant taxa metric values for the Site and reference stations are presented in Table 11 and Figures 17 through 19, and statistical comparisons of Site station scores to reference station scores are summarized in Table 5. There were no significant differences between any Site station and either reference station for these metrics. The 2022 values for percent tolerant taxa and MTI metrics continue to show a clear downward trend from baseline conditions for most stations, indicating a downward trend in the proportion of the community composed of pollution-tolerant organisms. Metric values over time are shown in Figures E.13 through E.15 (Appendix E).

The findings based on the composition metrics are as follows:

- The 2022 HBI values ranged from 2.79 to 3.51 at the Site stations and from 2.55 to 2.60 at the reference stations (Table 11 and Figure 17). These values indicate that organic pollution–tolerant organisms are a relatively small component of community structure across all stations. All stations had HBI values below 4.5, indicating either very good or excellent water quality across all stations (Hilsenhoff 1987). Although statistical results did show variance among stations, no Site station differed significantly from either reference station.

- MTI values in 2022 were relatively low, ranging from 1.24 to 1.65 at the Site stations and from 1.42 to 1.72 at the reference stations (Table 11 and Figure 18). Statistical analysis showed no significant differences among stations. The low overall range of MTI values over the entire data record suggests that metals-tolerant organisms are a relatively small component of macroinvertebrate community structure in Railroad Creek. McGuire (2006) reports MTI values for communities dominated by species intolerant of metals are less than 4, while values for communities composed of only the most metals-tolerant species approach 10. However, as noted above, the MTI metric for Railroad Creek is an incomplete indicator of community sensitivity because metals tolerance ratings are available for only a subset of observed taxa (an average of 40% across all stations).

- Percent tolerant taxa by abundance ranged from 0.35% to 1.36% at the Site stations and from 0.85% to 1.05% at the reference stations (Table 11 and Figure 19). These low percentages suggest that a relatively small component of the macroinvertebrate community in Railroad Creek is tolerant of changes in water temperature and dissolved oxygen levels. Although statistical results did show variance among stations, no Site station differed significantly from either reference station.

3.2.6 Habitat Correlations

Benthic macroinvertebrate metrics were correlated with substrate composition (e.g., percent sand, gravel, cobble) and embeddedness at the replicate level to provide additional context for interpreting the macroinvertebrate results. Substrate composition and embeddedness are useful

covariates because they are unlikely to vary considerably over the summer growth period that supports macroinvertebrate community structure. Other replicate-level habitat variables, such as water depth and flow velocity, are not as useful as covariates because they vary day to day and sometimes hour to hour.

Substrate and embeddedness correlation results are presented in Table 12. A Spearman's correlation coefficient was used because the benthic macroinvertebrate metrics have a non-parametric distribution. The strongest correlation coefficient calculated was 0.48 for percent boulder and percent clingers. Embedded depth percentage had a significant, positive correlation with total richness, EPT richness, Plecoptera richness, Trichoptera richness, clinger richness, percent shredders, and percent tolerant taxa. Embedded depth did not have a significant negative correlation with any metric. These findings differ from previous years which generally found embeddedness levels to be negatively correlated to richness metrics.

Other significantly correlated parameters and metrics include the following: negative correlation between percent gravel and EPT richness, clinger richness, percent shredders, percent clingers, percent Ephemeroptera, and EPT/EPT+C; positive correlation between percent gravel and percent dominant taxa and HBI; negative correlation between percent fines and total abundance, total richness, EPT richness, Plecoptera richness, Trichoptera richness, and clinger richness; negative correlation between percent cobbles and percent dominant taxa and HBI; positive correlation between percent cobbles and total abundance, total richness, EPT richness, Plecoptera richness, clinger richness, percent shredders, and percent Ephemeroptera; negative correlation between percent boulders and scraper to scraper-filterer ratio and HBI; positive correlation between percent boulder and percent clingers, percent collector-filterers, percent Ephemeroptera, and EPT/EPT+C. Overall, these correlations highlight potential relationships between the benthic macroinvertebrate community and habitat characteristics but are not considered to have strong predictive power due to the general similarity in habitat across stations.

Consistent with the previous statistical evaluations and predicted responses, macroinvertebrate metrics in Railroad Creek are influenced by embeddedness and/or fine sediments that reduce voids between gravels and cobbles, diminishing variety and complexity of the benthic habitat. Sediment dynamics in the watershed are expected to have been influenced by the effects of the Wolverine fire. Specifically, the fire has likely increased the delivery of sand and fine sediments (6 mm diameter and smaller) to the stream channel, particularly in stations where the riparian zone was burned, which predominate downstream of the Site. These sediments are being actively transported and distributed throughout the Railroad Creek system, and habitat suitability for certain invertebrate species has likely been affected in areas exposed to elevated fine sediment deposition. Other forms of natural environmental variability including seasonal and interannual changes in discharge, discussed in detail in Appendix F, have also influenced sediment delivery processes in Railroad Creek.

3.2.7 Benthic Macroinvertebrate Community Summary

Overall, the 2022 benthic macroinvertebrate metrics indicate increased macroinvertebrate community diversity compared to baseline conditions in 2010 and 2011 and reference station conditions. No significant differences between any Site station and both reference stations were identified for any of the metrics assessed in the statistical evaluation. Although individual stations RC-2, SG-9, and SG-12R did not meet the 80% threshold for Trichoptera richness in 2022, the post-remediation increases in diversity and increases in the other 4 richness metrics at Site stations are promising indicators of recovery.

3.3 Fish

A summary of the 2022 biomonitoring findings for observed fish species and size class distribution at each station is provided in this section. Electroshocker settings during sampling and water quality parameters collected at each station prior to fish collection are presented in Table 13.

As discussed in Section 2.3.1, in coordination with the Agencies, and to accommodate the Site conditions, the fish surveys were completed at all stations without block nets in a single pass. Because the fish could not be isolated within the sampling area, a required component of the sampling protocol for fish population studies, a fish abundance estimate could not be calculated.

3.3.1 Fish Population

A total of 46 fish were collected and measured from the 7 sampling stations during the 2022 sampling event (Table 14). Another 69 fish were observed but evaded capture (Table 14). Thirty-six, or 78%, of the collected fish were cutthroat trout (*Oncorhynchus clarkii*). Of the remaining fish collected, 1 (2%) was a cutthroat–rainbow trout hybrid, and 9 (20%) were classified as YOY with no physical characteristics enabling visual identification to species. No rainbow trout (*O. mykiss*) were collected during 2022 biomonitoring. Observed fish could not be identified to species.

Fish were captured and observed in all sampling stations. The highest percentage of fish captured was at RC-1 (30%), while the remaining fish captured had a comparable distribution among stations, from 9% at Stations RC-6 and RC-2 to 15 % at Station SG-12R. All YOY were collected at stations RC-1 (5), SG-9 (1), and RC-10 (3). RC-1 included a side channel that ran the length of the station, but it was not sampled due to dense channel-spanning vegetation that rendered it inaccessible.

Although not a component of fish population sampling, a total of 27 trout were captured in the reconstructed channel of Copper Creek. Another 25 fish were observed but not captured. During the summer, Copper Creek can run dry, and fish migration into Copper Creek could

result in mortality by stranding. The presence of fish in Copper Creek does not influence the fish population results of this survey (i.e., the fish sampling is not biased by the presence of fish in Copper Creek). This is because the sampling methodology is designed to assess the relative populations within and between 100-meter stations over time, not to assess the trout population of Railroad Creek as a whole. Copper Creek is also likely one of many accessible habitats within the watershed that could contribute to stranding mortality.

3.3.2 Fish Size Distribution

The size distribution of the fish community is an indicator of overall population structure and health. In general, a broad distribution of size classes ranging from YOY to mature individuals typical of the maximum achievable size for a given environment is indicative of a healthy reproducing population (Pope et al. 2010). Fish size can be equated to age class, but size at age varies in food-limited, cold-water stream environments. Consequently, there can be considerable overlap between year classes, particularly among larger adults; therefore, any artificial age demarcation beyond YOY could be inaccurate.

Fish count by fork length for the 2022 sampling event is shown for all stations in Figure 20 and by station in Figure 21. Fish count by size class is summarized for all years in Table 15. The YOY designation was based on individuals having a fork length measurement smaller than 65 mm. Size distribution frequencies support the use of 65-mm fork length as a threshold for identifying YOY (Figure 21). Several other year classes are suggested in the size/frequency histograms, particularly the yearling class (fork length = 65-99 mm). Given the small number of fish collected and the likely degree of overlap in size at age, the distinction between these year classes is less certain. The majority of fish collected at each station in 2022 (and prior years) had a fork length between 100 mm and 199 mm, with the exception of RC-1, where fish in the 65- to 99-mm size class were most abundant.

A direct comparison of size classification results from the 2022 sampling event to previous years is not applicable due to the change in sampling method; however, relative comparisons can be made based on size classes. Fewer fish in the YOY and 200- to 299-mm size classifications were collected in 2022, relative to the total number of fish collected. This could be due in part to the high flow conditions encountered, e.g., YOY size fish may have been holding predominantly in side channels and other margin habitats throughout the system and larger sized fish may have been concentrated in the deepest pools that were inaccessible to the sampling team[2]. Overall, a range of fish size classifications consistent with previous years' sampling were documented in 2022 despite the change in sampling protocol.

It is important to recognize that size distribution at any point in time will reflect the influence of multiple factors, including watershed-scale population dynamics, the suitability of available

2 Several fish (9 of the 27 fish) collected in the Copper Creek pools were in the 200- to 250-mm size class, indicating their representation in the population structure in 2022.

habitat at a given station for each age class, and temporally specific conditions during sampling, as well as the effects of remediation. These results are consistent with those from previous years of post-remediation biomonitoring and suggest that the fish population within the study area remains reproductively viable.

3.3.3 Fish Summary

Despite high flows that reduced capture efficiency, fish were collected and observed at each station in 2022. Abundance estimates could not be calculated because the fish could not be isolated within the sampling area, a required component of the sampling protocol for fish population studies. Therefore, comparisons with abundance estimates calculated in previous years of sampling are not applicable.

A total of 46 fish were collected and measured from the 7 sampling stations during the 2022 sampling event, and another 69 fish were observed but evaded capture (Table 17). Of the collected fish, only 1 cutthroat-rainbow trout hybrid was observed, with the remaining fish identified as cutthroat or YOY. Overall, fish size classifications documented in previous years' sampling were also documented in 2022.

Trout population dynamics are influenced by many factors, and causes of this variation may be intricate. Fish are highly mobile and do not exhibit site fidelity at the scale of a 100-meter station. Fish abundance and size distribution may be associated with the suitability of differential habitat types that vary both between sampling stations within a given year or season, but also within any single sampling station over time as the creek is geomorphically active and habitat conditions change. Abundance and size distribution are further influenced by annual variations in fish maturity at the time of sampling, as well as annual fecundity and mortality rates (Dauwalter et al. 2002; Neville et al. 2016; Platts and Nelson 1988).

Fish populations in dynamic mountain stream environments are strongly influenced by environmental factors, including flow events (i.e., high and low), sediment delivery, and overwintering conditions. Changes in habitat conditions resulting from the Wolverine fire have likely influenced fish population abundance and age structure at the watershed scale. Based on studies conducted in other watersheds, these population-level effects can last for several years (Sedell et al. 2015, Rosenberger et al. 2015). Additionally, variations across sampling events such as timing, flow conditions, and capture efficiency can influence the population represented and abundance estimates. These factors should all be considered when interpreting year-to-year changes in fish abundance within and between stations. The variability highlights the importance of relying on a full, multi-year data record, as well as other available lines of evidence when drawing conclusions about effectiveness of the remediation on the Railroad Creek fish population.

3.4 Summary of Findings

The year 5 post-remediation biomonitoring habitat, benthic macroinvertebrate, and fish data were successfully collected from 7 stations. As described above in Section 2.3, however, fish sampling methods were modified from previous years and only qualitative data could be collected.

A total of 46 fish were collected and measured from the 7 sampling stations during the 2022 sampling event, and another 69 fish were observed but evaded capture (Table 17). Of the collected fish, only 1 cutthroat-rainbow trout hybrid was observed, with the remaining fish identified as cutthroat or YOY. Overall, a range of fish size classifications consistent with previous years' sampling were documented in 2022.

Sixteen biological metrics grouped into 5 categories were used to assess the health of the benthic macroinvertebrate community at each biomonitoring station. There were no significant differences between any Site station and both reference stations for any of the benthic macroinvertebrate metrics assessed in the statistical evaluation, and the 80% threshold for 4 of the 5 richness metrics (all except Trichoptera richness) was met at all Site stations. The 80% threshold for Trichoptera richness was not met at 3 of the 5 Site stations (RC-2, SG-9, and SG-12R).

Overall, the 2022 benthic macroinvertebrate metrics indicate increased macroinvertebrate community diversity compared to baseline conditions in 2010 and 2011 and reference station conditions. No significant differences between any Site station and both reference stations were identified for any of the metrics assessed in the statistical evaluation. Although stations RC-2, SG-9, and SG-12R did not meet the 80% threshold for Trichoptera richness in 2022, the post-remediation increases in diversity and increases in the other 4 richness metrics at Site stations are promising indicators of recovery. Because benthic macroinvertebrate communities can vary seasonally and from year to year, it is important to evaluate the benthic macroinvertebrate data alongside the water and sediment quality data presented in the 2022 ACAR. This comprehensive approach can be used to discern the extent of Phase 1 remedial effectiveness from natural variability (Appendix F). The results of the 2022 evaluation of the benthic macroinvertebrate community are summarized below:

- Productivity Metric: There were no statistically significant differences in total abundance between any Site station and either reference station in 2022.
- Richness Metrics: All Site stations met the 80% threshold for 4 out of the 5 richness metrics. The 80% threshold for Trichoptera richness was not met at 3 of the 5 Site stations, RC-2, SG-9, and SG-12R. Richness results from 2022 reinforce overall upward trends across all the richness metrics from 2010 and 2011 baseline values. It should also be noted that the richness metrics are related to each other; for example, EPT richness

makes up more than 50% of total richness at each station and a decline in one metric would be apparent in the other.

- Trophic/Habit Metrics: None of the trophic/habit metrics had significant differences between any Site station and either reference station. The overall community composition and distribution of trophic strategies and habits in the benthic macroinvertebrate community aligns with expectations for cold-water mountain stream systems.

- Composition Metrics: There were no significant differences between any Site station and both reference stations for the composition metrics. Trends for these metrics continue to increase from baseline values.

- Tolerance Metrics: There were no significant differences between any Site station and either reference station for the tolerance metrics. These metrics generally indicate good to excellent stream quality across all stations.

- The strongest habitat correlation for the benthic macroinvertebrate results was with the mean percentage of boulders at a given station, which was positively correlated with percent clingers, percent collector-filterers, percent Ephemeroptera, and EPT/EPT+C. Strong habitat correlations were also evident in the embedded depth percentage, with positive correlations across all of the richness metrics, in addition to percent shredders and percent tolerant taxa. The positive correlation between embeddedness and the richness metrics is noteworthy given that it is not consistent with the negative correlation observed in past monitoring years. Several other metrics had both positive and negative correlations to the substrate parameters. Overall, these correlations highlight potential relationships between the benthic macroinvertebrate community and habitat characteristics but are not considered to have strong predictive power due to the general similarity in habitat across stations.

When reviewing the results, it is important to recognize that the benthic macroinvertebrate community and fish population are influenced by pre- and post-remediation conditions, as well as natural environmental variables, described in detail in Appendix F. The Wolverine fire was a major watershed-scale disturbance event that likely continues to alter the hydrologic, nutrient, and sediment transport regime in Railroad Creek. Post-fire effects will continue to evolve over time, and their influence on the macroinvertebrate community is an important consideration when drawing conclusions about remedial effectiveness from observed trends.

4.0 REFERENCES

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TABLES

Table 1. Timeline of Past Remediation and Biomonitoring Activities

Year	Activity	Monitoring Timing		Report
2010	Baseline biomonitoring	Benthic Macroinvertebrates:	9/8/2010–9/24/2010	MWH 2012a
		Fish:	9/22/2010–9/27/2010	
2011	Baseline biomonitoring	Benthic Macroinvertebrates:	9/8/2011–9/13/2011	MWH 2012b
		Fish:	Not Collected	
2012	Phase 1 selected remedy initiated	--		
2015	Post-Wolverine fire biomonitoring	Benthic Macroinvertebrates:	9/23/2015–10/8/2015	Stantec 2016
		Fish:	10/5/2015–10/11/2015	
2016	Post-Wolverine fire biomonitoring	Benthic Macroinvertebrates:	9/15/2016–9/26/2016	Stantec 2017
		Fish:	9/22/2016–9/29/2016	
2018	Phase 1 remedy completed	--		
2018	Post-Phase 1 biomonitoring, year 1	Benthic Macroinvertebrates:	9/26/2018–9/29/2018	Arcadis 2019
		Fish:	9/30/2018–10/5/2018	
2019	Post-Phase 1 biomonitoring, year 2	Benthic Macroinvertebrates:	9/24/2019–9/30/2019	Confluence 2020
		Fish:	9/25/2019–10/2/2019	
2020	Post-Phase 1 biomonitoring, year 3	Benthic Macroinvertebrates:	8/20/2020–8/24/2020	Confluence 2021
		Fish:	8/21/2020–8/28/2020	
2021	Post-Phase 1 biomonitoring, year 4	Benthic Macroinvertebrates:	8/17/2021–8/22/2021	Confluence 2022
2022	Post-Phase 1 biomonitoring, year 5	Benthic Macroinvertebrates:	8/18/2022—8/21/2022	This report
		Fish:	8/19/2022—8/23/2022	

Table 2. Habitat Description for each 100-Meter Sampling Station

Site	Reach Gradient	Approximate Reach Area (ft^2)	Dominant Habitat Type[1]	Approximate Proportion of Wetted Area	Approximate Average Depth (ft^2)	Large Woody Debris Count	Dominant Substrate	Riparian Condition	Defining Characteristics
RC-6	3-5%	11,483	Fast, turbulent (riffle)	90%	1.1	10	Cobble/gravel	Conifer/deciduous mixed forest, overhanging alder common	Predominantly riffle habitat. Scour pool and dry tributaries along right bank. Overhanging vegetation along most of the reach.
			Slow (pools)	10%	2.5				
RC-1	3%	16,404	Fast, turbulent (riffle)	84%	1.2	4	Boulder/cobble and gravel	Conifer/deciduous mixed forest, overhanging alder common	Predominantly riffle habitat with on large scour pool on the upstream edge of the reach and 2 scour pools just downstream of a woody debris jam. A heavily overgrown shallow side channel paralleling main channel along entire station length was inaccessible and not sampled in 2020.
			Slow (pools)	16%	2.2				
RC-4	4-5%	13,123	Fast, turbulent (riffle)	96%	1.5	8	Cobble/gravel	Armored on right bank, riparian vegetation on left bank	Predominantly riffle habitat with 1 large scour pool formed by boulder grade control at Holden waterline crossing; foot bridge crosses Railroad Creek immediately downstream of waterline crossing; artificial log and boulder bank stabilization on both banks.
			Slow (pools)	4%	3.2				
RC-2	1-2%	11,483	Fast, turbulent (riffle)	92%	1.8	3	Cobble/gravel	Armored on right bank, sparse riparian vegetation on left bank	Predominantly riffle habitat with some scour pool associated with boulders. Relocated reach with constructed riffle-pool complex; riprap stabilization on right bank adjacent to tailings pile; artificial large
			Slow (pools)	8%	2.0				

Site	Reach Gradient	Approximate Reach Area (ft^2)	Dominant Habitat Type[1]	Approximate Proportion of Wetted Area	Approximate Average Depth (ft^2)	Large Woody Debris Count	Dominant Substrate	Riparian Condition	Defining Characteristics
									woody debris habitat features added during remediation. Station is located on a bend to the right.
SG-9	2-3%	16,404	Fast, turbulent (riffle)	17%	1.3	65	Cobble/gravel	Conifer/deciduous mixed forest impacted by fire, overhanging alder common	Riffle/glide reach, with scour pools, gravel bars, and large woody debris located along the margins. A vegetated side channel paralleling main channel along the right bank was inaccessible due to overhanging vegetation and was not sampled in 2020.
			Fast, nonturbulent (glide)	73%	2.0				
			Side channel, slow	2%	0.4				
			Slow (pools)	8%	2.6				
RC-5A[1]	3%	14,436	Fast, turbulent (riffle)	61%	1.6	41	Cobble/gravel	Conifer/deciduous mixed forest	Transition from boulder riffle and glide dominant with bedrock control on right bank to glide dominated by gravel at downstream end; large woody debris features; low-gradient tributary enters on left bank
			Fast, nonturbulent (glide)	36%	1.3				
			Slow (pools)	3%	2.0				
SG-12R	2%	13,123	Fast, turbulent (riffle)	54%	0.9	20	Cobble/gravel	Conifer/deciduous mixed forest impacted by fire, overhanging alder common	Riffle/glide reach located on a gradual bend to the left. Large, deep, scour pool on right bank running approximately half the length of the reach, with plentiful large woody debris. Gravel bar on left bank with overhanging vegetation.
			Fast, nonturbulent (glide)	12%	1.3				
			Slow (pools)	34%	3.0				
RC-10	3%	13,123	Fast, turbulent (riffle)	66%	1.3	16	Cobble/gravel	Conifer/deciduous mixed forest	Riffle/glide reach, with large woody debris throughout.

Site	Reach Gradient	Approximate Reach Area (ft^2)	Dominant Habitat Type[1]	Approximate Proportion of Wetted Area	Approximate Average Depth (ft^2)	Large Woody Debris Count	Dominant Substrate	Riparian Condition	Defining Characteristics
			Fast, nonturbulent (glide)	26%	2.5			impacted by fire, overhanging alder common	Scour pools and overhanging vegetation along both sides of creak.
			Slow (pools)	8%	2.5				
RC-15[1]	4-7%	8,202	Fast, turbulent (riffle)	79%	1.4	9	Boulder/cobble with some gravel	Conifer/deciduous mixed forest impacted by fire, overhanging alder common	All habitat information presented in this table is for a side channel located on the left bank. Predominantly riffle habitat, with a boulder cascade in the upper half, and a boulder/cobble pool/riffle complex in the lower half. A large gravel bar separates this side channel from the main channel.
			Side channel, fast	3%	0.5				
			Slow (pools)	18%	2.1				

[1] Data for this station are provided for comparison and are from previous biomonitoring events (Confluence 2020, 2021).

Table 3. Water Quality within the 100-Meter Sampling Station, n = 15

Site	Sample Date	Temperature (°C)		Dissolved Oxygen (mg/L)		pH		ORP (mV)		Conductivity (µS/cm)		Turbidity (NTU)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
RC-6	8/20/2022	13.2	0.908	9.9	0.224	7.1	0.084	154.9	10.9	24.4	2.76	1.7	0.535
RC-1	8/19/2022	13.4	0.074	9.7	0.061	7.1	0.024	139.2	3.1	27.4	0.93	2.1	2.290
RC-4	8/19/2022	13.2	0.158	9.7	0.042	7.1	0.040	142.6	8.7	29.5	0.31	1.3	0.247
RC-2	8/18/2022	12.9	0.422	9.6	0.050	7.2	0.035	97.9	11.8	31.4	0.13	1.2	0.319
SG-9	8/21/2022	13.8	0.094	9.8	0.066	7.0	0.064	96.6	3.7	49.9	12.23	2.0	0.207
SG-12R	8/18/2022	12.6	0.855	9.6	0.194	7.0	0.082	70.1	27.9	90.5*	42.34	1.2	0.405
RC-10	8/20/2022	11.9	0.345	10.0	0.638	7.1	0.185	133.2	20.7	43.2	4.06	1.3	0.474

*This value is likely the result of a calibration error or equipment issue.

Table 4. Physical Habitat Characteristics within the 100-Meter Sampling Station, n = 15

Site	Depth (ft)		Flow Velocity at Bottom (ft/s)		Flow Velocity at 0.6x Depth From Surface (ft/s)		% Fines/Sand (<2 mm)		% Gravel (2-64 mm)		% Cobble (64-256 mm)		% Boulder (>256 mm)		% Embedded Depth	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
RC-6	0.63	0.21	1.37	0.79	1.28	0.78	8	9.6	51	34.6	25	28.1	18	22.0	30	19.2
RC-1	0.67	0.21	1.17	0.68	1.27	0.86	1	2.6	35	32.0	47	27.1	17	26.0	16	8.3
RC-4	0.71	0.21	0.54	0.54	0.55	0.55	0	0.0	40	23.9	55	25.6	5	18.1	27	16.2
RC-2	0.68	0.28	0.49	0.59	0.85	1.05	4	6.0	44	22.1	50	18.8	3	10.3	17	10.5
SG-9	0.68	0.30	0.75	0.43	0.88	0.46	11	21.0	55	22.9	30	20.1	0	0.0	15	6.4
SG-12R	0.68	0.25	0.71	0.40	0.64	0.33	5	10.5	70	20.0	25	22.9	0	0.0	12	7.5
RC-10	0.77	0.33	1.18	0.50	1.25	0.57	9	7.3	53	25.0	24	22.6	13	19.1	22	19.6

Table 5. Benthic Macroinvertebrate Metrics Statistical Results Summary

Metric	Method	Analysis of Variance p-value	Stations Differing from Reference Stations[1]	Percent of the Reference Station Mean
Productivity				
Total Abundance[2]	Kruskal-Wallis Rank Sum Test	0.000 *	--	
Richness				
Total Richness	80% of Reference Station Mean		--	
EPT Richness	80% of Reference Station Mean		--	
Plecoptera Richness	80% of Reference Station Mean		--	
Trichoptera Richness	80% of Reference Station Mean		SG-12R SG-9 RC-2	48% 69% 76%
Clinger Richness	80% of Reference Station Mean		--	
Trophic/Habit Metrics				
% Shredders[3]	Kruskal-Wallis Rank Sum Test	0.011 *	--	
% Clingers[3]	Kruskal-Wallis Rank Sum Test	0.029 *	--	
% Collector-Filterers[3]	Kruskal-Wallis Rank Sum Test	0.001 *	--	
Scraper to Scraper-Filterer Ratio[3]	Kruskal-Wallis Rank Sum Test	0.002 *	--	
Composition Metrics				
% Dominant Taxa	Kruskal-Wallis Rank Sum Test	0.208	--	
% Ephemeroptera	ANOVA	0.153	--	
EPT/EPT+C[2]	Kruskal-Wallis Rank Sum Test	0.003 *	--	
Tolerance Metrics				
HBI[3]	Kruskal-Wallis Rank Sum Test	0.005 *	--	
MTI	ANOVA	0.236	--	
% Tolerant Taxa[3]	Kruskal-Wallis Rank Sum Test	0.015 *	--	

* Value is significant at alpha = 0.05.
[1] Dunn's Test was used to evaluate non-parametric pairwise comparisons. Site station values were only considered to differ from the reference stations if they were significantly different from both reference stations.
[2] Though significant differences were detected and there were differences between Site and reference stations, Site stations did not differ significantly from both reference stations.
[3] Though significant differences were detected, Site stations did not differ significantly from reference stations.

Table 6. Benthic Macroinvertebrate Productivity Metric Summary, 2022

Station	Total Abundance
Reference Stations	
RC-6	47
RC-1	121
Habitat Disturbance	
RC-4	118
Metals Impact Zone	
RC-2	71
SG-9	137
Recovery Zone	
SG-12R	94
RC-10	87

Table 7. Benthic Macroinvertebrate Richness Metrics Summary, 2022

Station	Richness Metrics				
	Total taxa richness	EPT Index	Plecoptera (stoneflies) Richness	Trichoptera (caddisflies) Richness	Clinger Richness
Reference Stations					
RC-6	74	46	15	16	38
RC-1	72	43	14	13	35
Habitat Disturbance					
RC-4	76	43	15	13	38
Metals Impact Zone					
RC-2	77	43	16	11	35
SG-9	80	43	17	10	35
Recovery Zone					
SG-12R	66	36	15	7	32
RC-10	78	39	13	12	35

Table 8. Trichoptera Richness by Station, All Years

Station	Year								
	2010	2011	2015	2016	2018	2019	2020	2021	2022
Reference Stations									
RC-6	10	13	13	16	16	15	14	16	16
RC-1	11	7	9	13	17	16	13	18	13
Habitat Disturbance									
RC-4	8	7	12	14	16	16	18	15	13
Metals Impact Zone									
RC-2	3	6	4	5	9	13	10	10	11
SG-9	--	--	--	--	--	--	11	9	10
RC-5A	6	7	6	8	7	12	--	--	--
Recovery Zone									
SG-12R	--	--	--	--	--	--	13	14	7
RC-10	7	6	10	9	14	9	14	14	12
RC-15	11	12	14	12	13	11	14	--	--

Dashes indicate that the station was not sampled during that year.

Table 9. Benthic Macroinvertebrate Trophic/Habit Metrics Summary, 2022

Station	Trophic/Habit Metrics			
	% Filterers	% Shredders	% Clingers	Scrapers/Scrapers+Filterers
Reference Stations				
RC-6	3.68	5.38	60	0.91
RC-1	1.82	3.74	61	0.96
Habitat Disturbance				
RC-4	0.40	8.54	54	0.99
Metals Impact Zone				
RC-2	0.37	3.65	48	0.99
SG-9	1.02	6.48	42	0.97
Recovery Zone				
SG-12R	0.35	3.11	48	0.99
RC-10	1.84	3.29	42	0.95

Note: Numbers in this table are replicate mean values weighted by the relative abundance of each replicate.

Table 10. Benthic Macroinvertebrate Composition Metrics Summary, 2022

Station	Composition Metrics		
	% Ephemeroptera	% Contribution of Dominant Taxon	EPT/EPT+C[1]
Reference Stations			
RC-6	46	18	0.87
RC-1	55	18	0.81
Habitat Disturbance			
RC-4	47	19	0.74
Metals Impact Zone			
RC-2	41	18	0.65
SG-9	37	19	0.63
Recovery Zone			
SG-12R	42	25	0.72
RC-10	42	24	0.69

[1] The EPT/EPT+C ratio is calculated using the same equation as the EPTC ratio reported in the 2019 ACAR (Floyd|Snider 2020b).

Note: Numbers in this table are replicate mean values weighted by the relative abundance of each replicate.

Table 11. Benthic Macroinvertebrate Tolerance Metrics Summary, 2022

Station	Tolerance Metrics		
	HBI	MTI	% Tolerant by Abundance
Reference Stations			
RC-6	2.55	1.72	0.85
RC-1	2.6	1.42	1.05
Habitat Disturbance Zone			
RC-4	2.79	1.65	1.36
Metals Impact Zone			
RC-2	3.26	1.57	1.31
SG-9	3.51	1.24	1.17
Recovery Zone			
SG-12R	3.46	1.35	0.35
RC-10	3.49	1.36	0.92

Note: Numbers in this table are replicate mean values weighted by the relative abundance of each replicate.

Table 12. Correlation of Benthic Macroinvertebrate Metrics with Replicate-Level Substrate Parameters

Metric	Fines/Sand (%)	Gravel (%)	Cobble (%)	Boulder (%)	Embedded Depth (%)
Productivity					
Total Abundance	-0.26*	-0.03	0.20*	-0.12	0.17
Richness					
Total Richness	-0.28*	-0.06	0.22*	-0.13	0.33*
EPT Richness	-0.35*	-0.25*	0.32*	0.05	0.34*
Plecoptera Richness	-0.23*	-0.05	0.22*	-0.18	0.26*
Trichoptera Richness	-0.21*	-0.05	0.03	0.19	0.26*
Clinger Richness	-0.26*	-0.25*	0.25*	0.14	0.26*
Trophic/Habit Metrics					
% Shredders	-0.08	-0.23*	0.22*	0.04	0.24*
% Clingers	-0.08	-0.30*	0.13	0.48*	-0.04
% Collector-Filterers	0.15	-0.11	-0.05	0.32*	0.02
Scraper to Scraper-Filterer Ratio	-0.16	0.05	0.11	-0.26*	-0.05
Composition Metrics					
% Dominant Taxa	0.18	0.26*	-0.24*	-0.14	-0.12
% Ephemeroptera	-0.12	-0.32*	0.22*	0.38*	-0.04
EPT/EPT+C	0.04	-0.25*	0.07	0.44*	-0.14
Tolerance Metrics					
HBI	0.18	0.31*	-0.25*	-0.38*	-0.06
MTI	0.06	-0.06	0.02	0.16	-0.08
% Tolerant Taxa	0.05	0.02	0.02	-0.18	0.30*

* Spearman's correlation coefficient is significant at alpha = 0.05. Significant correlation coefficients between 0.3 and 0.5 are considered to indicate a low level of correlation and those <0.3 indicate negligible association.

Table 13. Electroshoker Settings and Water Quality Parameters during Fish Sampling

Site	Pulse Width	Pulse Frequency	Volts	Time (seconds)		Number of Passes	Temperature (°C)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH
				LR-20	LR-24					
RC-6	500	35	700-900	810	1880	1	12.0	25	10.25	6.91
RC-1	500	35	700-900	880	870	1	13.0	25	10.03	7.12
RC-4	500	35	700-800	--	--	1	13.0	29	9.66	7.12
RC-2	500	30	600-800	2000	1240	1	12.4	32	9.70	7.12
SG-9	500	35	700-900	--	--	1	13.5	59	9.73	6.98
SG-12R	500	30-35	500-900	2380	2380	1	13.5	47	9.43	7.11
RC-10	500	35	700-800	900	1990	1	11.7	42	10.16	7.16
Note: Electroshocker time data was not recorded at two stations but is considered to be comparable to other stations recorded.										

Table 14. 2022 Fish Collection Summary

Site	Total Fish Captured	% of Fish Collected At Station	Unknown (YOY)		Cutthroat Trout		Hybrid		Rainbow Trout		Fish Observed*	
			Total	% of Total Fish	Total	% of Total Fish	Total	% of Total Fish	Total	% of Total Fish	Total	% of Total Fish**
RC-6	4	9%	0	0%	4	100%	0	0%	0	0%	8	10%
RC-1	14	30%	5	36%	8	57%	1	7%	0	0%	13	23%
RC-4	5	11%	0	0%	5	100%	0	0%	0	0%	10	13%
RC-2	4	9%	0	0%	4	100%	0	0%	0	0%	4	7%
SG-9	6	13%	1	17%	5	83%	0	0%	0	0%	24	26%
SG-12R	6	13%	0	0%	6	100%	0	0%	0	0%	10	14%
RC-10	7	15%	3	43%	4	57%	0	0%	0	0%	0	6%
Total	46	100%	9	20%	36	78%	1	2%	0	0%	69	100%

* Due to reduced capture efficiency from high flows, fish observed but not captured are included here.

** Includes captured and observed fish

Table 15. Fish Size Classes, All Years

Station	Size Class (mm)	2010	2015	2016	2018	2019	2020	2022
RC-6	<65	--	10	21	6	9	--	--
	65-99	8	10	13	9	9	5	2
	100-199	43	35	28	36	12	12	1
	200-299	3	3	3	2	4	1	1
RC-1	<65	3	27	28	51	12	1	0
	65-99	6	17	15	8	10	2	7
	100-199	41	43	43	50	27	7	2
	200-299	6	7	4	4	1	2	--
RC-4	<65	1	6	11	11	3	1	--
	65-99	6	9	9	6	9	6	1
	100-199	34	38	40	38	21	17	1
	200-299	4	6	7	4	2	1	--
RC-2	<65	--	--	17	11	--	--	--
	65-99	--	--	--	1	1	7	--
	100-199	9	17	16	57	16	8	4
	200-299	2	5	1	8	2	1	--
SG-9	<65	--	--	--	--	--	20	--
	65-99	--	--	--	--	--	28	1
	100-199	--	--	--	--	--	21	3
	200-299	--	--	--	--	--	1	1
RC-5a	<65	--	11	18	3	14	--	--
	65-99	--	2	--	7	4	--	--
	100-199	5	21	17	32	28	--	--
	200-299	4	8	4	2	4	--	--
SG-12R	<65	--	--	--	--	--	27	--
	65-99	--	--	--	--	--	12	1
	100-199	--	--	--	--	--	55	5
	200-299	--	--	--	--	--	2	--
RC-10	<65	3	19	43	28	50	18	--
	65-99	2	6	27	14	7	9	1
	100-199	9	25	46	16	30	25	3
	200-299	1	--	2	--	1	--	--
RC-15	<65	3	12	27	17	39	--	--
	65-99	18	--	27	15	7	--	--
	100-199	38	43	55	41	63	--	--
	200-299	2	4	2	1	--	--	--

FIGURES

Figure 1. 2022 Biomonitoring Stations

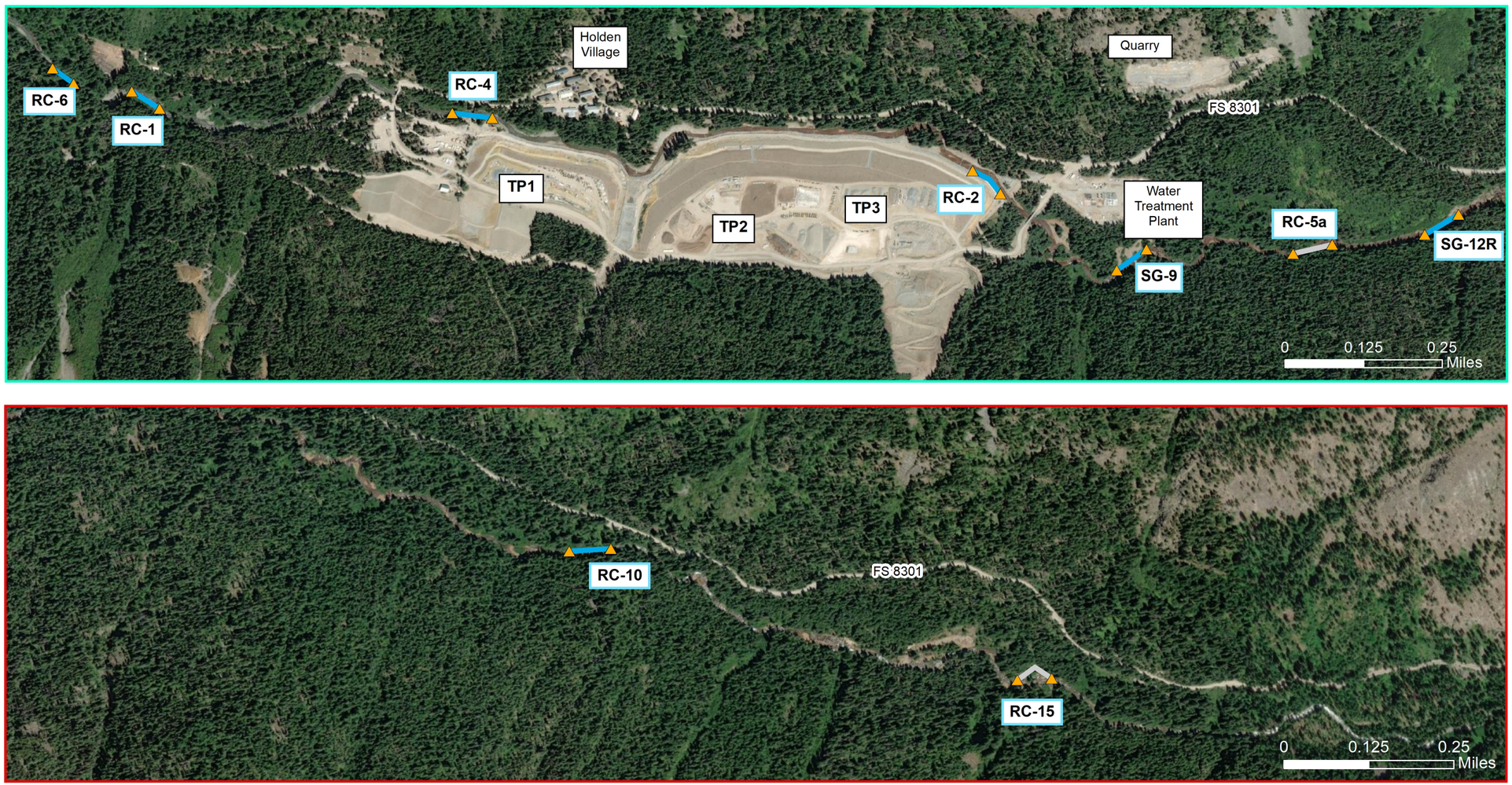


Figure 1. Sampling Locations

Figure 2. Quartile Distribution of Benthic Macroinvertebrate Abundance per Square Foot by Station, 2022

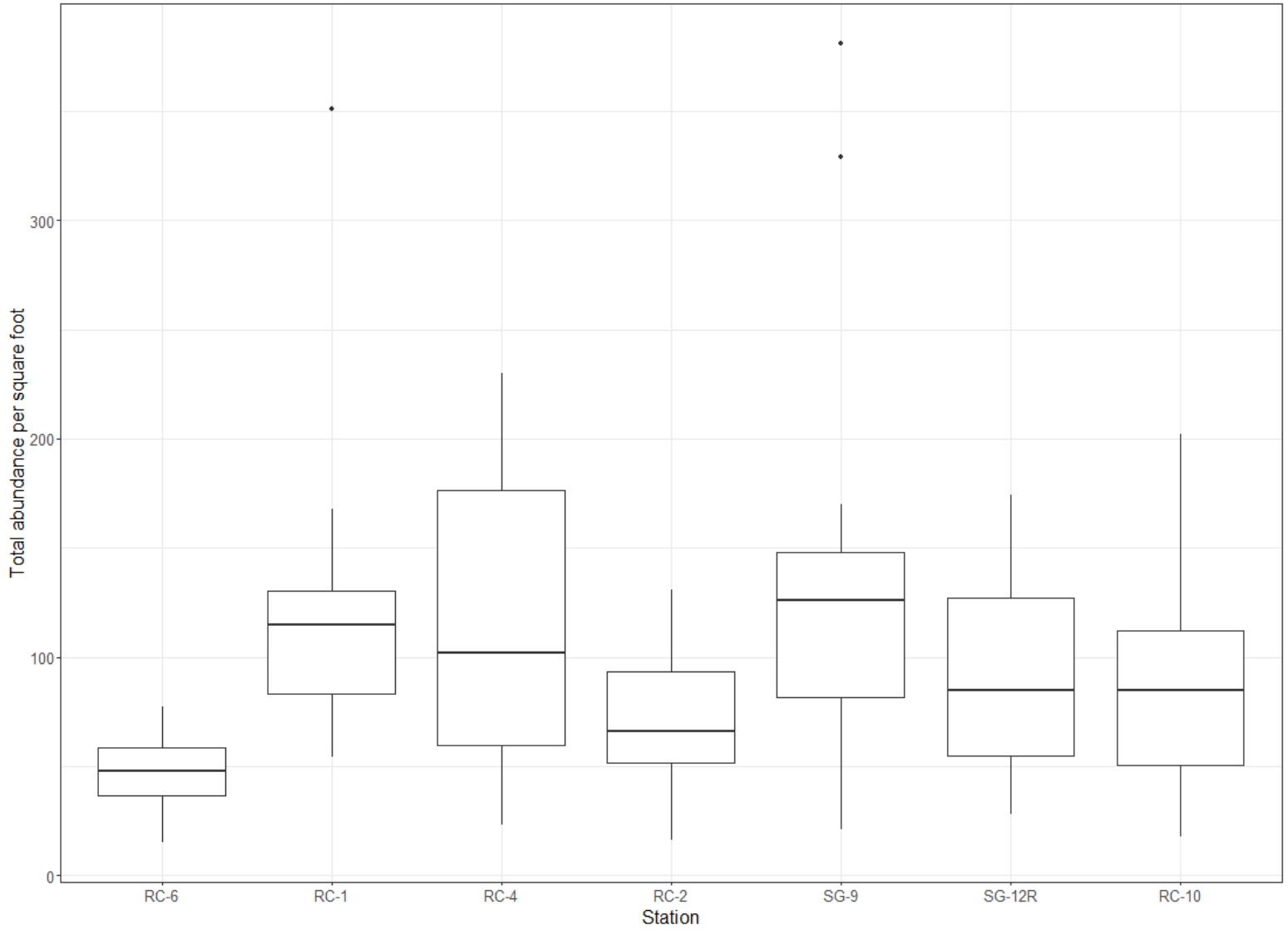


Figure 3. Total Richness & EPT Richness, 2022

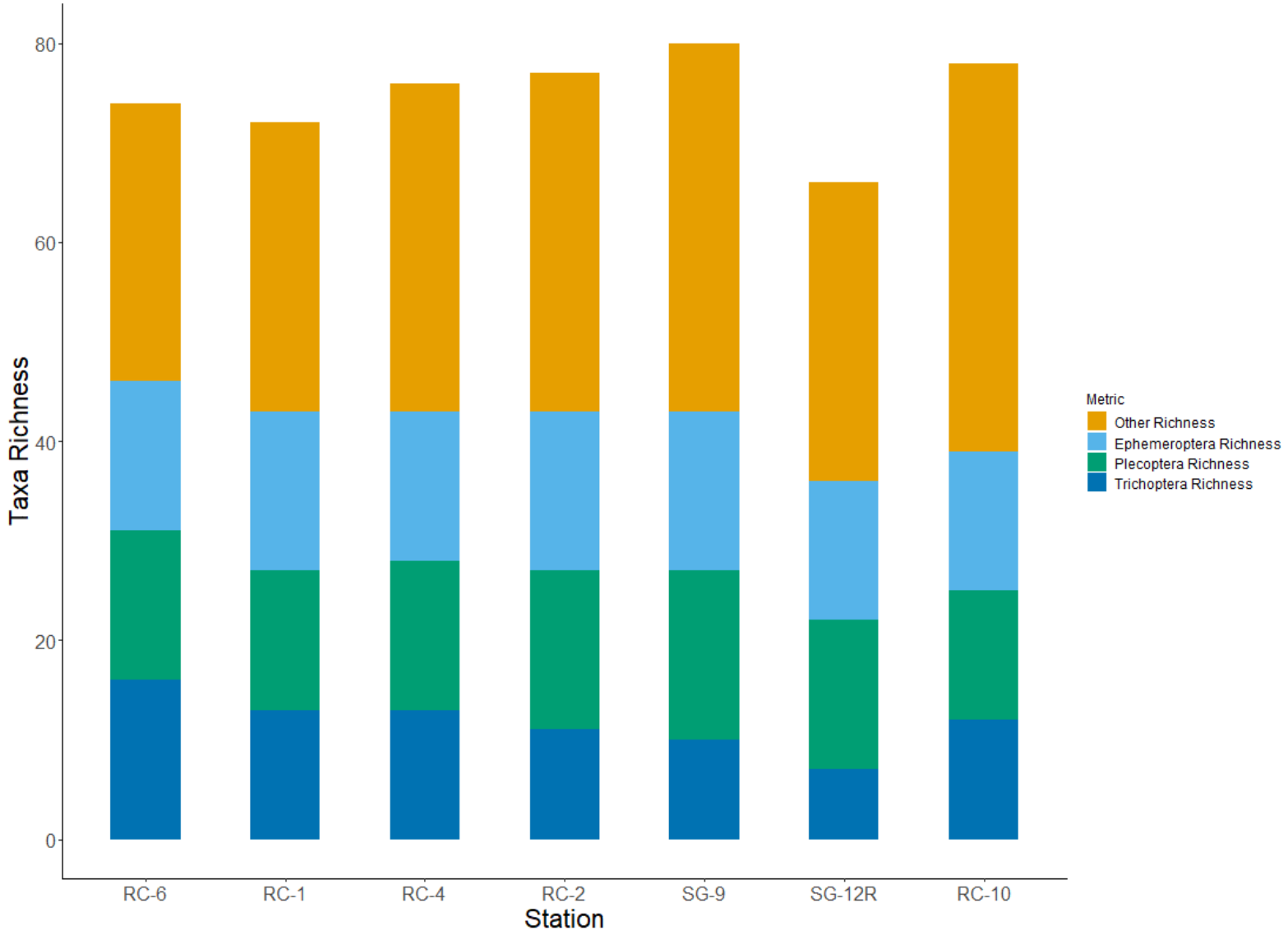


Figure 4. Total Richness by Station, 2022

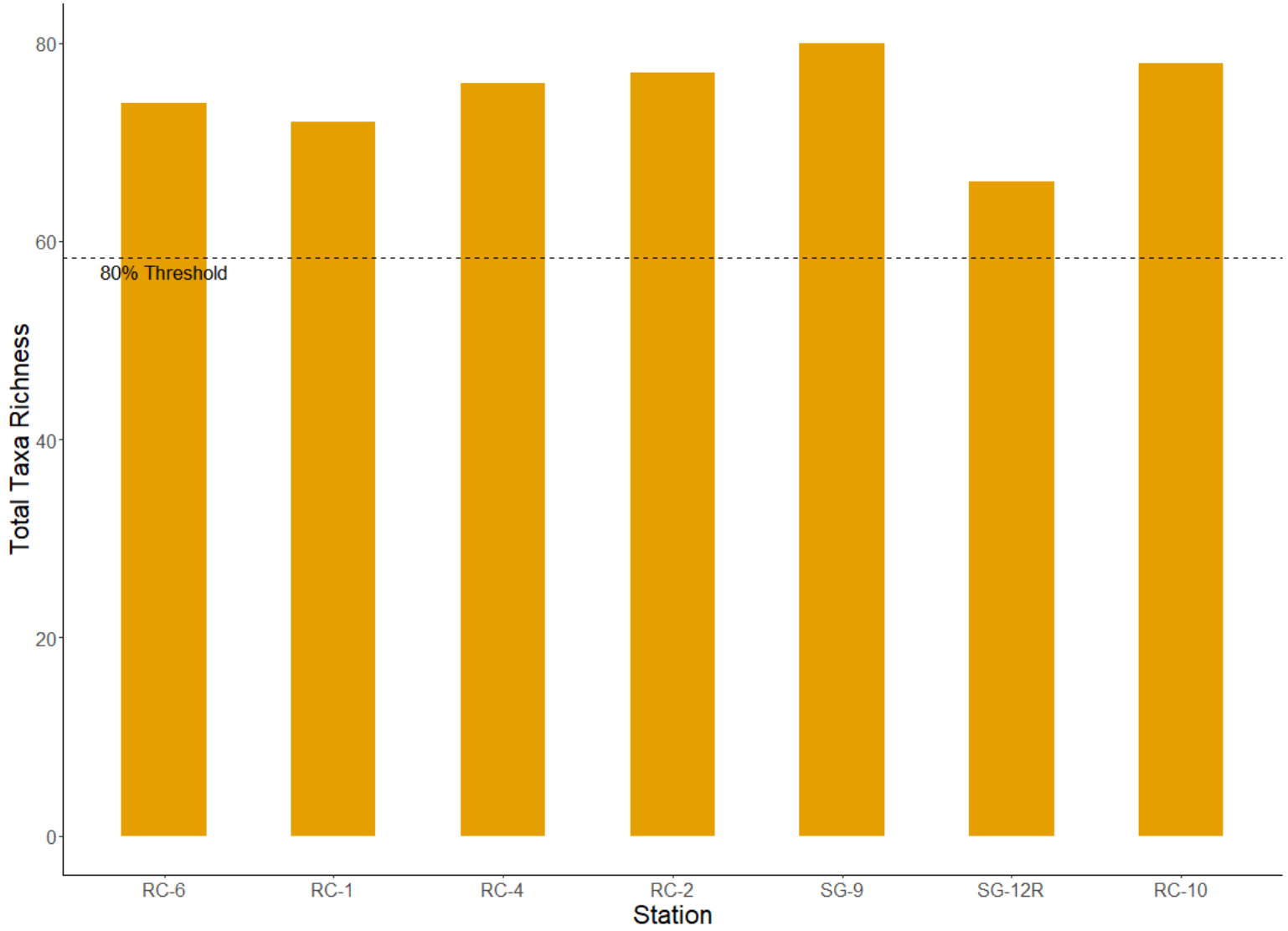


Figure 5. EPT Richness Index by Station, 2022

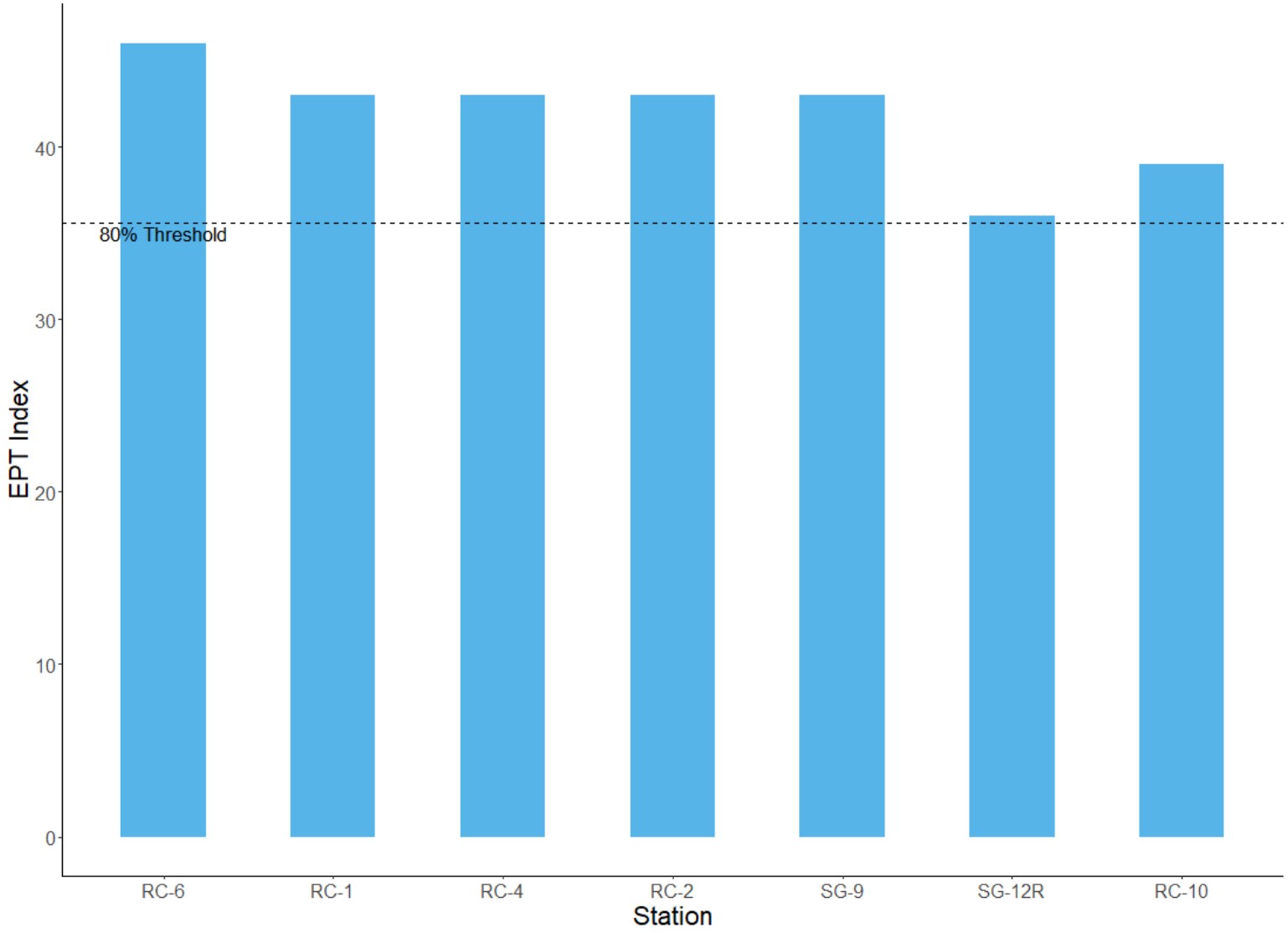


Figure 6. Plecoptera Richness by Station, 2022

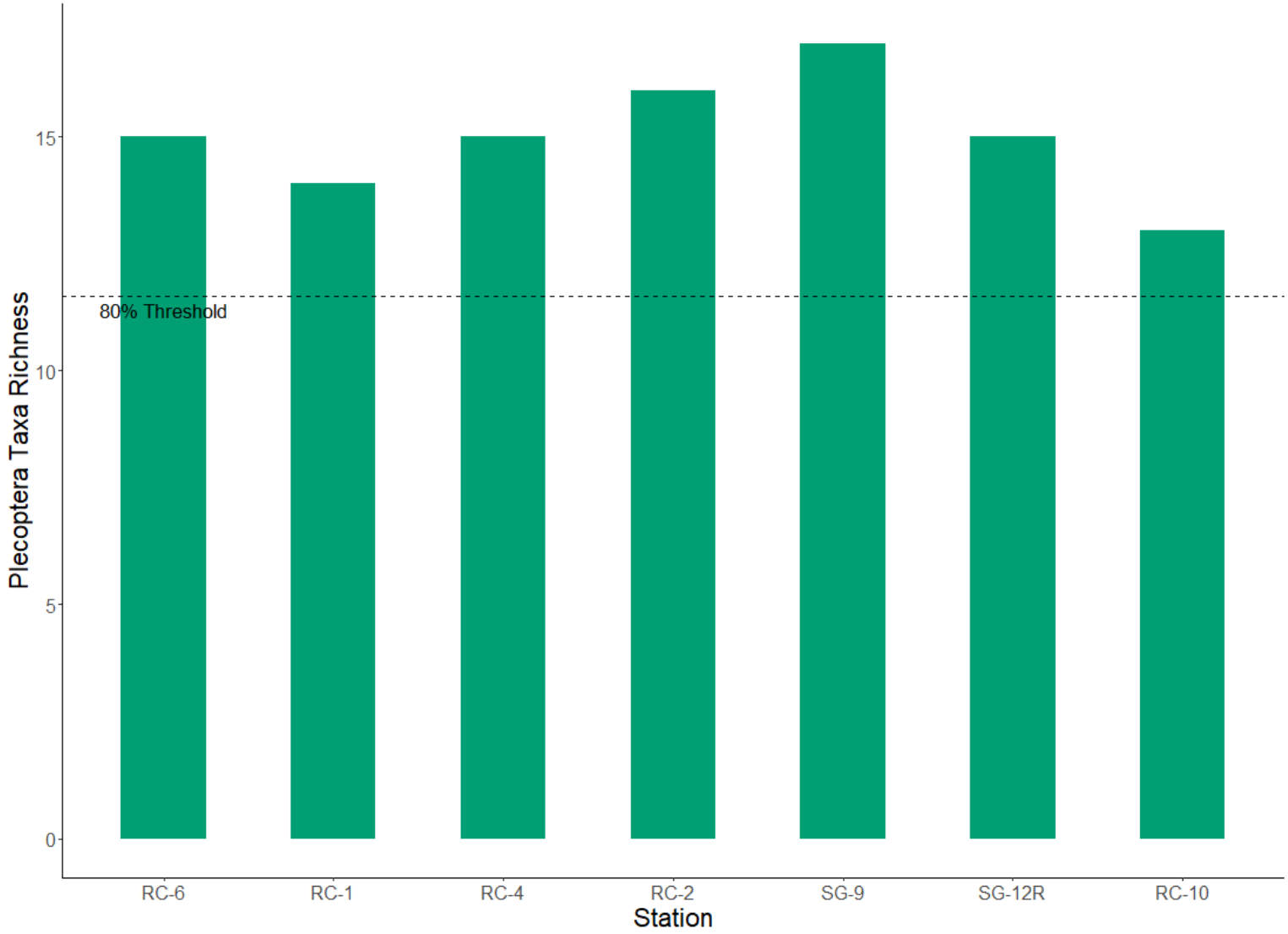


Figure 7. Trichoptera Richness by Station, 2022

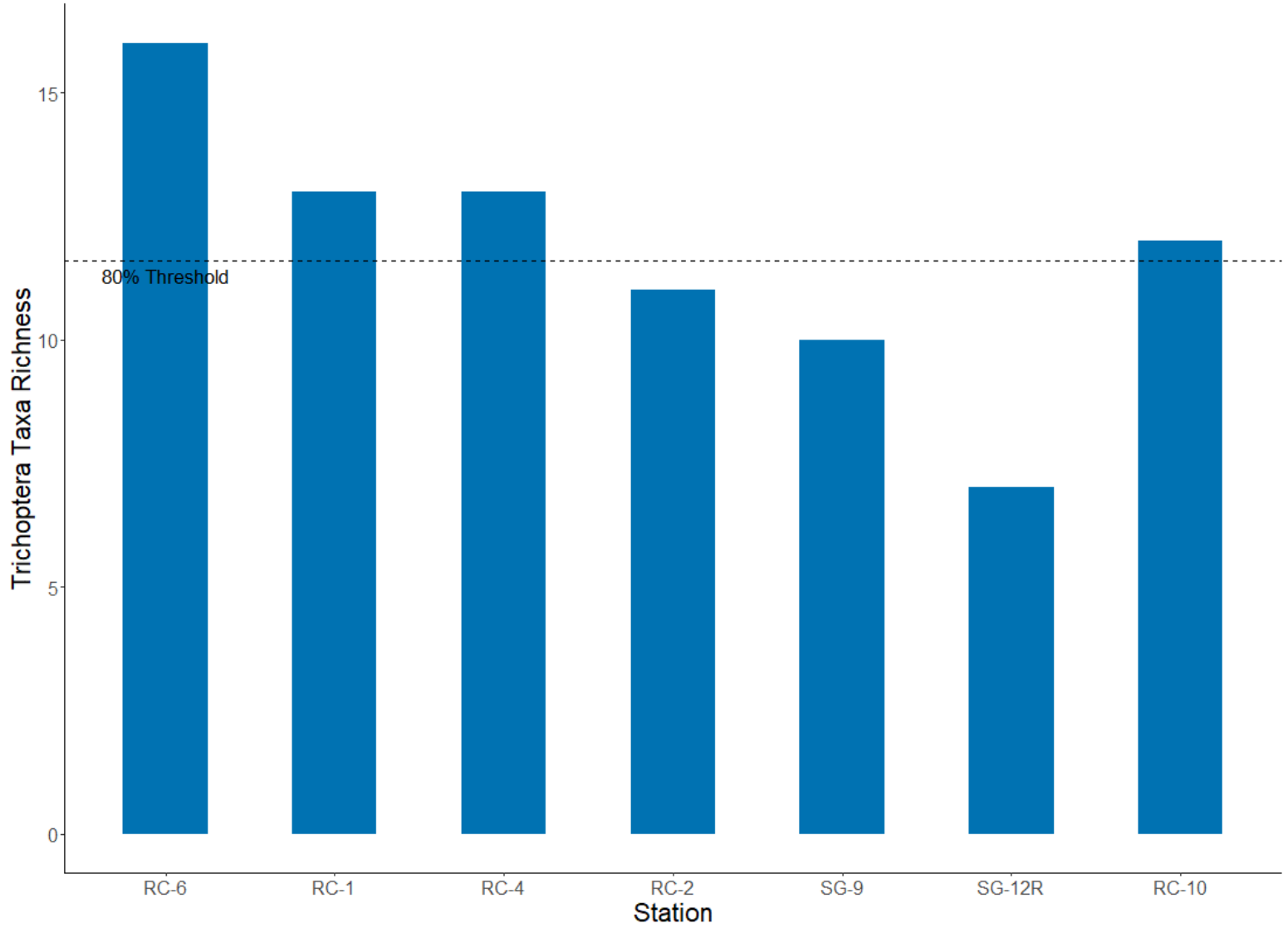


Figure 8. Clinger Richness by Station, 2022

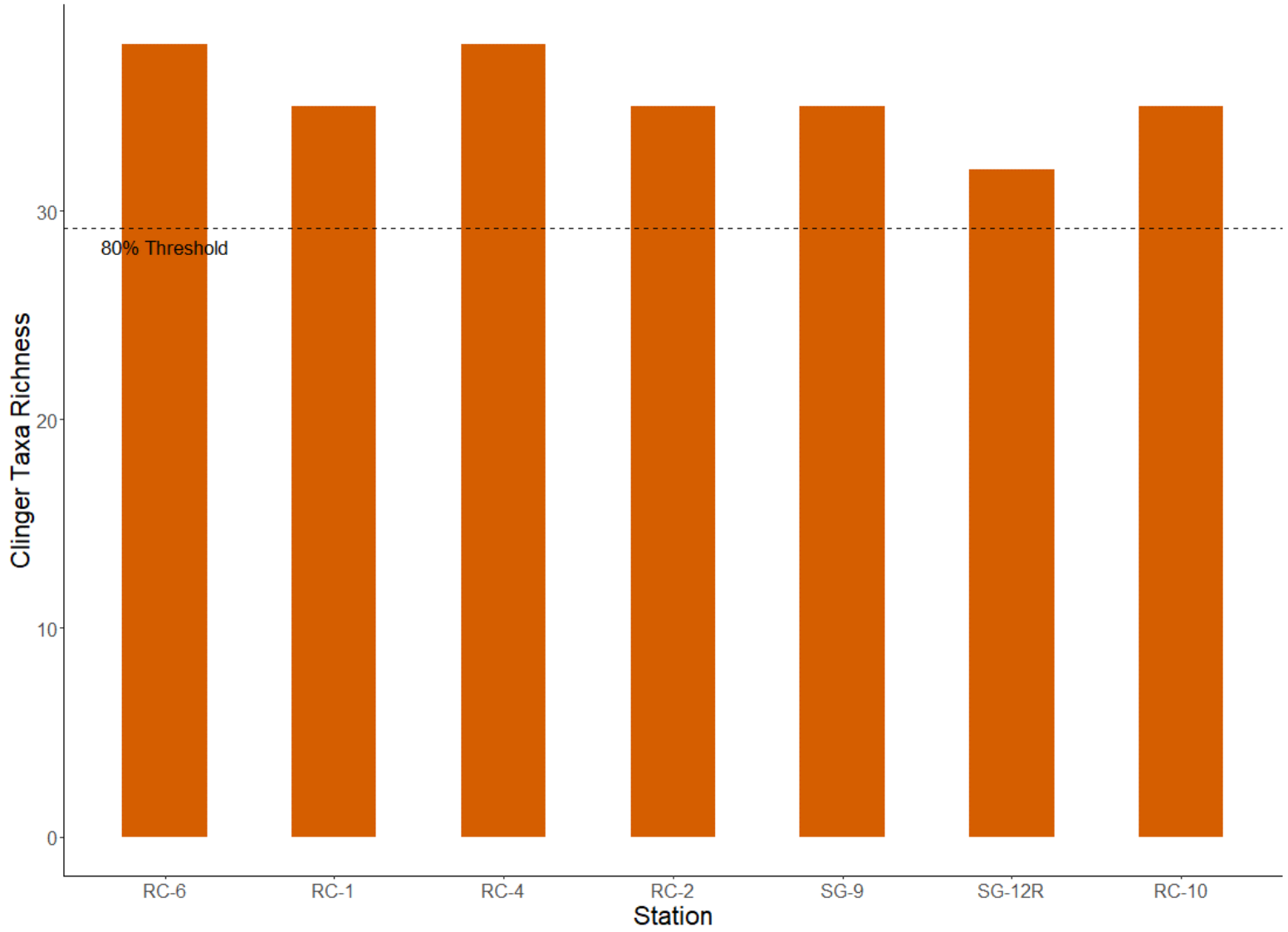


Figure 9. Trichoptera Richness by Station, All Years

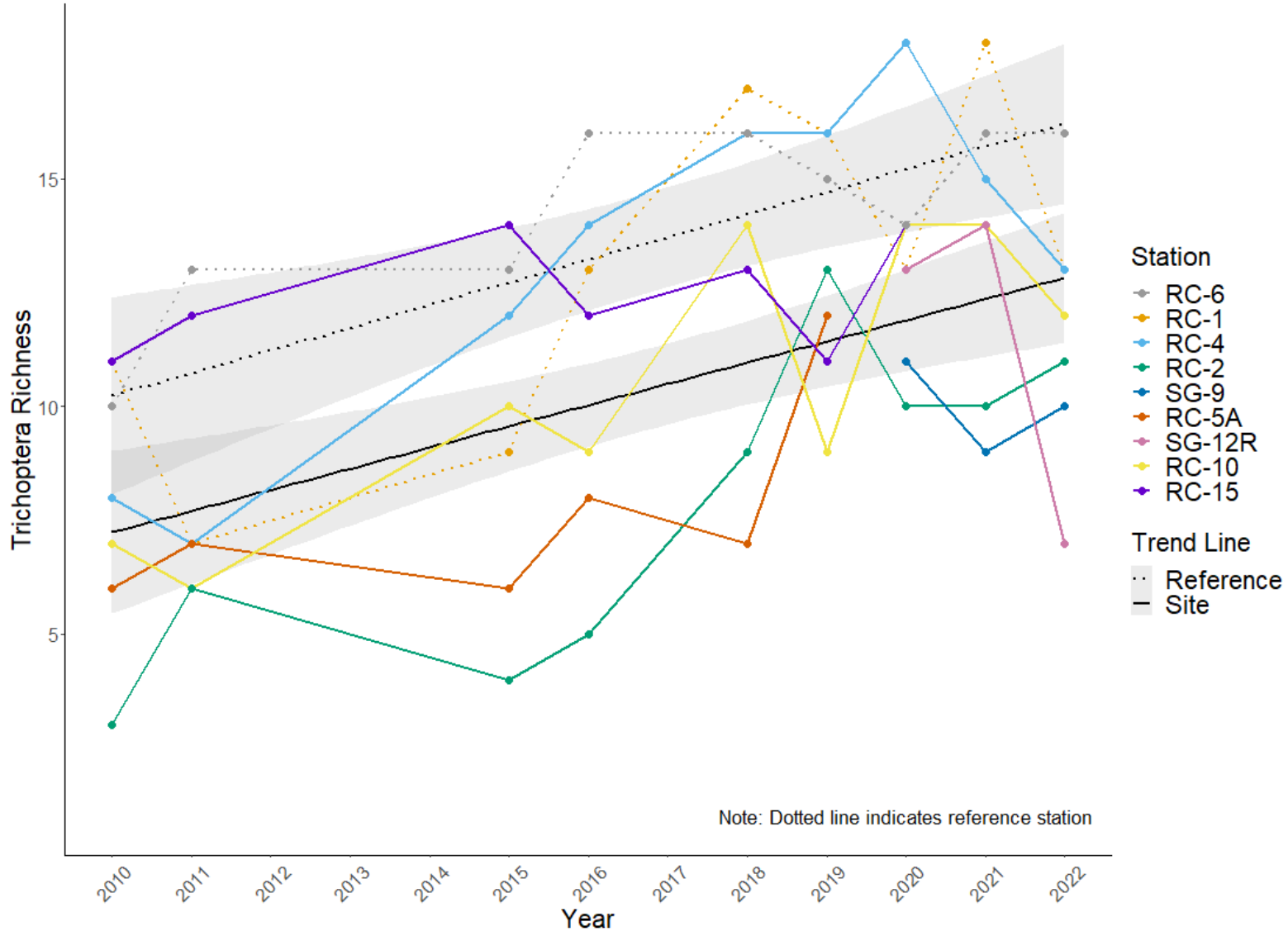


Figure 10. Quartile Distribution of Percent Shredders by Station, 2022

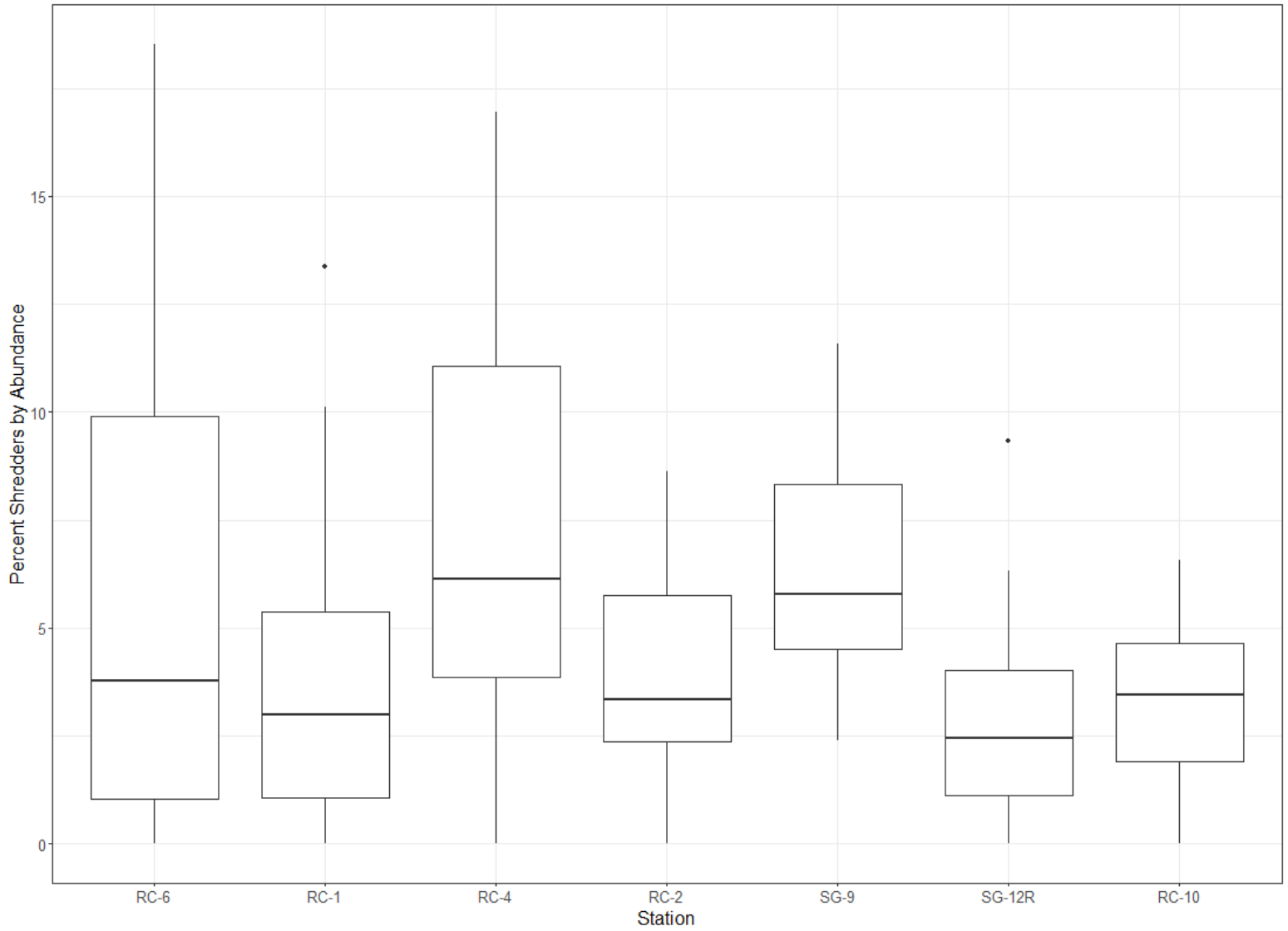


Figure 11. Quartile Distribution of Percent Clingers by Station, 2022

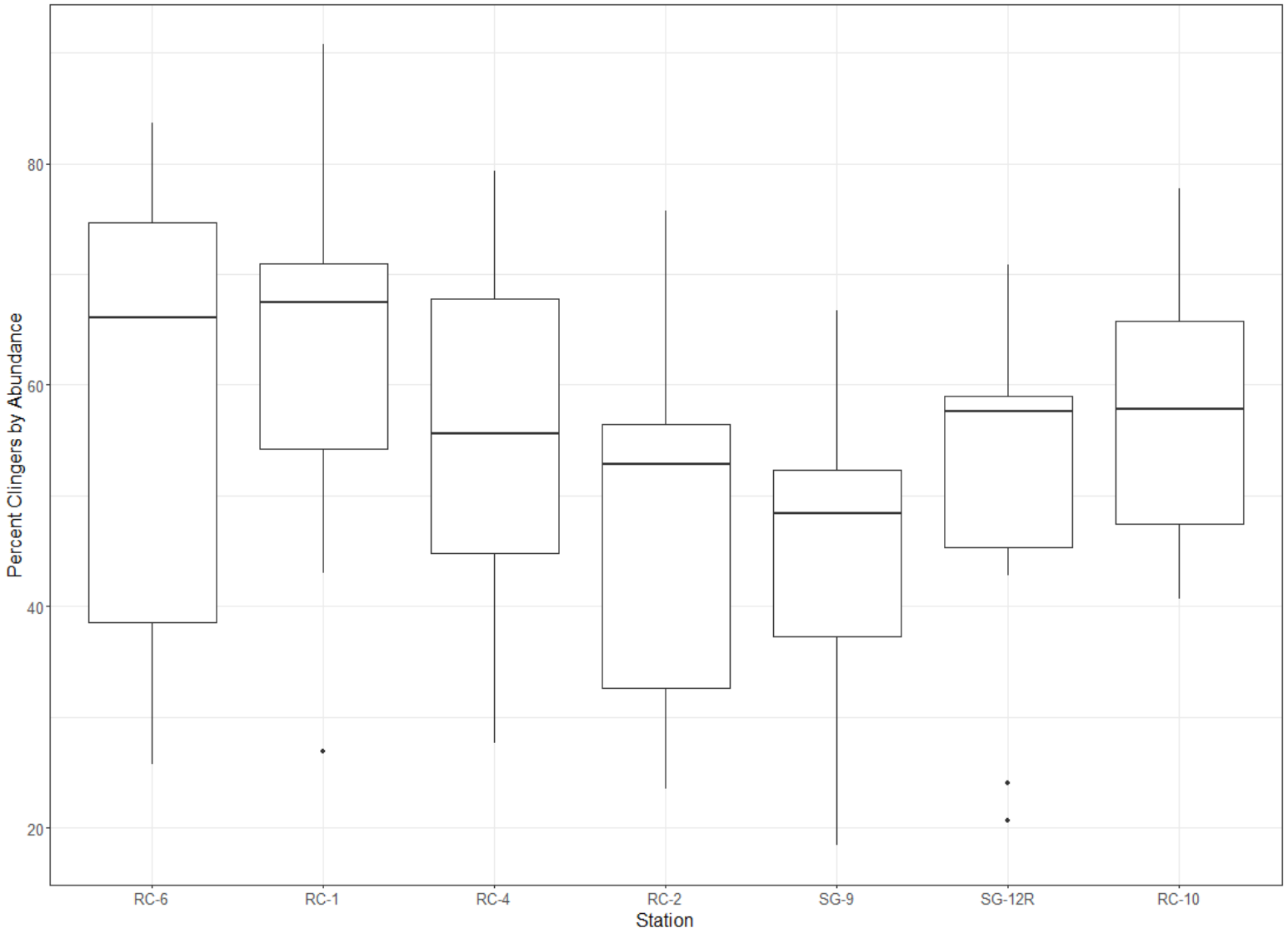


Figure 12. Quartile Distribution of Percent Filterers by Station, 2022

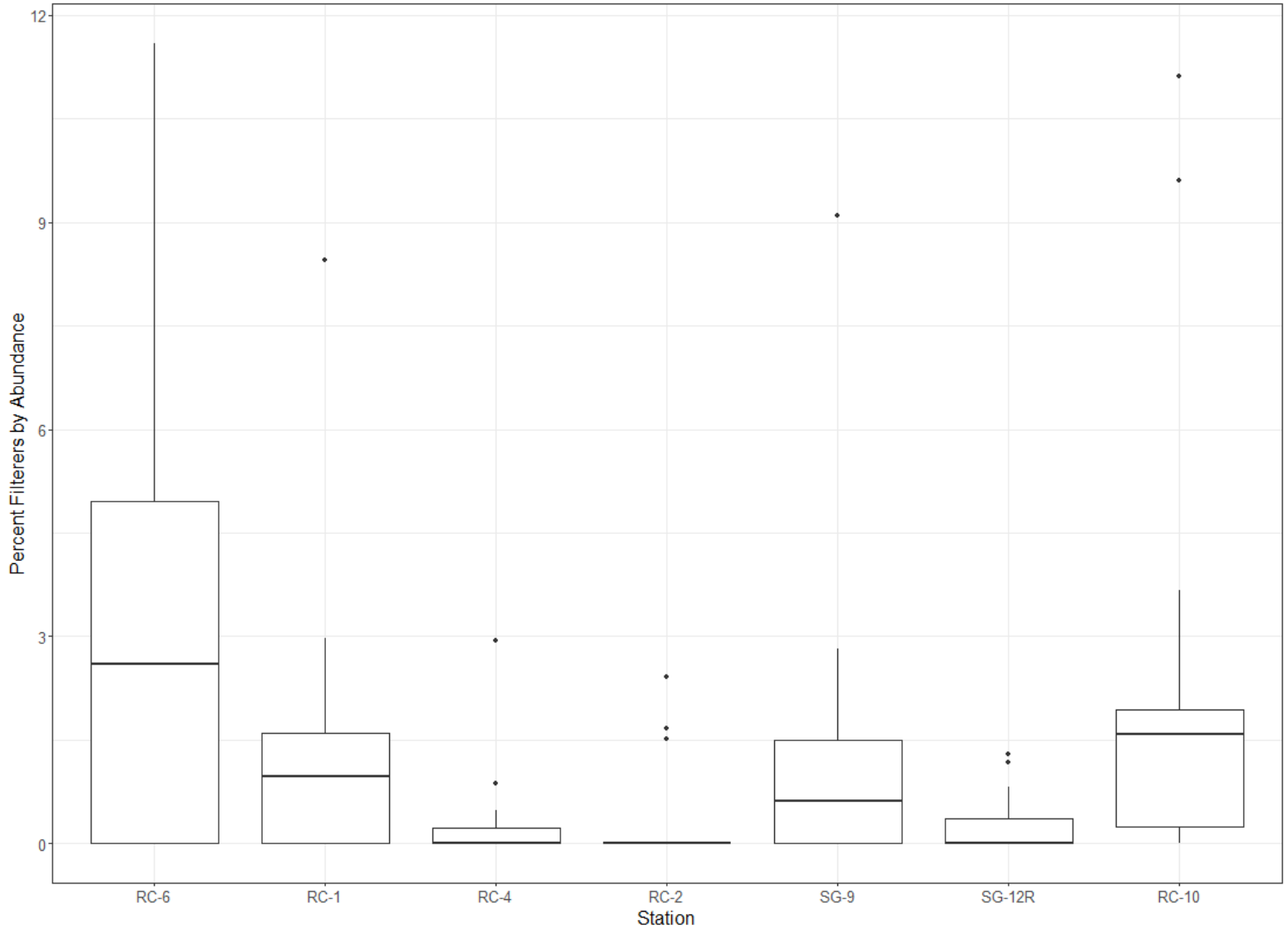


Figure 13. Quartile Distribution of Ratio of Scrapers to Scrapers and Filtering Collector Scores by Station, 2022

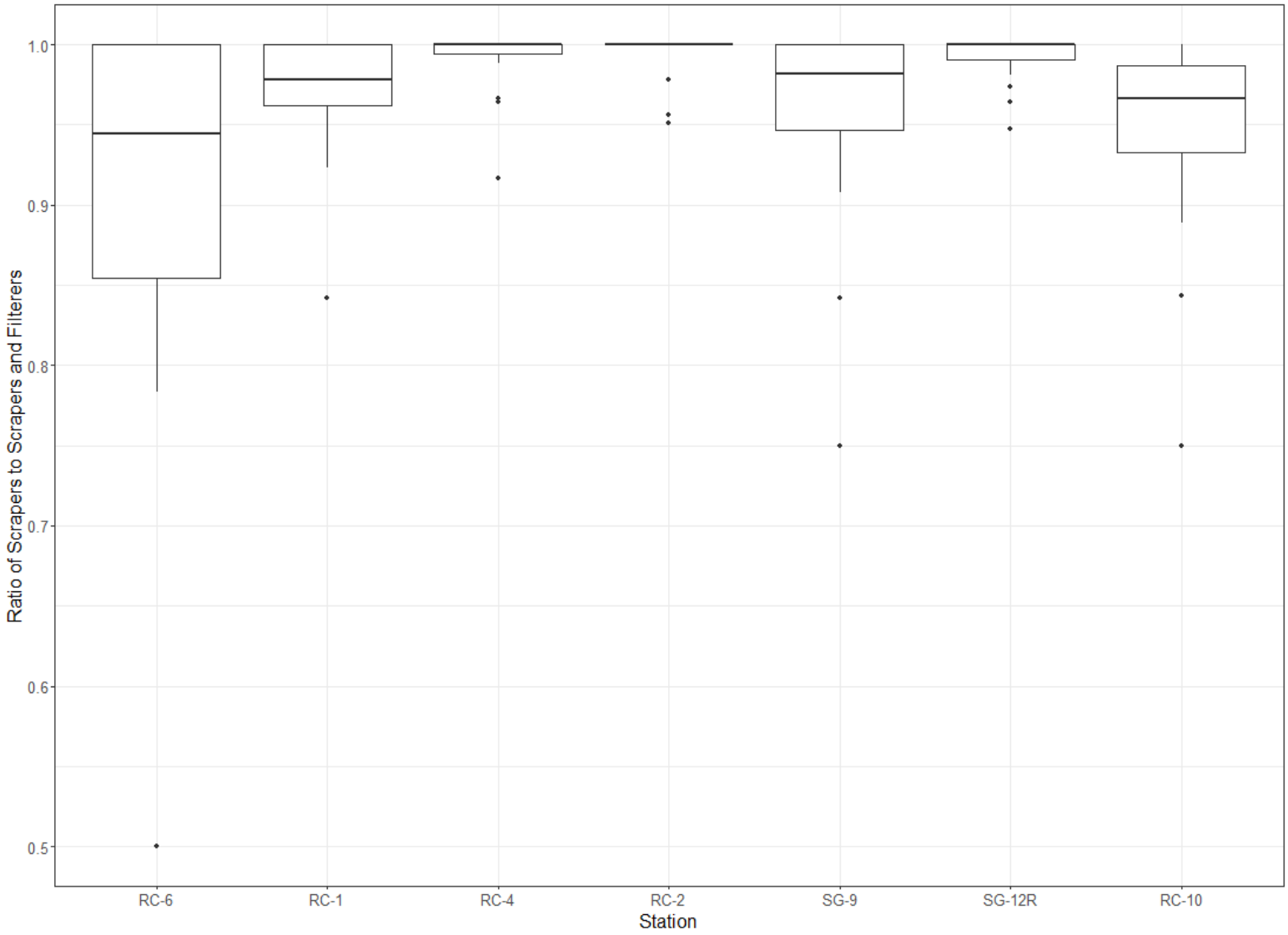


Figure 14. Quartile Distribution of Percent Contribution of Dominant Taxon Scores by Station, 2022

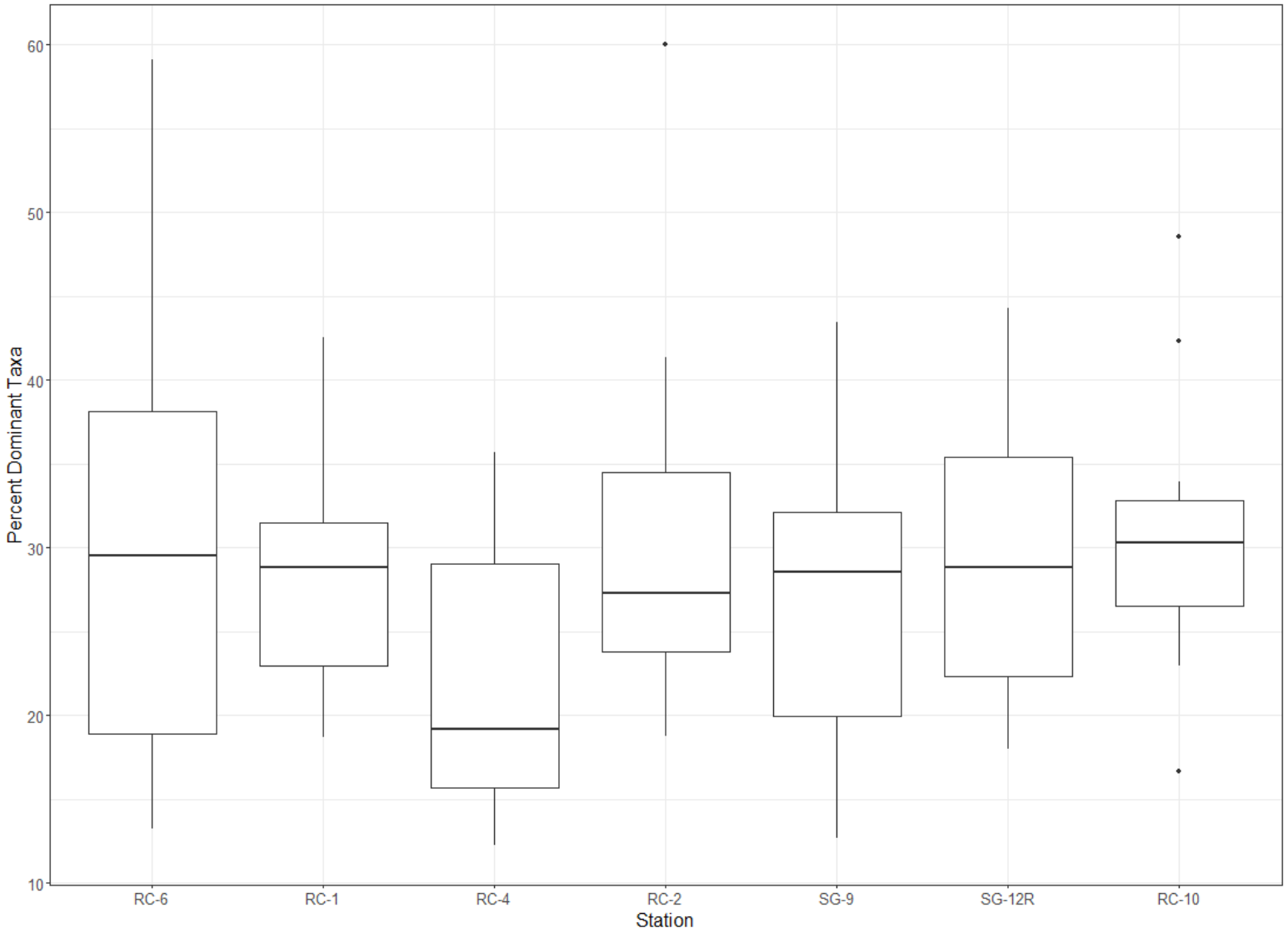


Figure 15. Quartile Distribution of Percent Ephemeroptera by Station, 2022

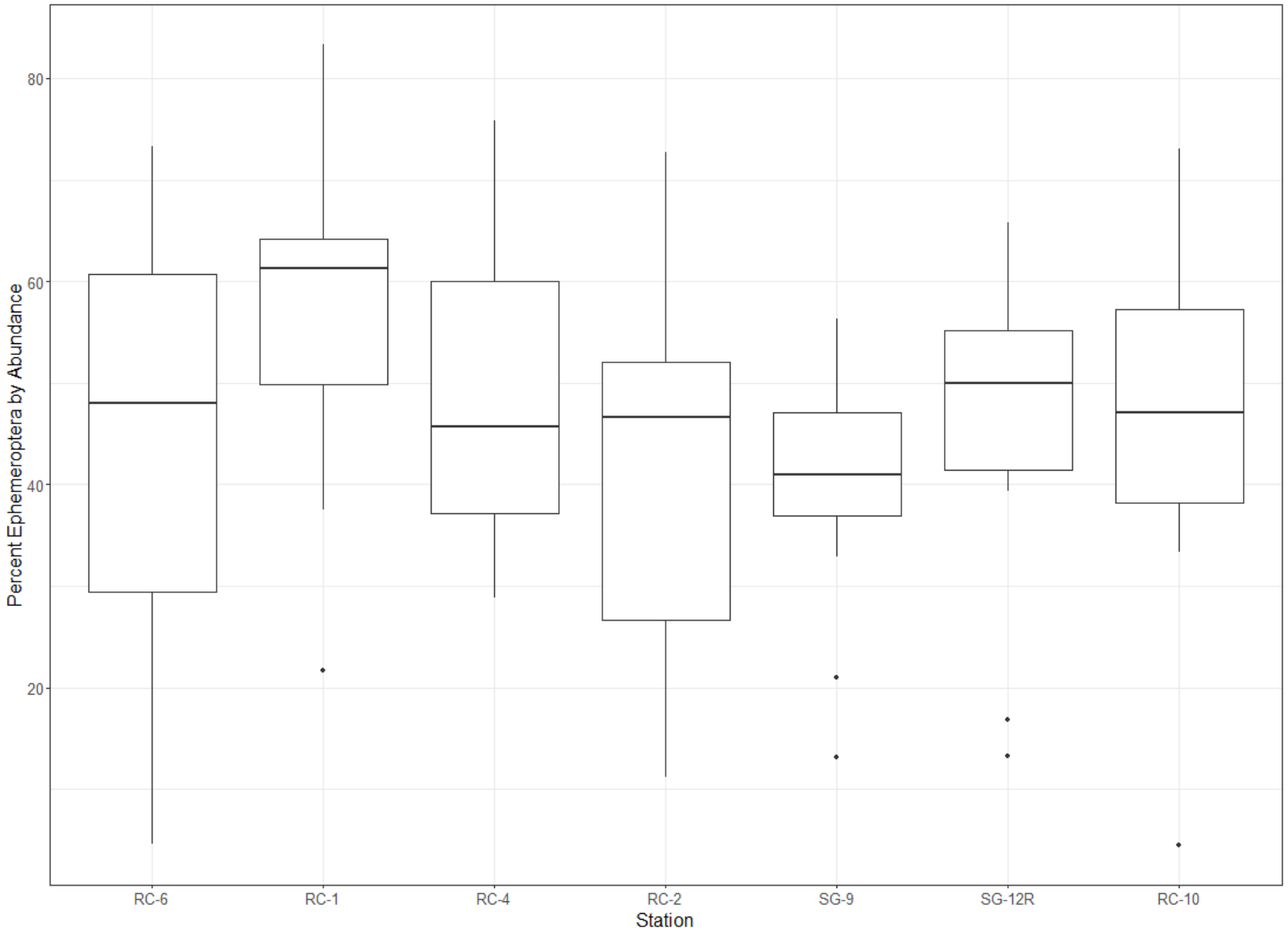


Figure 16. Quartile Distribution of EPT/EPT+C Metric Scores by Station, 2022

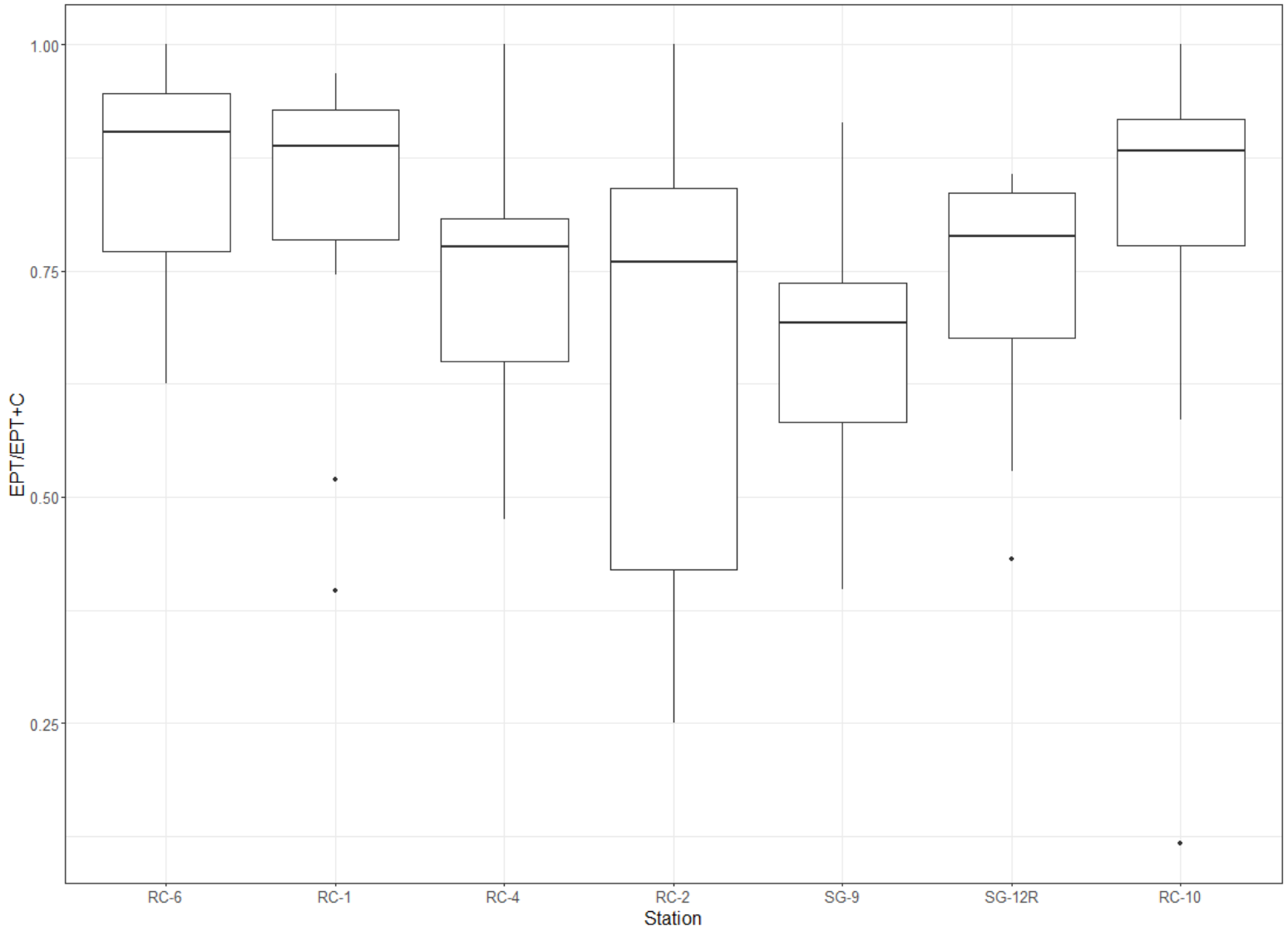


Figure 17. Quartile Distribution of HBI Scores by Station, 2022

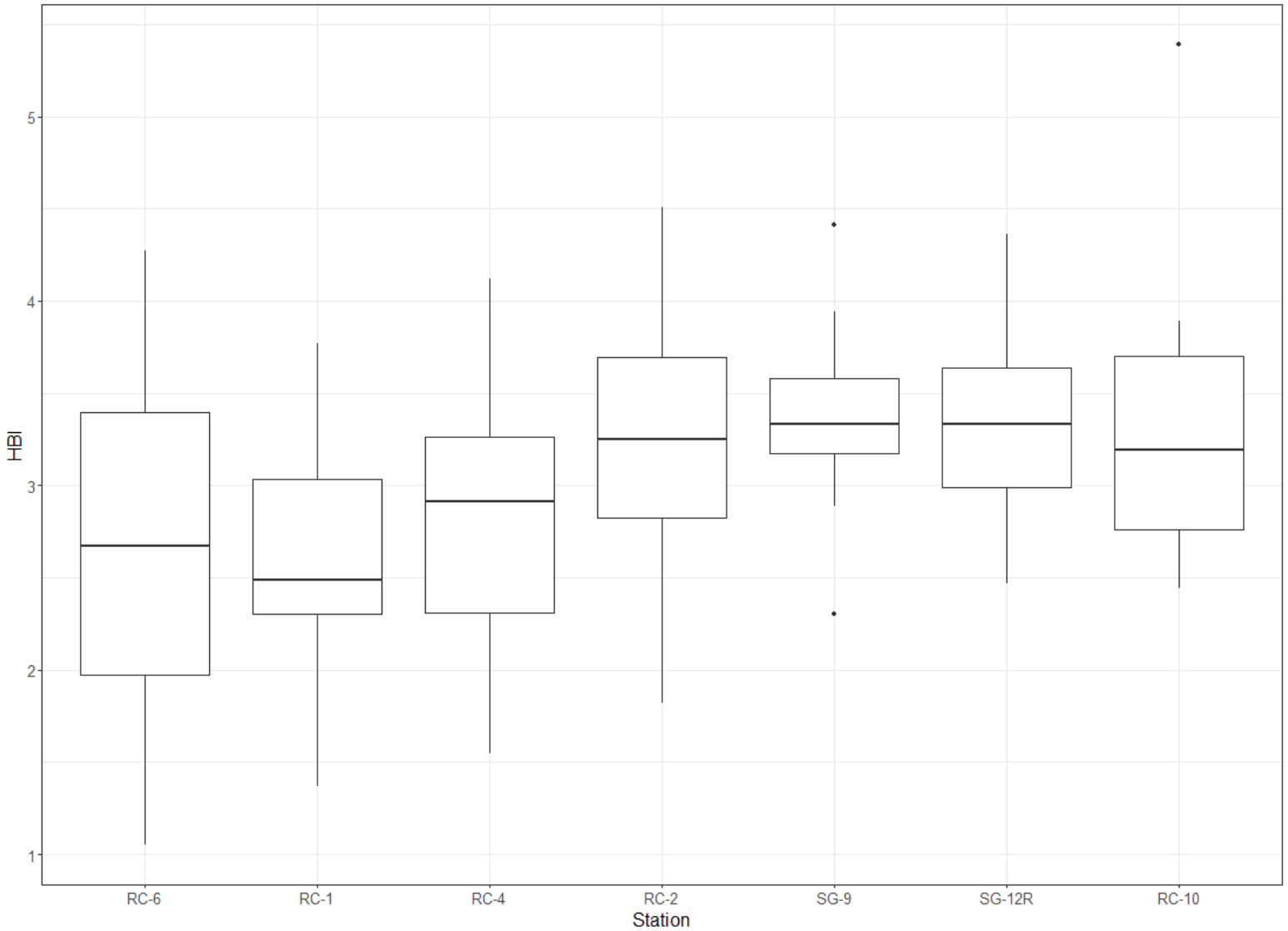


Figure 18. Quartile Distribution of MTI Scores by Station, 2022

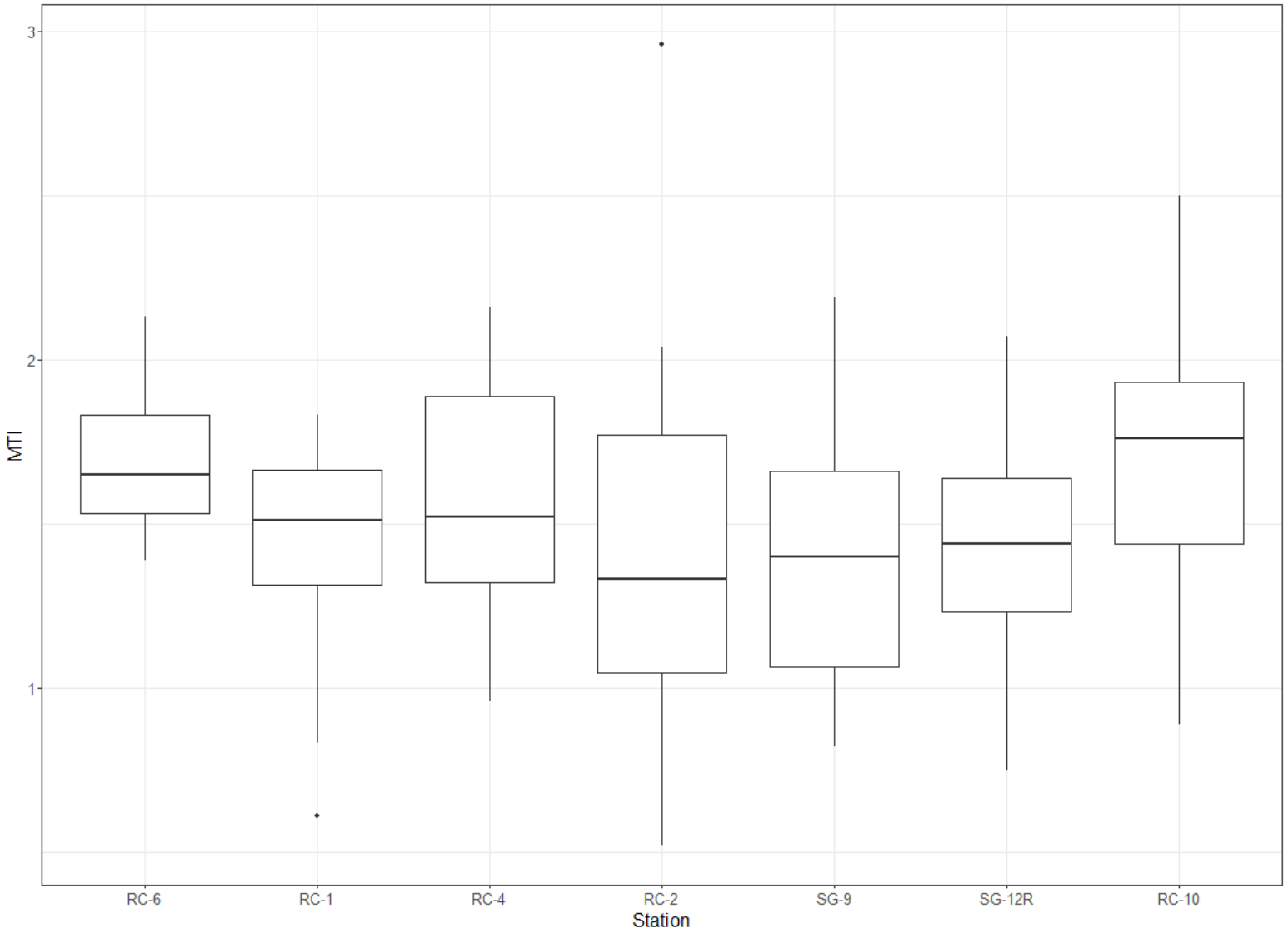


Figure 19. Quartile Distribution of Percent Tolerant Taxa by Station, 2022

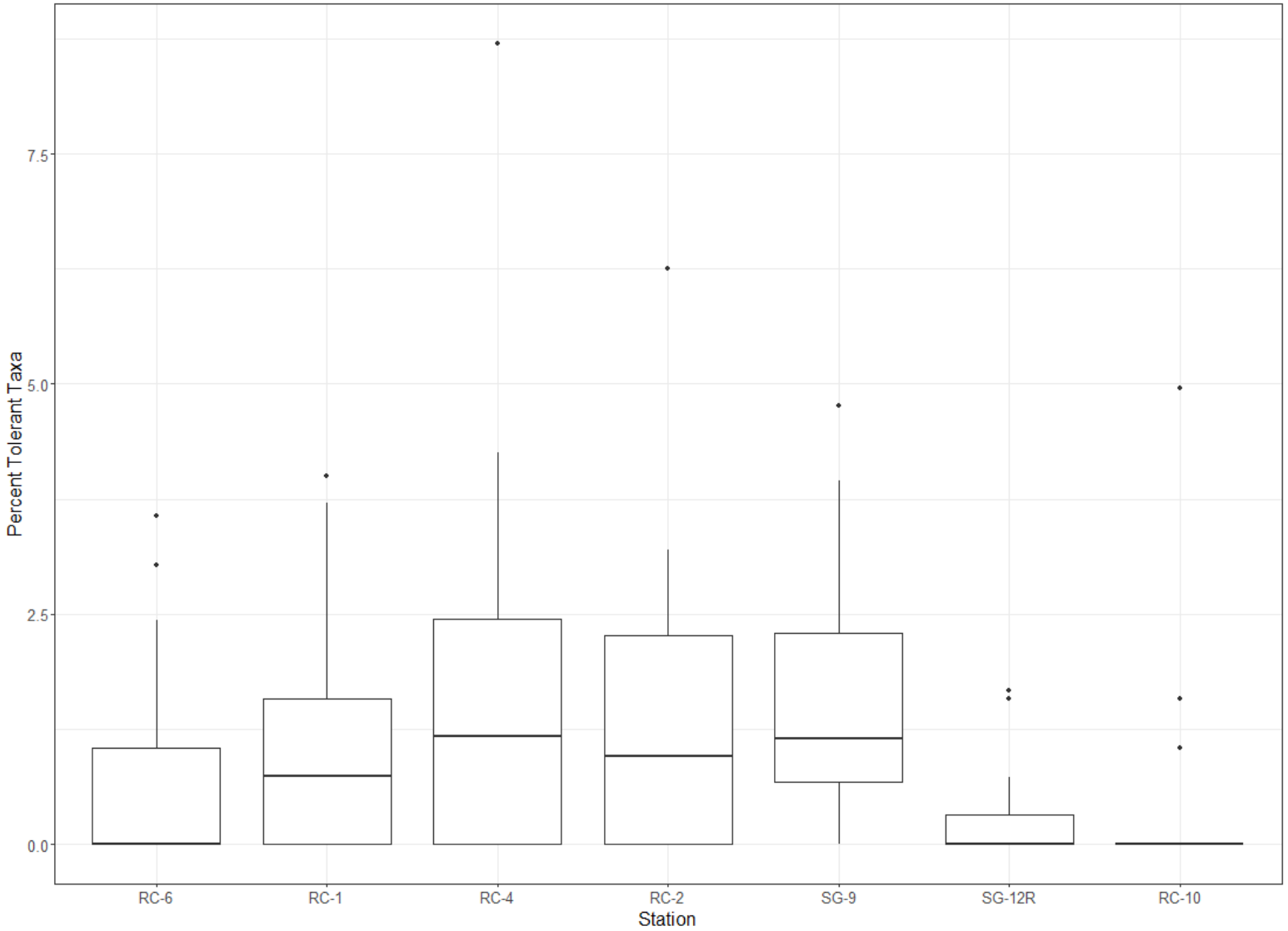


Figure 20. Fish Size Histogram for All Stations, 2022

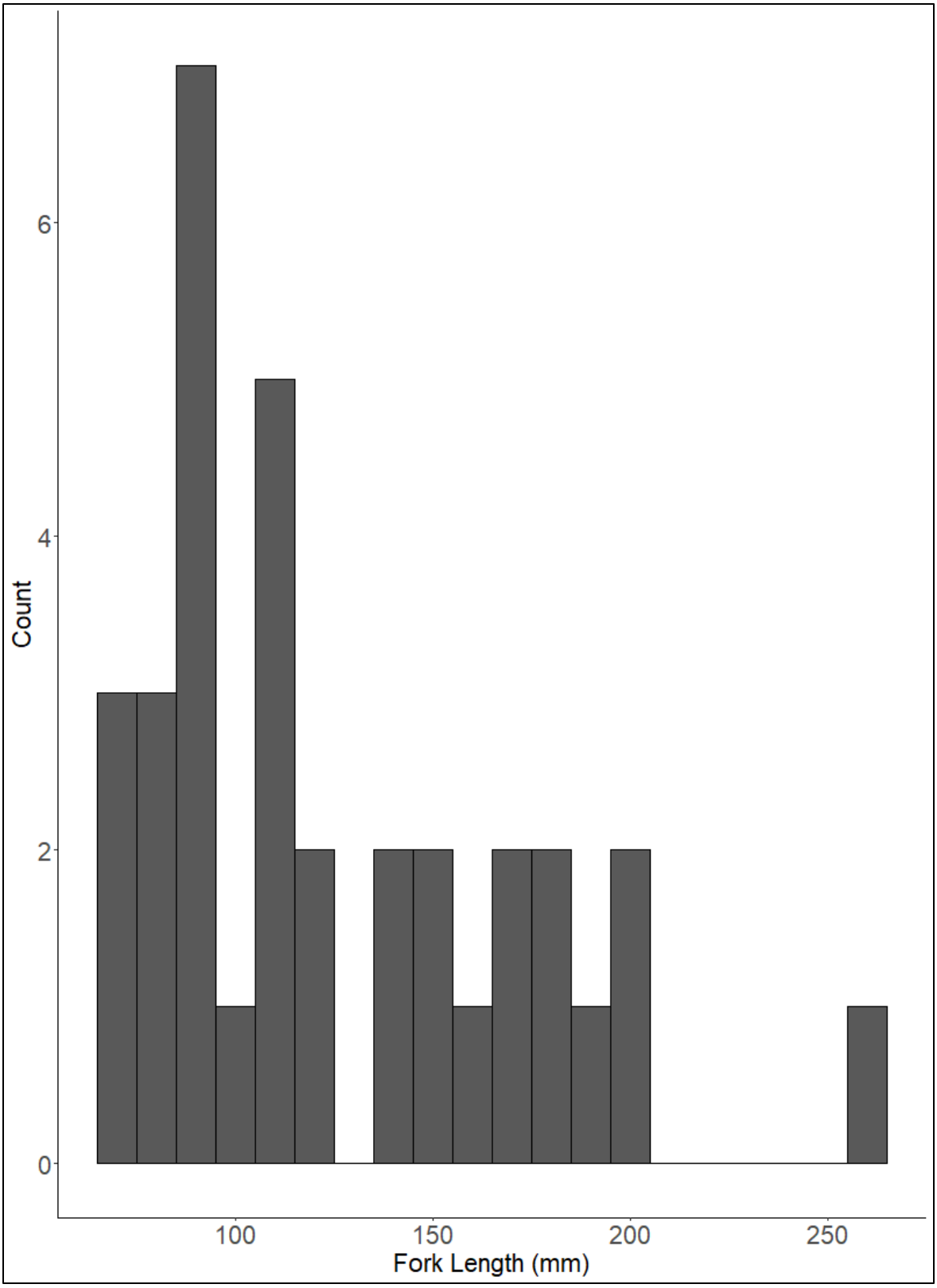
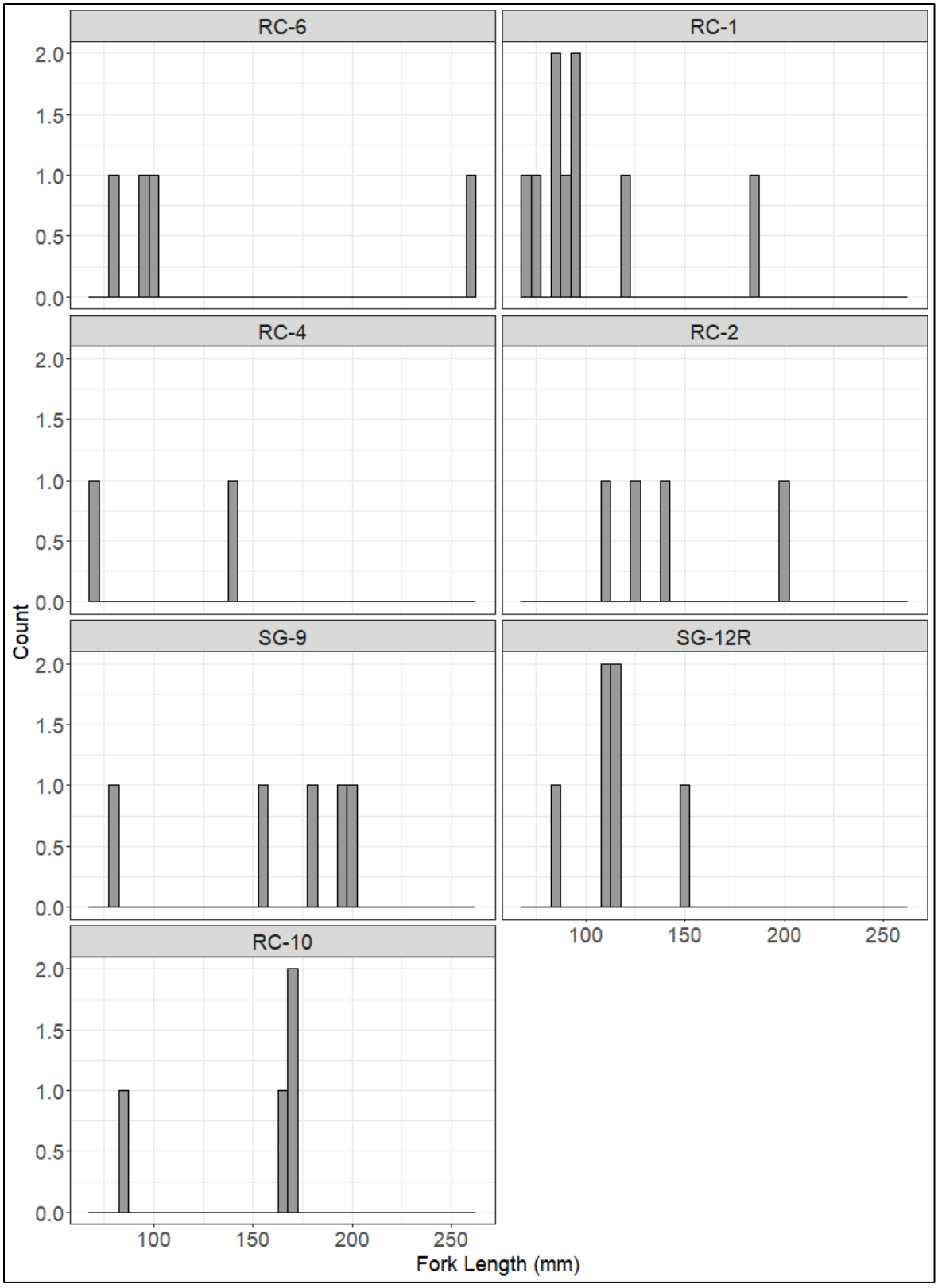


Figure 21. Fish Size Histograms by Station, 2022



Appendix A
Field Forms

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling - Chain of Custody Form

Site: RC6
Date: 8/20/22
Field Crew: NAD, KMU, KLH, SRV, IKS
Time Start: 1442 Time End: _____
Weather: Overcast

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-01-BI** Habitat type: Riffle Collection Date/Time: 8/20 1456 Collected By: KLH, IKS	40	10	50		0	45	14.2	9.67	7.16	155.0	26.3	1.13
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-02-BI** Habitat type: Riffle Collection Date/Time: 8/20 1540 Collected By: KLH, IKS		10	40	50	0	50	14.3 14.2	9.52	7.11	155.9	26.0	1.35
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-03-BI** Habitat type: Riffle Collection Date/Time: 8/20 1552 Collected By: KLH, IKS		10	60	30	0	50	14.3	9.67	7.15	144.2	25.9	1.44
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-04-BI** Habitat type: riffle Collection Date/Time: 8/20 1603 Collected By: KLH, KMU	5	25	10	60	0	40	14.3	9.68	7.15	139.0	25.4	1.65
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-05-BI** Habitat type: riffle Collection Date/Time: 8/20 1610 Collected By: KLH, KMU	10	40	25	25	0	30	14.3	9.68	7.15	139.3	24.7	1.74
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-06-BI** Habitat type: riffle Collection Date/Time: 8/20 1635 Collected By: NAD, KMU	5	95			0	0	14.3	9.67	7.13	137.5	26.0	1.71
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-07-BI** Habitat type: RIFFLE Collection Date/Time: 8/21 0821 Collected By: CB, SRV	5	95			0	5	12.3	10.10	6.88	175.3	24.6	2.70

Site: RC-6

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-08-BI** Habitat type: RIFFLE Collection Date/Time: 8/21 Collected By: CB, SRV	/	80	/	20	0	30	12.3°C	10.14	6.99	159.1	24.6	1.28
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-09-BI** Habitat type: RIFFLE Collection Date/Time: 8/21, 0855 Collected By: CB, SRV	5	95	/	/	0	5	12.4	10.12	7.01	~~162~~ 157.1	24.6	3.05
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-10-BI** Habitat type: RIFFLE Collection Date/Time: 8/21 0910 Collected By: CB, SRV	10	90	/	/	0	10	12.4	10.09	6.97	162.4	24.6	1.64
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-11-BI** Habitat type: RIFFLE Collection Date/Time: 8/21, 0925 Collected By: CB, SRV	5	55	40	/	0	10	12.5	10.10	6.98	168.6	24.7	1.44
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-12-BI** Habitat type: RIFFLE Collection Date/Time: 8/21, 0940 Collected By: CB, SRV	5	50	45	/	0	30	12.6	10.04	7.01	161.0	24.7	1.70
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-13-BI** Habitat type: RIFFLE Collection Date/Time: 8/21, 0955 Collected By: CB, SRV	10	70	~~5~~ 5	15	0	40	12.7	10.00	7.03	159.3	24.7	1.33
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-14-BI** Habitat type: RIFFLE Collection Date/Time: 8/21, 1006 Collected By: CB, SRV	5	5	90	/	0	60	12.7	10.10	7.03	155.1	24.7	1.20
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-6-2022-15-BI** Habitat type: RIFFLE Collection Date/Time: 8/21, 1019 Collected By: CB, SRV	10	35	5	50	0	40	12.7	10.02	7.04	155.2	24.7	1.51

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: RC-6
Date: 8/20/22

Field Crew: IKS, WAD, SRV, KMU, KLH

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.20023 °N	120.79286 °W
Center (site location)	48.19991	120.79217
50-meter downstream marker	48.19962	120.79182

Staff gage : 0.84

Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] RC-6 -2022-01-BI	48.20022	120.79284	0.73	0.52	0.72
[Site] RC-6 -2022-02-BI	48.20020	120.79281	0.89	1.08	0.60
[Site] RC-6 -2022-03-BI	48.20020	120.79280	0.86	2.6	2.5
[Site] RC-6 -2022-04-BI	48.20018	120.79278	0.55	0.41	0.16
[Site] RC-6 -2022-05-BI	48.20015	120.79281	0.95	2.13	1.56
[Site] RC-6 -2022-06-BI	48.19987	120.79213	0.46	0.70	0.80
[Site] RC-6 -2022-07-BI	48.19990	120.79221	0.38	1.26	1.26
[Site] RC-6 -2022-08-BI	48.19991	120.79225	1.00	2.40	2.70
[Site] RC-6 -2022-09-BI	48.19993	120.79221	0.50	2.48	2.24
[Site] RC-6 -2022-10-BI	48.19988	120.79212	0.40	0.20	0.20
[Site] RC-6 -2022-11-BI	48.19982	120.79205	0.33	1.69	1.67
[Site] RC-6 -2022-12-BI	48.19984	120.79199	0.65	1.53	1.34
[Site] RC-6 -2022-13-BI	48.19973	120.79189	0.90	0.80	0.84
[Site] RC-6 -2022-14-BI	48.19978	120.79190	0.50	0.93	0.93
[Site] RC-6 -2022-15-BI	48.19969	120.79181	0.7	1.75	1.75

Holden Mine Biomonitoring – 2022

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: RC-6
Date: 08/21/22

Field Crew: CLB, SRV, KMM, TS, PO
Survey Reach Gradient: _____
* Entire sampling length

Habitat Unit Map (Draw and label habitat units in each reach corresponding to unit description)	Channel Unit						Large Woody Debris Count[3]		
	Unit ID[a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
- Replicate 2021 map. SS1 ~20ft DS of U.S. end. SS2 is ~30ft U.S. of midpoint.	FT	100m*	60	2					
	SS1	30	25	3.25	N/A	BO			
	SS2	20	8	2.5	N/A	WD			

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2022 Biomonitoring
Site Name: RC- 6
Stream Name Railroad Creek
Date: 8/23/2022 **Time:**
Latitude: 48.19991°N **Longitude:** 120.79217°W
Field Crew: CB, IS, KH, CKD, ND, KM, PO

Water Quality Parameters	
Temperature	12.0
Conductivity	25.3
DO	10.25
pH	6.91

Stream Description
Runoff high. Wetted channel extends well below thick overhanging alder. Very difficult to fish.

Shocker Settings		~~LR-24~~ Pass 1	~~LR-20~~ Pass 2	Pass 3
Pulse Width (500 uS):				
Pulse Frequency (30-50 Hz):		35	35	
Duty Cycle (Begin 12%):		15	15	
Volts (Begin 500-800):		800-900	700	
Time Begin:	844			
Time End:	1000			
Total Fish Caught				
Total Fish 1st and 2nd pass:				
2nd pass as % of total of 1st & 2nd			if >40% then do a third pass	

LR20: 808 seconds
LR-24: 1883 seconds

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT	80	11	
1	CT	95	8	
1	CT	100	11	
1	CT	260	173	

Pass	Species	Fork Length (mm)	Weight (g)	Observations

* observed 8 additional fish (could not net due to fast flow conditions) + 1 tadpole (~20mm)

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling - Chain of Custody Form

Site: RC-1
Date: 8/19/22
8/20/22

Field Crew: IKS, NAD, MTM, KMU, KAM, EAM, CKD
Time Start: 1530 Time End: 1715
1300 1400 (8/20)

Weather: overcast

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-01-BI** Habitat type: riffle Collection Date/Time: 8/19 1545 Collected By: MTM, KMU		70	30		0	30	13.4	9.56	7.08	142.1	28.1	2.29
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-02-BI** Habitat type: riffle Collection Date/Time: 8/19 1555 Collected By: MTM, KMU	5	20	80		0	20	13.4	9.64	7.11	141.2	28.0	1.29
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-03-BI** Habitat type: riffle Collection Date/Time: 8/19 1605 Collected By: MTM, KMU		90	10		0	20	13.4	9.64	7.09	141.0	28.1	1.84
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-04-BI** Habitat type: riffle Collection Date/Time: 8/19 1615 Collected By: MTM, KMU		40	60		0	30	13.4	9.65	7.08	142.4	28.1	1.56
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-05-BI** Habitat type: riffle Collection Date/Time: 8/19 1622 Collected By: MTM, KMU		30	60	10	0	10	13.4	9.69	7.10	138.0	28.1	1.33
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-06-BI** Habitat type: riffle Collection Date/Time: 8/19 1632 Collected By: MTM, KMU		90	10		0	10	13.6	9.63	7.13	138.9	28.1	2.30
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-07-BI** Habitat type: riffle Collection Date/Time: 8/19 1640 Collected By: MTM, KMU		20	80		0	20	13.4	9.66	7.03	142.3	28.1	2.16

Site: RC-1

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (µS/cm)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-08-BI** Habitat type: riffle Collection Date/Time: 08/19 1447 Collected By: MTM, KMV		30	70		0	30	13.4	9.67	7.09	137.3	28.1	1.32
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-09-BI** Habitat type: riffle Collection Date/Time: 8/19 1457 Collected By: MTM, KMV		10	90		0	10	13.4	9.65	7.09	138.9	28.1	1.24
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-10-BI** Habitat type: riffle Collection Date/Time: 8/20 1305 Collected By: NAD, IKS		20	40	40	0	5	13.4	9.74	7.08	144.6	28.3	1.46
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-11-BI** Habitat type: riffle Collection Date/Time: 8/20 1305 Collected By: NAD, IKS		10	60	30	0	0	13.4	9.78	7.09	137.2	26.3	1.35
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-12-BI** Habitat type: Riffle Collection Date/Time: 8/20 1315 Collected By: NAD, IKS	10	80	10		0	15	13.6	9.65	7.12	138.4	26.4	1.30
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-13-BI** Habitat type: riffle Collection Date/Time: 8/20 1321 Collected By: IKS, NAD			50	50	0	10	13.5	9.78	7.07	133.6	25.7	10.3
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-14-BI** Habitat type: Riffle Collection Date/Time: 8/20 1330 Collected By: NAD, IKS			20	80		10	13.5	9.78	7.11	134.2	26.5	1.26
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-1-2022-15-BI** Habitat type: riffle Collection Date/Time: 8/20 1340 Collected By: IKS, NAD		10	40	50	0	15	13.5	9.65	7.10	137.7	26.5	1.15

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: RC-1
Date: 8/19/22

Field Crew: IKS, KLH, NAD, MTM, KMV, CKD, EM, KAM

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.199615°N	-120.79019°W
Center (site location)	48.1995°N	-120.789695°W
50-meter downstream marker	48.1995°N	-120.78948°W

reach shortened due to unsafe stream conditions (flow too high)

Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] RC-1 -2022-01-BI	48.19959°N	-120.79007°W	0.88	0.64	1.15
[Site] RC-1 -2022-02-BI	48.199606°N	-120.790079°W	0.97	0.43	0.43
[Site] RC-1 -2022-03-BI	48.19959°N	-120.790[illegible]°W	0.46	0.26	0.26
[Site] RC-1 -2022-04-BI	48.19959°N	-120.78942°W	0.70	2.33	2.33
[Site] RC-1 -2022-05-BI	48.19957°N	-120.78987°W	0.52	1.90	1.90
[Site] RC-1 -2022-06-BI	48.199624°N	-120.78987°W	0.30	0.29	0.36
[Site] RC-1 -2022-07-BI	48.19954°N	-120.78984°W	0.60	2.25	1.08
[Site] RC-1 -2022-08-BI	48.19958°N	-120.78972°W	0.51	1.05	1.33
[Site] RC-1 -2022-09-BI	48.19955°N	-120.78961°W	0.66	1.19	1.09
[Site] RC-1 -2022-10-BI	48.19952°N	-120.78953°W	1.03	1.87	2.07
[Site] RC-1 -2022-11-BI	48.19951°N	-120.78949°W	0.75	1.10	3.09
[Site] RC-1 -2022-12-BI	48.19950°N	-120.78945°W	0.42	0.52	0.52
[Site] RC-1 -2022-13-BI	48.199479°N	-120.78942°W	0.77	1.19	2.0
[Site] RC-1 -2022-14-BI	48.1995°N	-120.78944°W	0.71	1.21	1.16
[Site] RC-1 -2022-15-BI	48.19952°N	-120.78956°W	0.84	1.29	1.29

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2022 Biomonitoring
Site Name: RC-1
Stream Name Railroad Creek
Date: 8/23/2022 **Time:** 11:59
Latitude: 48.19951°N **Longitude:** 120.78961695°W
Field Crew: IKS, KLH, NAO, CLB, CKD, BD, KMV

Water Quality Parameters	
Temperature	13.0
Conductivity	25.3
DO	10.03
pH	7.12

Stream Description
Running high. Unable to fish some spots along LB due to high flow. Shallow, channel margin habitat ~~lost~~ observed at all monitoring

LR-20: 876 sec.
LR-24: 869 seconds
years (higher quantity + quality shallow water habitat along both banks).

Shocker Settings				
		~~Pass 1~~ LR-24	~~Pass 2~~ LR-20	Pass 3
Pulse Width (500 uS):				
Pulse Frequency (30-50 Hz):		35	35	
Duty Cycle (Begin 12%):		15	15	
Volts (Begin 500-800):		900	700	
Time Begin:	1055			
Time End:	1158			
Total Fish Caught				
Total Fish 1st and 2nd pass:				
2nd pass as % of total of 1st & 2nd			if >40% then do a third pass	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT	950	11	
1	CT	950	11	
1	CT	70	7	
1	CT	68	10	
1	CT	87	7	
1	YOY	–	–	
1	CT	74	6	
1	hybrid	86	7	
1	CT	185	56	
1	CT	121	21	
1	YOY	–	–	
1	YOY	–	–	
1	YOY	–	–	
1	YOY	–	–	

Pass	Species	Fork Length (mm)	Weight (g)	Observations

• observations – 5 YOY
8 other
+1 tadpole

*3 of the observed fish located inside channel in downstream end of station

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling - Chain of Custody Form

Site: RC-4 Field Crew: IKS, NAD, MTM, KLH, KMU

Date: 8/19/22 Time Start: 1100 Time End: _____ Weather: overcast

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-01-BI** Habitat type: riffle Collection Date/Time: 8/19 1105 Collected By: MTM, KMU		30	70		0	30	12.9	9.68	7.08	151.7	29.3	1.42
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-02-BI** Habitat type: riffle Collection Date/Time: 8/19 1130 Collected By: MTM, KMU		60	40		0	20	13.0	9.68	7.12	152.2	29.3	1.33
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-03-BI** Habitat type: riffle Collection Date/Time: 8/19 1150 Collected By: MTM, KMU		10	20	70	0	30	13.0	9.72	7.13	150.5	29.3	1.42
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-04-BI** Habitat type: riffle Collection Date/Time: 8/19 1208 Collected By: MTM, KMU		20	80		0	10	13.1	9.65	7.09	152.3	29.4	1.24
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-05-BI** Habitat type: riffle Collection Date/Time: 8/19 1225 Collected By: MTM, KMU		20	80		0	30	13.0	9.72	7.13	159.5	29.3	1.73
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-06-BI** Habitat type: riffle Collection Date/Time: 8/19 1315 Collected By: MTM, KMU		20	80	=	0	20	13.2	9.72	7.17	131.7	29.3	1.32
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-07-BI** Habitat type: riffle Collection Date/Time: 8/19 1325 Collected By: MTM, KMU		30	70		0	~~50~~ 80	13.2	9.66	7.12	138.2	29.3	1.50

Site: RC-4

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-08-BI** Habitat type: pool Collection Date/Time: 8/19 1428 Collected By: MTM, KMU		30	70		0	10	13.3	9.57	7.03	142.1	30.2	1.02
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-09-BI** Habitat type: riffle Collection Date/Time: 8/19 1433 Collected By: MTM, KMU		80	20		0	20	13.3	9.63	7.06	141.2	30.0	0.96
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-10-BI** Habitat type: riffle Collection Date/Time: 8/19 1442 Collected By: MTM, KMU		80	20		0	10	13.4	9.65	7.08	141.3	29.9	1.91
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-11-BI** Habitat type: riffle Collection Date/Time: 8/19 1335 Collected By: MTM, KMU		30	70		0	40	13.2	9.70	7.14	134.5	29.4	1.27
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-12-BI** Habitat type: riffle Collection Date/Time: 8/19 1342 Collected By: MTM, KMU		30	70		0	30	13.3	9.71	7.14	133.9	29.3	1.11
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-13-BI** Habitat type: riffle Collection Date/Time: 8/19 1348 Collected By: MTM, KMU		80	10	10	0	20	13.3	9.69	7.15	130.5	29.3	1.41
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-14-BI** Habitat type: riffle 8/29 Collection Date/Time: 8/19 1400 Collected By: MTM, KMU		50	50		0	70	13.4	9.65	7.16	141.1	29.4	1.28
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-4-2022-15-BI** Habitat type: riffle Collection Date/Time: 8/19 1406 Collected By: MTM, KMU		30	70		0	20	13.3	9.71	7.15	138.1	29.2	1.22

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: RC-4
Date: 8/19/22

Field Crew: KMV, IKS, MTM, KH, NAD

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.19910°N	120.77912°W
Center (site location)	48.19903	120.77839
50-meter downstream marker	48.19897	120.77776

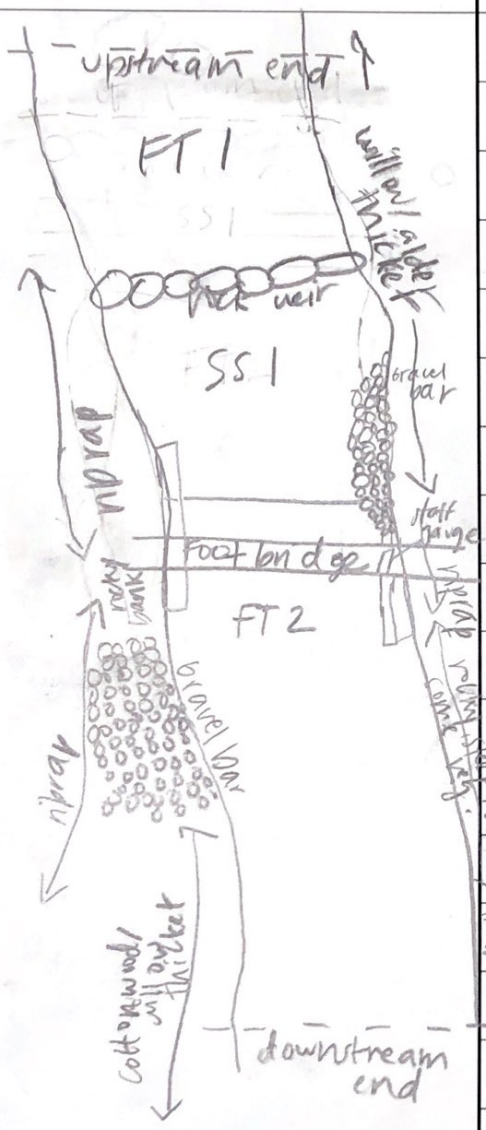
Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] RC-4 -2022-01-BI	48.19902°N	120.77899W	0.83	0.01	0.01
[Site] RC-4 -2022-02-BI	48.19903°N	120.77897	0.80	0.29	0.44
[Site] RC-4 -2022-03-BI	48.19903	120.77894	0.60	0.71	0.71
[Site] RC-4 -2022-04-BI	48.19901	120.77887	0.91	0.08	0.47
[Site] RC-4 -2022-05-BI	48.19902	120.77836	0.60	0.86	1.29
[Site] RC-4 -2022-06-BI	48.19902	120.77882	0.41	1.0	0.34
[Site] RC-4 -2022-07-BI	48.19901	120.77861	0.69	0.01	0.07
[Site] RC-4 -2022-08-BI	48.19912	120.77869	1.02	0.24	0.26
[Site] RC-4 -2022-09-BI	48.19912	120.77862	0.88	2.16	2.16
[Site] RC-4 -2022-10-BI	48.19917	120.77852	0.52	0.59	0.43
[Site] RC-4 -2022-11-BI	48.19903	120.77838	0.67	0.11	0.11
[Site] RC-4 -2022-12-BI	48.19905	120.77831	1.030	0.63	0.82
[Site] RC-4 -2022-13-BI	48.19905	120.77811	0.67	0.31	0.31
[Site] RC-4 -2022-14-BI	48.19901	120.77794	0.27	0.29	0.29
[Site] RC-4 -2022-15-BI	48.19900	120.77776	0.76	0.50	0.56

Holden Mine Biomonitoring – 2022

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: RC-4
Date: 8/19/22
Field Crew: HKS, KMV, MTM, KLH, NAD
Survey Reach Gradient: 2%
staff gauge @ 1.00 ft.

Habitat Unit Map
(Draw and label habitat units in each reach corresponding to unit description)



Channel Unit						Large Woody Debris Count[3]		
Unit ID[a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
FT1	70	50	1.0					
SS1	40	30	4.0+	0.8	RR			
FT2	220	35	1.5					111

* all LWD engineered, installed as part of stream construction

+ engineered channel
+ riprap along both banks near the footbridge, extends further downstream along right bank
+ bank grasses vegetated along riprap
+ dense willow/alder thicket along left bank in the upstream half
+ dense cottonwood, willow, alder thicket along right bank near downstream end
+ large pool immediately downstream of engineered rock weir

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2022 Biomonitoring
Site Name: RC-4
Stream Name Railroad Creek
Date: 8/2-/2022 **Time:** 1500
Latitude: 48.19903°N **Longitude:** 120.77839°W
Field Crew: CD, CB, MTM, PO, TS

Water Quality Parameters	
Temperature	13.0
Conductivity	29.3
DO	9.606
pH	7.12

Stream Description
LOWER HALF CASCADE HIGH FLOWS

Shocker Settings LR24 LR-2000			
	Pass 1	Pass 2	Pass 3
Pulse Width (500 uS):	8		
Pulse Frequency (30-50 Hz):	35	35	
Duty Cycle (Begin 12%):	15	15	
Volts (Begin 500-800):	800	700	
Time Begin: 1505			
Time End: 1620			
Total Fish Caught			
Total Fish 1st and 2nd pass:			
2nd pass as % of total of 1st & 2nd		if >40% then do a third pass	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT	72	8	
1	CT			YOY
1	CT			YOY
1	CT			YOY
1	CT	138	27	
				10 VISUAL OBSERV.

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling - Chain of Custody Form

Site: RC-2
Date: 8/18/22

Field Crew: IKS, NAD, MTM, KMU
Time Start: 930 Time End: 1430

Weather: cloudy

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-01-BI** Habitat type: riffle Collection Date/Time: 8/18 950 Collected By: MTM, KMU		~~40~~	60		0	20	12.2	9.68	7.14	127.4	31.6	0.87
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-02-BI** Habitat type: riffle Collection Date/Time: 8/18 1008 Collected By: MTM KMU	10	30	60		0	5	12.2	9.70	7.10	112.2	31.3	1.33
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-03-BI** Habitat type: riffle Collection Date/Time: 8/18 1040 Collected By: MTM KMU		20	80		0	10	12.4	9.70	7.12	104.9	~~31.5~~ 31.5	1.13
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-04-BI** Habitat type: riffle Collection Date/Time: 8/18 1100 Collected By: MTM KMU		20	40	40	0	10	12.5	9.71	7.13	101.2	31.5	0.92
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-05-BI** Habitat type: riffle Collection Date/Time: 8/18 1110 Collected By: MTM KMU		60	40		0	10	12.6	9.70	7.16	97.2	31.5	0.97
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-06-BI** Habitat type: riffle Collection Date/Time: 8/18 1135 Collected By: MTM KMU		~~40~~ 60	40		0	30	12.8	9.66	7.15	110.2	31.5	1.40
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-07-BI** Habitat type: riffle Collection Date/Time: 8/18 1150 Collected By: MTM KMU	5	~~20~~ 75	20		0	5	12.8	9.62	7.17	98.1	31.2	1.02

Site: RC-2

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-08-BI** Habitat type: riffle Collection Date/Time: 8/18 1202 Collected By: MTM, KMU		50	50		0	5	12.8	9.63	7.16	96.5	31.4	1.85
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-09-BI** Habitat type: ~~riffle~~ pool Collection Date/Time: 8/18 1310 Collected By: MTM, KMU		70	30		0	5 30	13.0	9.62	7.20	87.0	31.4	1.18
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-10-BI** Habitat type: riffle Collection Date/Time: 8/18 1320 Collected By: MTM, KMU		80	20		0	10	13.1	9.61	7.19	89.4	31.3	1.36
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-11-BI** Habitat type: riffle Collection Date/Time: 8/18 1327 Collected By: MTM, KMU	20	10	70		0	30	13.3	9.62	7.22	92.9	31.4	1.90
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-12-BI** Habitat type: riffle Collection Date/Time: 8/18 1345 Collected By: MTM, KMU	5	~~20~~ 40	55		0	30	13.2	9.59	7.21	84.7	31.2	1.01
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-13-BI** Habitat type: riffle Collection Date/Time: 8/18 1355 Collected By: MTM, KMU	10	~~70~~ 50	40		0	30	13.2	9.60	7.19	87.8	31.2	1.01
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-14-BI** Habitat type: riffle Collection Date/Time: 8/18 1405 Collected By: MTM, KMU		30	70		0	20	13.5	9.54	7.17	92.0	31.3	1.53
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-2-2022-15-BI** Habitat type: riffle Collection Date/Time: 8/18 1414 Collected By: MTM, KMU	10	20	70		0	10	13.4	9.60	7.20	86.6	31.2	1.20

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: RC-2
Date: 8/18/22

Field Crew: LTS, NAD, KMW, MTM

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.19775°N	120.76121°W
Center (site location)	48.19768°N	120.19768°W
50-meter downstream marker	48.197326°N	120.76041°W

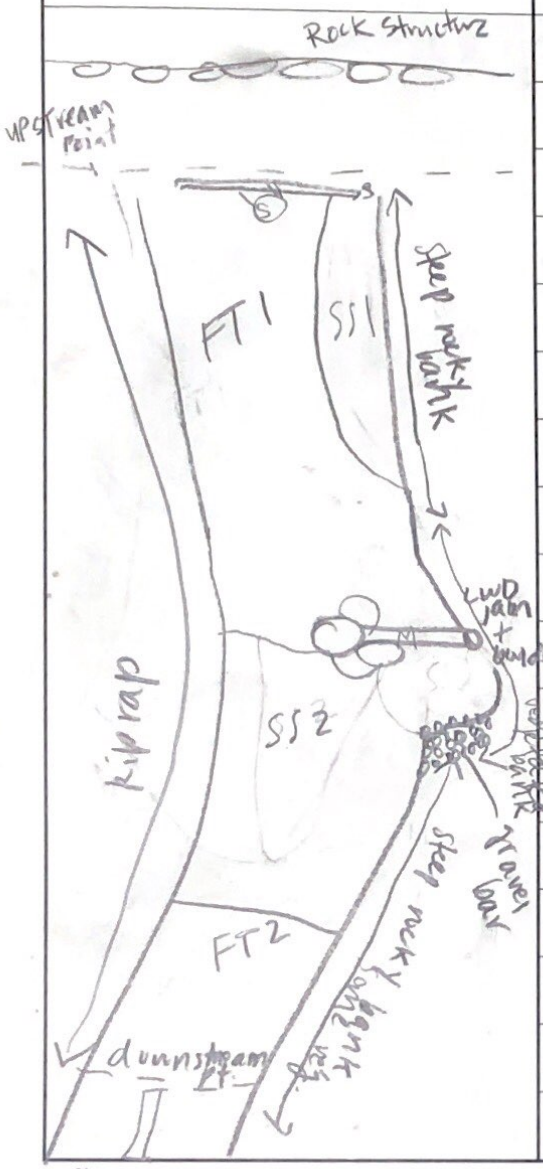
Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] RC-2 -2022-01-BI	48.19776°N	120.76121°W	0.55	0.102	0.802
[Site] RC-2 -2022-02-BI	48.19775°N	120.76115°W	0.53	0.66	3.94
[Site] RC-2 -2022-03-BI	48.19777°N	120.76106°W	0.33	0.80	0.14
[Site] RC-2 -2022-04-BI	48.19776°N	120.76098°W	0.48	0.62	1.49
[Site] RC-2 -2022-05-BI	48.19771°N	120.76095°W	1.02	0.95	0.95
[Site] RC-2 -2022-06-BI	48.19767°N	120.76090°W	0.34	0.02	0.09
[Site] RC-2 -2022-07-BI	48.19764°N	120.76076°W	0.67	1.8	1.8
[Site] RC-2 -2022-08-BI	48.19775°N	120.76071°W	0.75	1.66	1.66
[Site] RC-2 -2022-09-BI	48.19769°N	120.76056°W	1.1	0.07	0.07
[Site] RC-2 -2022-10-BI	48.19758°N	120.76048°W	0.90	0.09	0.63
[Site] RC-2 -2022-11-BI	48.19757°N	120.76041°W	0.65	0.03	0.05
[Site] RC-2 -2022-12-BI	48.19749°N	120.76047°W	0.93	0.19	0.95
[Site] RC-2 -2022-13-BI	48.19745°N	120.76043°W	0.70	0.23	0.23
[Site] RC-2 -2022-14-BI	48.197401°N	120.76043°W	0.20	0.17	0.24
[Site] RC-2 -2022-15-BI	48.19738°N	120.76039°W	1.07	0.02	0.56

Holden Mine Biomonitoring – 2022

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: RC-2
Date: 8/18/22
Field Crew: IKS, NAD, MTM, KMV
Survey Reach Gradient: 4%
staff gauge: 0.9

Habitat Unit Map
(Draw and label habitat units in each reach corresponding to unit description)



Unit ID [a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	Large Woody Debris Count[3] S 6-12	M 12-20	L >20
FT1	135	40	0.8				2	
SS1	80	20	1.8	0.5	RR			
SS2	50	30	2.5	0.6	RR			
SS3								
FT2	60	30	1.5					

modified / constructed channel

right bank consist of riprap, left bank is steep and rocky sparsely vegetated

Relatively dense vegetation on right bank near log jam

Gravel bar just downstream of log jam

TP-3 adjacent to right bank

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2022 Biomonitoring
Site Name: RC- 2
Stream Name Railroad Creek
Date: 8/19/2022 **Time:** 0800
Latitude: 46.19768°N **Longitude:** 120.19768°W
Field Crew: CB, CKD, TS, SV

Water Quality Parameters	
Temperature	12.4
Conductivity	31.5
DO	9.70
pH	7.12

Stream Description
RUNNING HIGH. BLOCK NETS NOT VIABLE. NOT SAFE.

Shocker Settings				
		Pass 1	Pass 2	Pass 3
Pulse Width (500 uS):				
Pulse Frequency (30-50 Hz):		30 HZ		
Duty Cycle (Begin 12%):		12%		
Volts (Begin 500-800):		600 - 800		
Time Begin:		1000	0	
Time End:		1145		
Total Fish Caught		4		
Total Fish 1st and 2nd pass:				
2nd pass as % of total of 1st & 2nd			if >40% then do a third pass	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT	198	76	
1	CT	125	22	~2,000 gel
1	CT	110	12	
1	CT	142	33	
				4 OBSERV.
				NOT CAUGHT
2				1,235 GEL

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling - Chain of Custody Form

Site: SG-9
Date: 8/21/22

Field Crew: MTM, KLH
Time Start: 0800 Time End: _____

Weather: Sunny

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-01-BI** Habitat type: Riffles Collection Date/Time: 8/21/22 / 8:20 Collected By: MTM, KLH	10	80	10	-	-	10	13.7	9.96	7.07	91.9	20.4	1.80
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-02-BI** Habitat type: Riffle Collection Date/Time: 8/21/22 / 8:28 Collected By: MTM, KLH	80	15	5	-	-	20	12.8	9.96	7.07	96.5	20.4	2.04
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-03-BI** Habitat type: Riffle Collection Date/Time: 8/21/22 / 8:37 Collected By: MTM, KLH	5	60	35	-	+	10	12.8	9.97	7.09	95.5	20.4	1.74
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-04-BI** Habitat type: Riffle Collection Date/Time: 8/21/22 / 8:44 Collected By: MTM, KLH	30	60	10	-	-	10	13.7	9.74	6.87	106.3	56.5	2.10
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-05-BI** Habitat type: Riffle Collection Date/Time: 8/21/22 / 8:59 Collected By: MTM, KLH	10	80	10	-	-	20	13.7	9.78	6.91	101.5	57.6	1.89
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-06-BI** Habitat type: Riffle Collection Date/Time: 8/21/22 / 9:10 Collected By: MTM, KLH	-	60	40	-	-	10	13.7	9.81	6.94	99.0	57.2	1.76
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-07-BI** Habitat type: Riffle Collection Date/Time: 8/21/22 / 9:16 Collected By: MTM, KLH	5	20	75 ~~80~~	-	-	20	13.8	9.81	6.92	98.8	57.4	1.85

Site: SG 9

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-08-BI** Habitat type: Riffle Collection Date/Time: 8/21/22/9:23 Collected By: MTM, KLH	20	50	30	-	-	30	13.8	9.84	6.97	96.9	56.1	1.96
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-09-BI** Habitat type: Riffle Collection Date/Time: 8/21/22/9:30 Collected By: MTM, KLH	-	80	20	-	-	10	13.8	9.83	6.97	95.2	56.1	1.69
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-10-BI** Habitat type: Riffle Collection Date/Time: 8/21/22/9:36 Collected By: MTM, KLH	-	50	50	-	-	10	13.9	9.82	6.95	97.4	57.3	2.00
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-11-BI** Habitat type: Riffle Collection Date/Time: 8/21/22/9:45 Collected By: MTM, KLH	-	70	30	-	-	20	13.9	9.82	6.98	94.5	55.3	2.60
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-12-BI** Habitat type: Riffle Collection Date/Time: 8/21/22/9:58 Collected By: MTM, KLH	-	80	20	-	-	10	13.9	9.89	6.97	96.0	53.7	2.10
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-13-BI** Habitat type: Riffle Collection Date/Time: 8/21/22 10:06 Collected By: MTM, IKS	-	40	60	-	-	20	13.9	9.85	7.00	93.0	53.9	1.98
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-14-BI** Habitat type: Riffle Collection Date/Time: 8/21/22 1020 Collected By: MTM, IKS	5	75	20	-	-	10	13.9	9.85	6.98	93.1	54.0	1.90
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-9-2022-15-BI** Habitat type: Riffle Collection Date/Time: 8/21/22 1032 Collected By: MTM, IKS	-	60	40	-	-	10	14.0	9.83	6.97	93.3	54.2	1.90

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: SG-9
Date: 8/21/22

Field Crew: JKS, NAD, KAM, EM, MTM, KLH

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.19538 °N	120.75647 °W
Center (site location)	48.19571	120.75576
50-meter downstream marker	48.19596	120.75526

Replicate #:	Latitude °N	Longitude °W	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] SG-9 -2022-01-BI	48.19539	120.75642	0.80	1.95	1.76
[Site] SG-9 -2022-02-BI	48.19541	120.75641	0.78	0.76	0.82
[Site] SG-9 -2022-03-BI	48.19540	120.75640	0.90	1.00	1.00
[Site] SG-9 -2022-04-BI	48.19578	120.75550	0.41	0.60	0.12
[Site] SG-9 -2022-05-BI	48.19578	120.75548	0.45	0.44	0.68
[Site] SG-9 -2022-06-BI	48.19579	120.75545	0.64	0.65	1.27
[Site] SG-9 -2022-07-BI	48.19580	120.75544	0.45	0.60	0.77
[Site] SG-9 -2022-08-BI	48.19581	120.75541	1.02	0.35	1.04
[Site] SG-9 -2022-09-BI	48.19582	120.75537	1.10	0.75	1.13
[Site] SG-9 -2022-10-BI	48.19584	120.75533	0.31	0.98	1.06
[Site] SG-9 -2022-11-BI	48.19585	120.75531	1.08	0.37	0.46
[Site] SG-9 -2022-12-BI	48.19586	120.75528	0.46	0.34	0.25
[Site] SG-9 -2022-13-BI	48.19587	120.75525	1.07	1.36	1.85
[Site] SG-9 -2022-14-BI	48.19590	120.75520	0.42	0.59	0.74
[Site] SG-9 -2022-15-BI	48.19592	120.75519	0.35	0.50	0.47

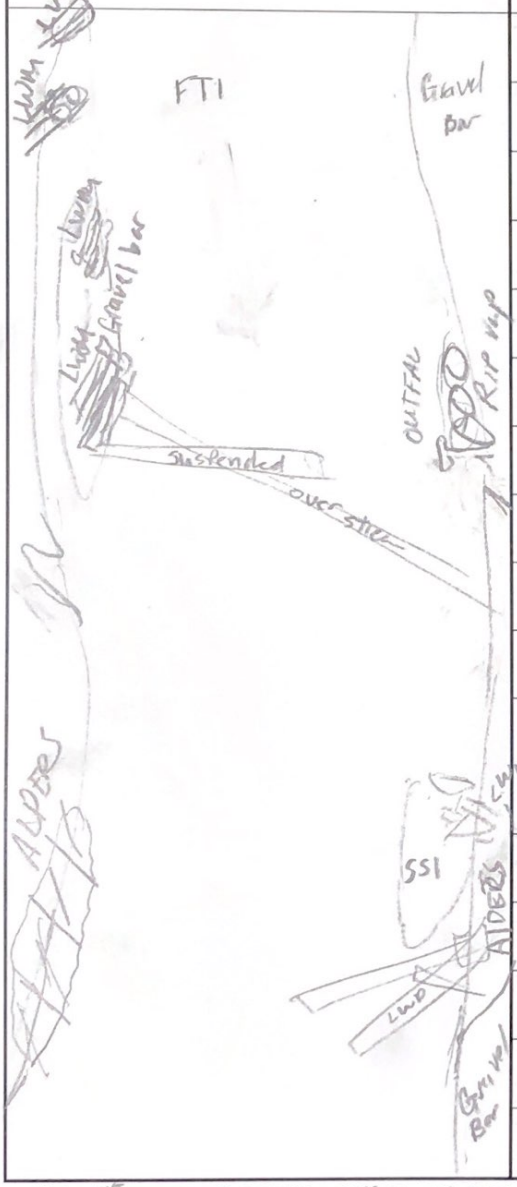
Holden Mine Biomonitoring – 2022

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: SG9
Date: 8/21/22

Field Crew: NAD, IKS
Survey Reach Gradient: 3%

Habitat Unit Map
(Draw and label habitat units in each reach corresponding to unit description)



Channel Unit						Large Woody Debris Count[3]		
Unit ID [a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
FT1	330	40	1.5			50+	50+	10+
SS1	25	10	3+	.5	WD BD	1	2	

Notes: UE LOG JAM DOWNSTREAM OF SITE

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2022 Biomonitoring
Site Name: ~~RC~~ SG-9
Stream Name Railroad Creek
Date: 8/23/2022 **Time:** 13:42 start, 15:00 end
Latitude: 48.19571°N **Longitude:** 120.75576°W
Field Crew: IKS, CLB, NAD, CKD, KMV, PRO, KLH

Water Quality Parameters	
Temperature	13.5°C
Conductivity	68.5
DO	9.73
pH	6.98

Stream Description
RB – too deep, overgrown to fish thoroughly flow velocity made fish hard to catch

* 10 YOY observed
* 14 other observations

Shocker Settings				
		~~Pass 1~~ LR-24	~~Pass 2~~ LR-20	Pass 3
Pulse Width (500 uS):				
Pulse Frequency (30-50 Hz):		35	35	
Duty Cycle (Begin 12%):		15	15	
Volts (Begin 500-800):		900	700	
Time Begin:				
Time End:				
Total Fish Caught				
Total Fish 1st and 2nd pass:				
2nd pass as % of total of 1st & 2nd			if >40% then do a third pass	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
	YOY			
	cut	195	67	
	cut	80	11	
	cut	155	55	
	cut	180	62	
	cut	200	94	

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling - Chain of Custody Form

Site: SG-12R **Field Crew:** MTM, IKS, NAD, KMU, **Page:** 1 of 2
Date: 8/18/22 **Time Start:** 1545 **Time End:** 0920 (8/19) **Weather:** overcast

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-01-BI** Habitat type: riffle Collection Date/Time: 8/18 1555 Collected By: MTM, KMU	10	~~70~~	20		0	10	13.5	9.36	7.05	111.3	47.9	2.45
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-02-BI** Habitat type: riffle Collection Date/Time: 8/18 1604 Collected By: MTM, KMU	5	95	~~95~~		0	10	13.5	9.45	7.10	104.4	48.0	0.93
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-03-BI** Habitat type: riffle Collection Date/Time: 8/18 1618 Collected By: MTM, KMU	30	70			0	5	13.5	9.45	7.08	101.3	46.7	1.17
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-04-BI** Habitat type: riffle Collection Date/Time: 8/18 1428 Collected By: MTM, KMU		30	70		0	20	13.5	9.43	7.10	100.3	47.4	1.34
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-05-BI** Habitat type: riffle Collection Date/Time: 8/18 1435 Collected By: MTM, KMU		40	60		0	5	13.5	9.50	7.11	91.8	46.1	0.89
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-06-BI** Habitat type: riffle Collection Date/Time: 8/18 1444 Collected By: MTM, KMU		80	20		0	10	13.5	9.47	7.11	91.3	48.2	0.83
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-07-BI** Habitat type: riffle Collection Date/Time: 8/18 1450 Collected By: MTM, KMU		80	20		0	5	13.6	9.50	7.11	87.7	48.2	1.05

Site: SG-12R

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
start 8/19												
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-08-BI** Habitat type: riffle Collection Date/Time: 8/19 0815 Collected By: MTM, KMV		90	10		0	10	11.8	9.74	6.80	456	150.4	1.26
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-09-BI** Habitat type: riffle Collection Date/Time: 8/19 0823 Collected By: MTM, KMV		3 50	50		0	20	11.8	9.84	6.98	45.7	128.0	1.54
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-10-BI** Habitat type: riffle Collection Date/Time: 8/19 0833 Collected By: MTM, KMV		100			0	5	11.8	9.80	6.99	45.9	137.0	0.86
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-11-BI** Habitat type: riffle Collection Date/Time: 8/19 0840 Collected By: MTM, KMV		70	30		0	20	11.9	9.83	6.99	45.8	128.1	1.30
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-12-BI** Habitat type: riffle Collection Date/Time: 8/19 0846 Collected By: MTM, KMV		60	40		0	10	11.8	9.84	6.99	45.6	129.4	1.27
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-13-BI** Habitat type: riffle Collection Date/Time: 8/19 0855 Collected By: MTM, KMV	sand 30	70			0	5	11.9	9.82	7.01	46.0	125.5	1.49
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-14-BI** Habitat type: riffle Collection Date/Time: 8/19 0902 Collected By: MTM, KMV		90	10		0	10	11.9	9.87	7.04	44.4	116.3	1.03
Holden Mine Biomonitoring 2022 Sample Location ID: **SG-12R-2022-15-BI** Habitat type: riffle Collection Date/Time: 8/19 0910 Collected By: MTM, KMV		60	40		0	30	12.0	9.81	7.00	44.0	118.4	1.02

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: SG-12R **Field Crew:** IKS, NAD, KMW, MTM **Page:** 1 of 1

Date: 8/18/22
8/19/22

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.19637433°N	-120.74571626°W
Center (site location)	48.19654807°N	-120.74510282°W
50-meter downstream marker	48.19683418°N	120.74457505°W

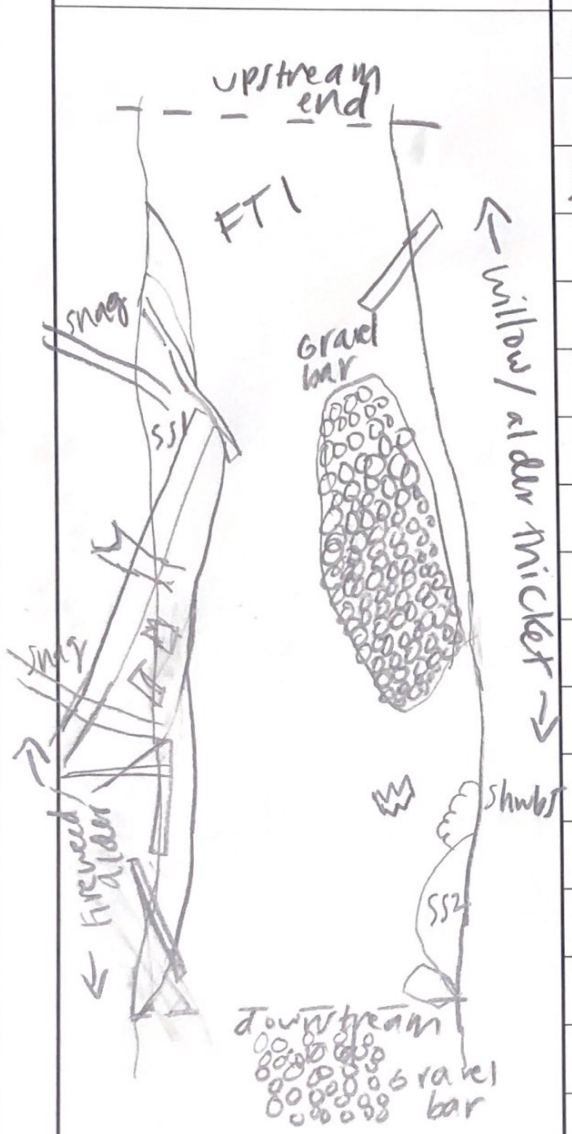
Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] SG-12R -2022-01-BI	48.19636408°N	-120.74565004°W	1.0	1.29	0.86
[Site] SG-12R -2022-02-BI	48.19636808°N	-120.74561079°W	0.88	0.71	0.71
[Site] SG-12R -2022-03-BI	48.19638927°N	-120.74556252°W	0.50	1.02	1.06
[Site] SG-12R -2022-04-BI	48.19634497°N	-120.74547593°W	0.83	0.60	0.60
[Site] SG-12R -2022-05-BI	48.19634434°N	-120.74541646°W	0.91	0.18	0.18
[Site] SG-12R -2022-06-BI	48.19640265°N	-120.74542511°W	0.51	0.26	0.26
[Site] SG-12R -2022-07-BI	48.19641878°N	-120.74531049°W	0.34	0.37	0.37
[Site] SG-12R -2022-08-BI	48.19641152°N	-120.74523926°W	0.80	0.57	0.57
[Site] SG-12R -2022-09-BI	48.19646592°N	-120.74512990°W	0.75	0.80	0.70
[Site] SG-12R -2022-10-BI	48.19652127°N	-120.74514942°W	0.10	0.51	0.51
[Site] SG-12R -2022-11-BI	48.19649315°N	-120.74508646°W	0.45	0.53	0.53
[Site] SG-12R -2022-12-BI	48.19655089°N	-120.74492765°W	0.78	1.02	1.02
[Site] SG-12R -2022-13-BI	48.19665118°N	-120.74483954°W	0.18	0.17	0.13
[Site] SG-12R -2022-14-BI	48.19665273°N	-120.74470128°W	0.90	1.38	0.97
[Site] SG-12R -2022-15-BI	48.19671575°N	-120.74480520°W	0.70	1.20	1.20

Holden Mine Biomonitoring – 2022

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: S6-12R
Date: 8/18/22
Field Crew: LKS, NAD, KMW, MTM
Survey Reach Gradient: 1%

Habitat Unit Map
(Draw and label habitat units in each reach corresponding to unit description)



Channel Unit						Large Woody Debris Count[3]		
Unit ID [a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
FT1	330	35	0.6			2	2	
SS1	300	150	4+	0.3	WD	5	0	3
SS2	20	12	2.0	0.2	WD	1		
SS3								
	Lots of woody debris/snags, particularly on right bank							
	Gravel bar is smaller than last year							
	Right bank is steep w/ many snags/fire-damaged trees							
	Large LWD jam ~50 ft downstream of station (>100 pieces)							

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2022 Biomonitoring
Site Name: RC- 126
Stream Name Railroad Creek
Date: 8/20/2022 **Time:** 0800
Latitude: 48.19655°N **Longitude:** 120.74510°W
Field Crew: MTM, CB, TS, CKD, PO

Water Quality Parameters	
Temperature	13.5
Conductivity	47.4
DO	9.43
pH	7.11

Stream Description
OPTIMAL FISH HOLDING SPOTS WAGELY INACCESSIBLE DUE TO DEPTH AND FLOW.

Shocker Settings				
		Pass 1	Pass 2	Pass 3
Pulse Width (500 uS):				
Pulse Frequency (30-50 Hz):		30 – 35		
Duty Cycle (Begin 12%):		12 – 15		
Volts (Begin 500-800):		900 - 500 - 800		
Time Begin:	0800			
Time End:	1130			
Total Fish Caught				
Total Fish 1st and 2nd pass:				
2nd pass as % of total of 1st & 2nd			if >40% then do a third pass	

2,384 sec.

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT	149	24	~10 VISUAL
1	CT	115	12	
1	CT	112	12	
1	CT	86	8	
1	CT	115	18	
1	CT	118	12	

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling - Chain of Custody Form

Site: RC-10 Field Crew: IKS, NAD, KAM, SRV, KLH, EAM, KMU

Date: 8/20/22 Time Start: 0815 Time End: _____ Weather: sunny

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-01-BI** Habitat type: riffle Collection Date/Time: 8/20 0830 Collected By: SRV, KMU	10	90			0	15	11.5	10.28	6.94	173.8	42.0	0.89
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-02-BI** Habitat type: riffle Collection Date/Time: 8/20 0842 Collected By: SRV, KMU	20	75	5		0	20	11.5	10.31	7.09	154.2	42.0	1.22
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-03-BI** Habitat type: riffle Collection Date/Time: 8/20 0852 Collected By: SRV, KMU	20	25	25	30	0	30	11.6	10.29	7.13	146.7	42.1	0.78
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-04-BI** Habitat type: riffle Collection Date/Time: 8/20 0905 Collected By: SRV, KMU	10	30	60		0	10	11.7	10.13	7.11	146.4	42.2	2.57
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-05-BI** Habitat type: riffle Collection Date/Time: 8/20 0913 Collected By: SRV, KMU	5	45	50		0	5	11.7	10.16	7.17	145.8	42.2	1.14
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-06-BI** Habitat type: riffle Collection Date/Time: 8/20 0920 Collected By: SRV, KMU	10	55	10	25	0	40	11.7	10.28	7.14	137.1	42.2	1.73
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-07-BI** Habitat type: riffle Collection Date/Time: 8/20 0928 Collected By: SRV, KMU	25	20	30	25	0	40	11.9	10.18	7.13	140.1	42.2	0.95

Site: RC-10

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-08-BI** Habitat type: riffle Collection Date/Time: 8/20 0938 Collected By: SRV, KMV	10	90			0	5	11.9	10.24	7.16	137.4	42.3	1.23
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-09-BI** Habitat type: riffle Collection Date/Time: 8/20 0943 Collected By: SRV, KMV	5	50	25	20	0	60	11.9	10.18	7.16	139.0	42.2	1.35
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-10-BI** Habitat type: Riffle Collection Date/Time: 10:03 Collected By: SRV, KMK	5	45	10	40	0	60	12.1	10.09	7.13	137.5	42.1	0.72
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-11-BI** Habitat type: Riffle Collection Date/Time: 10:10 Collected By: SRV, KMK	5	95	ϕ	ϕ	ϕ	5	11.7	7.74	6.45	106.8	57.9	1.17
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-12-BI** Habitat type: Riffle Collection Date/Time: 10:20 Collected By: SRV, KMK	10	25	5	60	0	10	12.3	10.18	7.16	100.2	42.2	1.80
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-13-BI** Habitat type: riffle Collection Date/Time: 10:30 Collected By: SRV, KMV		70	30		0	5	12.3	10.16	7.20	109.7	42.1	1.12
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-14-BI** Habitat type: riffle Collection Date/Time: 10:37 Collected By: SRV, KMV	5	40	55		0	20	12.4	10.13	7.15	109.7	42.3	1.52
Holden Mine Biomonitoring 2022 Sample Location ID: **RC-10-2022-15-BI** Habitat type: riffle Collection Date/Time: 8/20 10:43 Collected By: SRV, KMV		40	60		0	5	12.6	10.13	7.16	114.7	42.4	1.56

Holden Mine Biomonitoring – 2022

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: RC-10
Date: 8/20/22

Field Crew: HES, WAD, EM, KAM, KLH, KMW, SRW

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.19075°N	120.70485°W
Center (site location)	48.19078	120.70424
50-meter downstream marker	48.19083	120.70360

Replicate #:	Latitude (°N)	Longitude (°W)	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] RC-10 -2022-01-BI	48.19075	120.70479	1.20	1.00	1.60
[Site] RC-10 -2022-02-BI	48.19076	120.70475	1.20	0.85	0.85
[Site] RC-10 -2022-03-BI	48.19074	120.70470	1.40	1.20	1.29
[Site] RC-10 -2022-04-BI	48.19075	120.70464	0.65	1.03	1.03
[Site] RC-10 -2022-05-BI	48.19075	120.70462	0.97	1.58	1.58
[Site] RC-10 -2022-06-BI	48.19074	120.70458	0.81	1.79	2.07
[Site] RC-10 -2022-07-BI	48.19074	120.70446	0.67	1.15	1.15
[Site] RC-10 -2022-08-BI	48.19073	120.70437	0.65	1.20	1.20
[Site] RC-10 -2022-09-BI	48.19073	120.70431	0.95	1.68	2.03
[Site] RC-10 -2022-10-BI	48.19077	120.70425	0.37	0.03	0.03
[Site] RC-10 -2022-11-BI	48.19072	120.70417	0.58	2.19	2.17
[Site] RC-10 -2022-12-BI	48.19076	120.70414	0.52	0.83	0.93
[Site] RC-10 -2022-13-BI	48.19072	120.70406	0.85	1.09	1.08
[Site] RC-10 -2022-14-BI	48.19078	120.70386	0.60	1.01	0.67
[Site] RC-10 -2022-15-BI	48.19078	120.70370	0.20	1.00	1.12

Holden Mine Biomonitoring – 2022

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: RC-1D **Field Crew:** IKS, NAD, KLH, EM, SRJ, MKMU, KAM **Page:** 2 of 2

Additional Notes/Observations	Channel Unit						Large Woody Debris Count[3]		
	Unit ID [a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
	FT 1	330	60	1.0			30+	20+	4 LOT
	SS1	20	15	1.3	0.2	TR	III	II	I
	SIDES	80	8	0.4			10+		III
	SS2	20	12	1.4	0.3	WD			
- Lots of LWD at this station									
- large log jam along right bank near downstream end of reach									
- alder thickets along both banks									
- side channel along left bank									
- bank along right bank moderately steep, LB low gradient									

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2022 Biomonitoring
Site Name: RC- 10
Stream Name Railroad Creek
Date: 8/20/2022 **Time:** 1400
Latitude: 48.19078°N **Longitude:** 120.70424°W
Field Crew: CB, KAM, TS, MTM, EM, CB, PO

Water Quality Parameters	
Temperature	11.7
Conductivity	42.1
DO	10.16
pH	7.16

Stream Description
Right bank largely inaccessible due to current speed and depth. Riffles with LWM.

LR24
3229
-1235
SEC

LR 20 B
902 SEC

Shocker Settings				
		LR24 ~~Pass 1~~	LR ~~2022~~ 2013	Pass 3
Pulse Width (500 uS):				
Pulse Frequency (30-50 Hz):		35	35	
Duty Cycle (Begin 12%):		15	15	
Volts (Begin 500-800):		800	700	
Time Begin:	1300			
Time End:	1400			
Total Fish Caught				
Total Fish 1st and 2nd pass:				
2nd pass as % of total of 1st & 2nd			if >40% then do a third pass	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
	CT	170	48	
	CT yoy	–	–	yoy
	CT	165	51	
	CT	85	8	
	CT	170	53	
	CT yoy	–	–	–
	CT yoy	–	–	–

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Appendix B

Benthic Macroinvertebrate & Habitat Photo Log

Photo 1 — Label for replicate 1 (RC-6).

Photo 2 — Representative substrate in replicate 1 (RC-6).

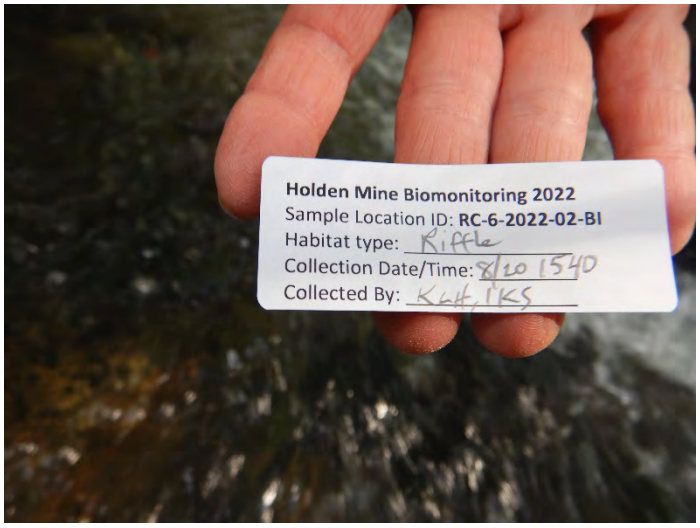


Photo 3 — Label for replicate 2 (RC-6).

Photo 4 — Representative substrate in replicate 2 (RC-6).

Photo 5 — Label for replicate 3 (RC-6).

Photo 6 — Representative substrate in replicate 3 (RC-6).

Photo 7— Label for replicate 4 (RC-6).

Photo 8 — Representative substrate in replicate 4 (RC-6).

Photo 9 — Label for replicate 5 (RC-6).

Photo 10 — Representative substrate in replicate 5 (RC-6).

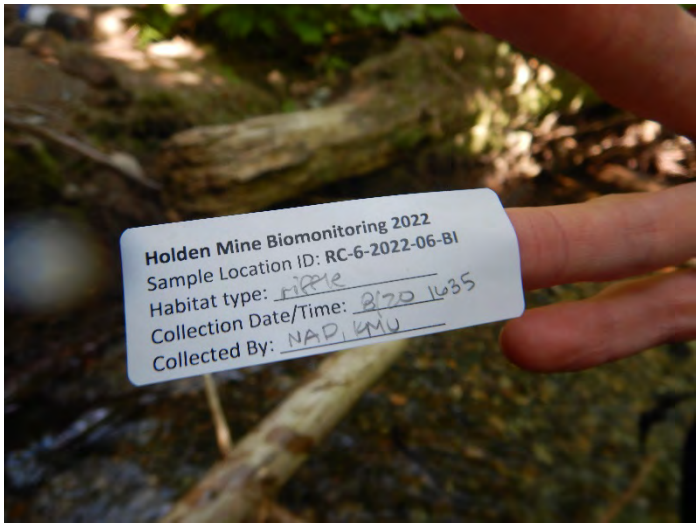


Photo 11 — Label for replicate 6 (RC-6).

Photo 12 — Representative substrate in replicate 6 (RC-6).

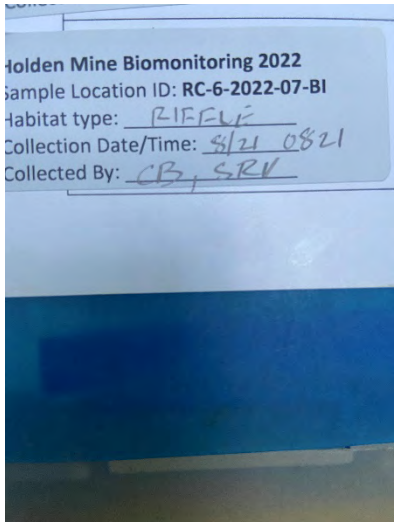


Photo 13 — Label for replicate 7 (RC-6).

Photo 14 — Representative substrate in replicate 7 (RC-6).

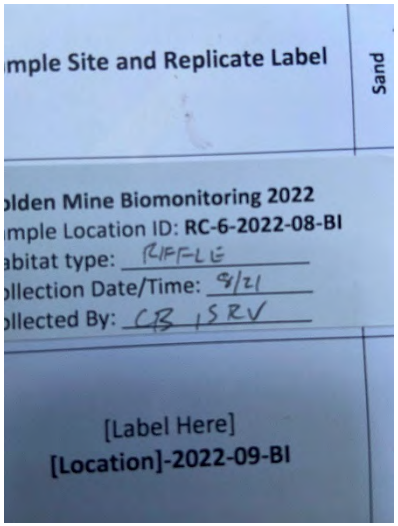


Photo 15 — Label for replicate 8 (RC-6).

Photo 16 — Representative substrate in replicate 8 (RC-6).

Photo 17 — Label for replicate 9 (RC-6).

Photo 18 — Representative substrate in replicate 9 (RC-6).

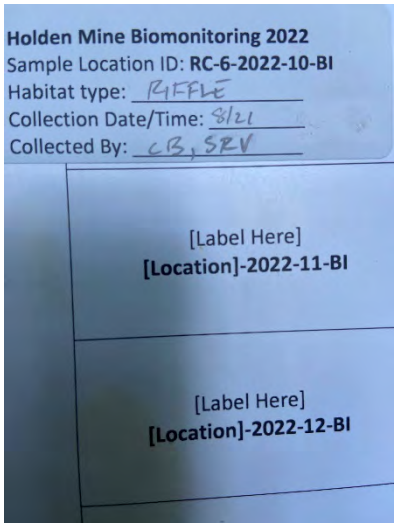


Photo 19 — Label for replicate 10 (RC-6).

Photo 20 — Representative substrate in replicate 10 (RC-6).

Photo 21 — Label for replicate 11 (RC-6).

Photo 22 — Representative substrate in replicate 11 (RC-6).

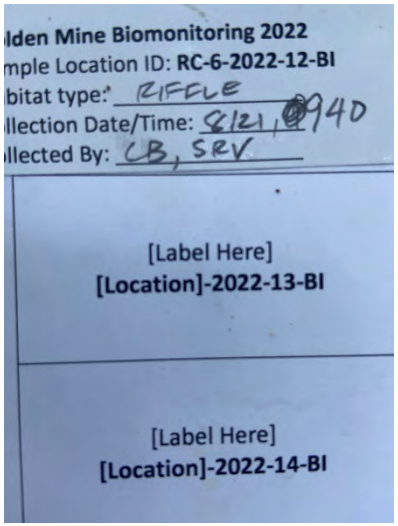


Photo 23 — Label for replicate 12 (RC-6).

Photo 24 — Representative substrate in replicate 12 (RC-6).

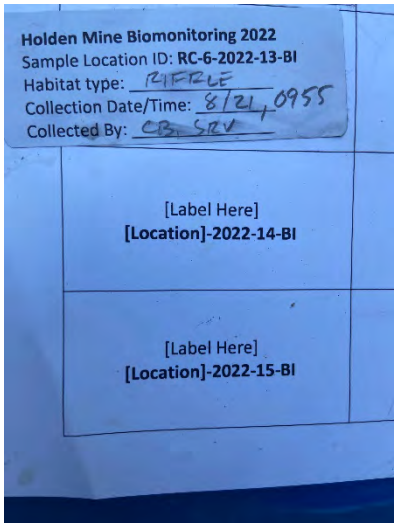


Photo 25 — Label for replicate 13 (RC-6).

Photo 26 — Representative substrate in replicate 13 (RC-6).

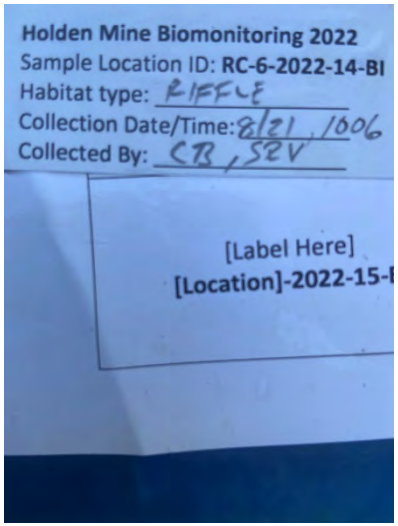


Photo 27 — Label for replicate 14 (RC-6).

Photo 28 — Representative substrate in replicate 14 (RC-6).

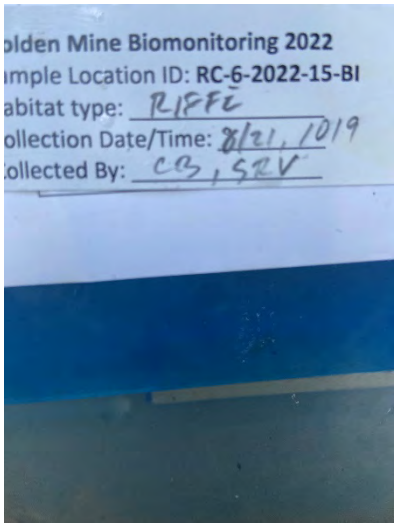


Photo 29 — Label for replicate 15 (RC-6).

Photo 30 — Representative substrate in replicate 15 (RC-6).

Photo 31 — Label for replicate 1 (RC-1).

Photo 32 — Representative substrate in replicate 1 (RC-1).

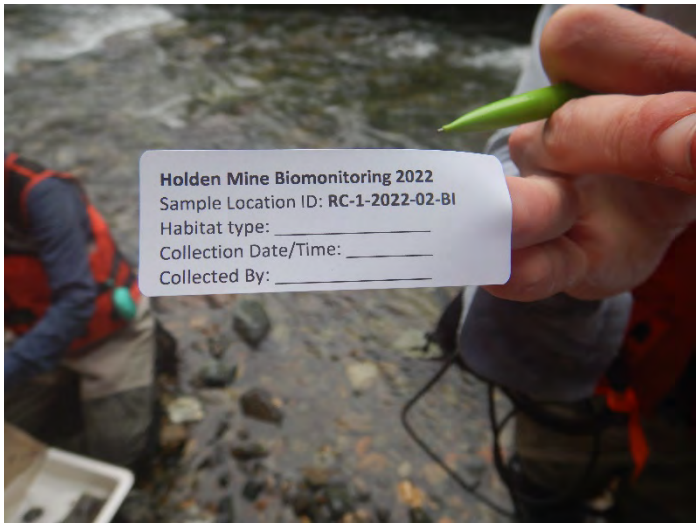


Photo 33 — Label for replicate 2 (RC-1).

Photo 34 — Representative substrate in replicate 2 (RC-1).

Photo 35 — Label for replicate 3 (RC-1).

Photo 36 — Representative substrate in replicate 3 (RC-1).

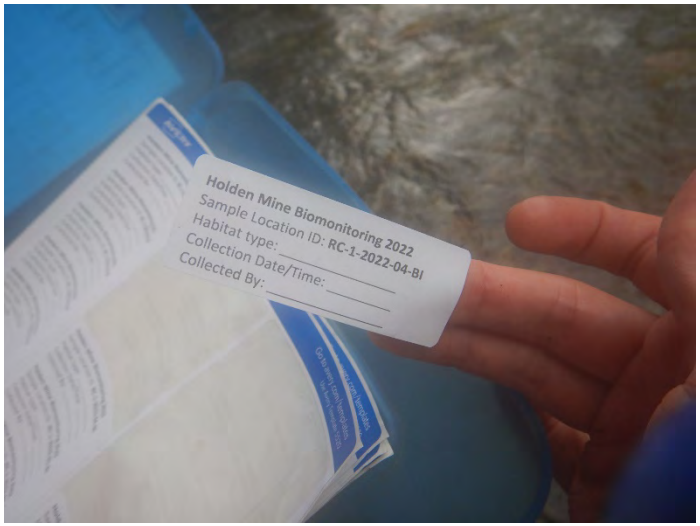


Photo 37 — Label for replicate 4 (RC-1).

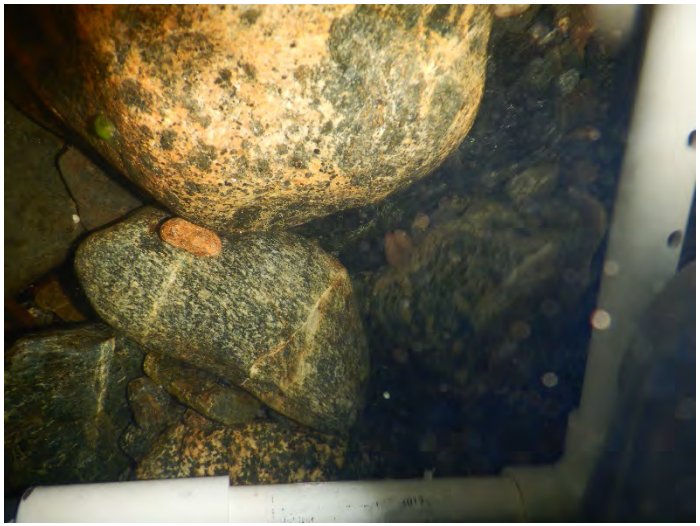


Photo 38 — Representative substrate in replicate 4 (RC-1).

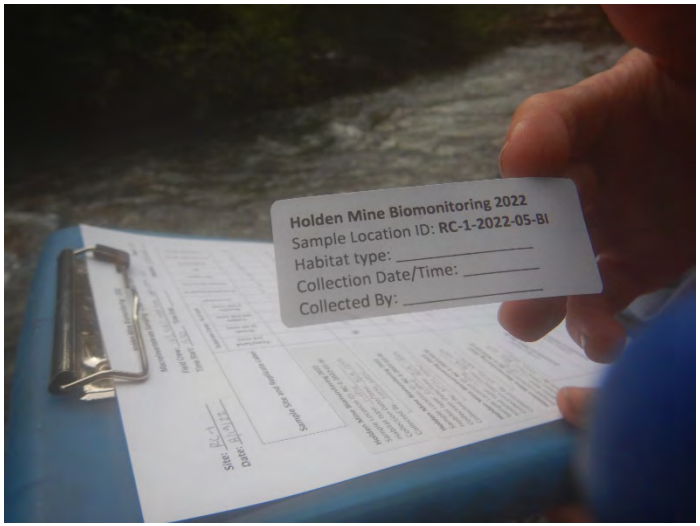


Photo 39 — Label for replicate 5 (RC-1).

Photo 40 — Representative substrate in replicate 5 (RC-1).

Photo 41 — Label for replicate 6 (RC-1).

Photo 42 — Representative substrate in replicate 6 (RC-1).

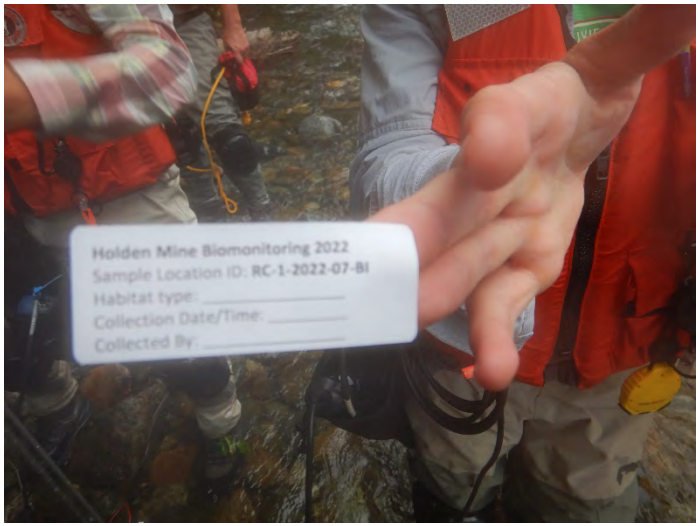


Photo 43 — Label for replicate 7 (RC-1).

Photo 44 — Representative substrate in replicate 7 (RC-1).

Photo 45 — Label for replicate 8 (RC-1).

Photo 46 — Representative substrate in replicate 8 (RC-1).

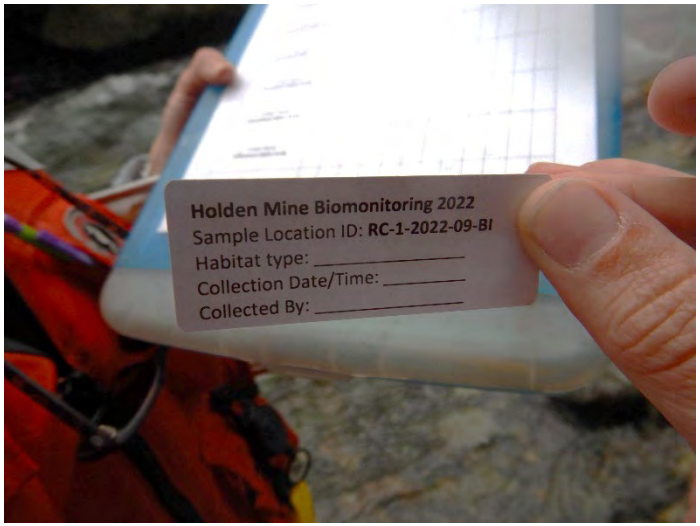


Photo 47— Label for replicate 9 (RC-1).

Photo 48 — Representative substrate in replicate 9 (RC-1).

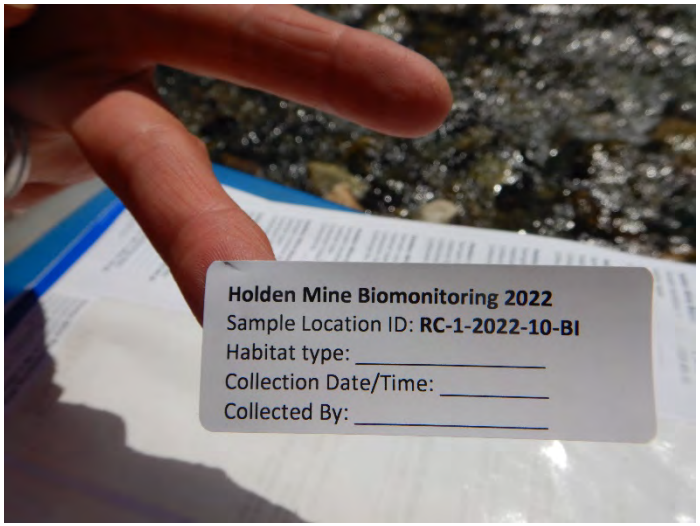


Photo 49 — Label for replicate 10 (RC-1).

Photo 50 — Representative substrate in replicate 10 (RC-1).

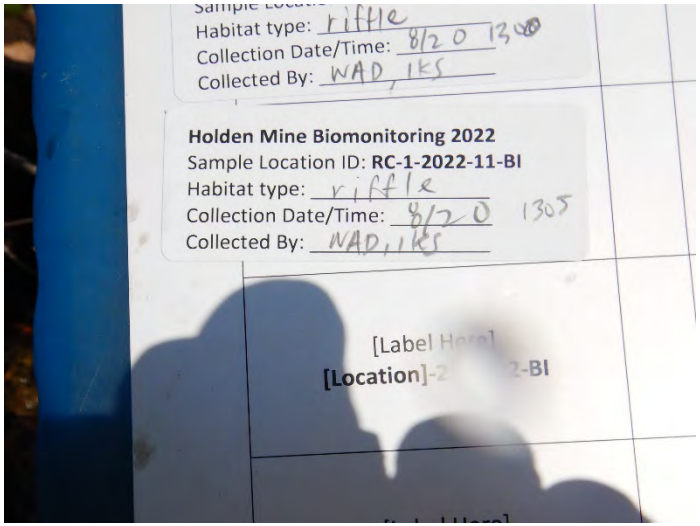


Photo 51 — Label for replicate 11 (RC-1).

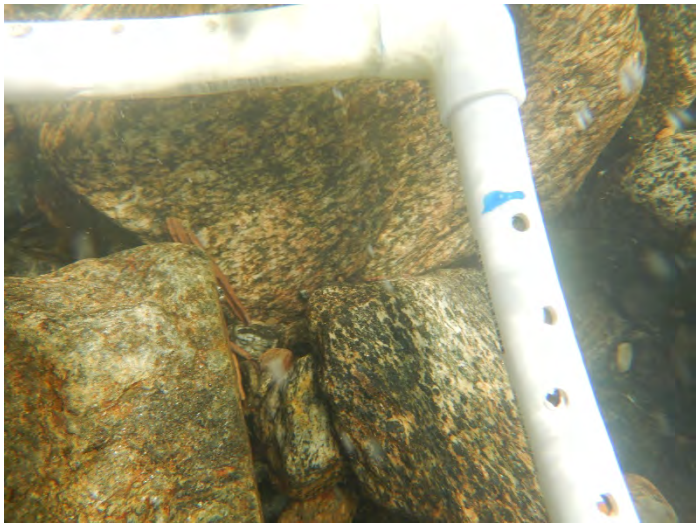


Photo 52 — Representative substrate in replicate 11 (RC-1).

Photo 53 — Label for replicate 12 (RC-1).

Photo 54 — Representative substrate in replicate 12 (RC-1).

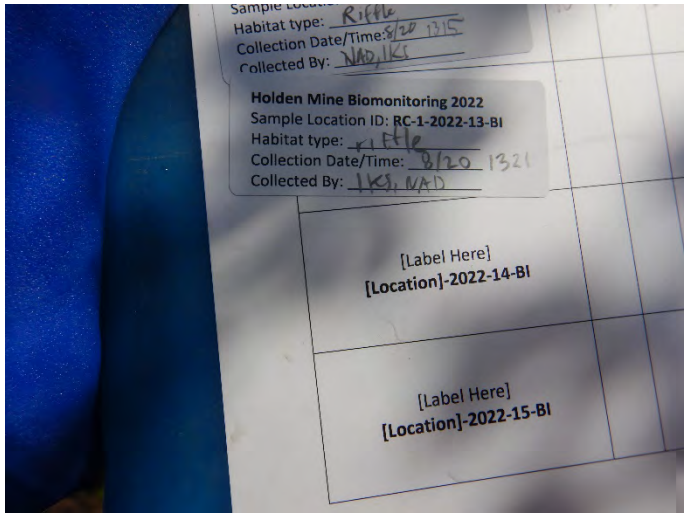


Photo 55 — Label for replicate 13 (RC-1).

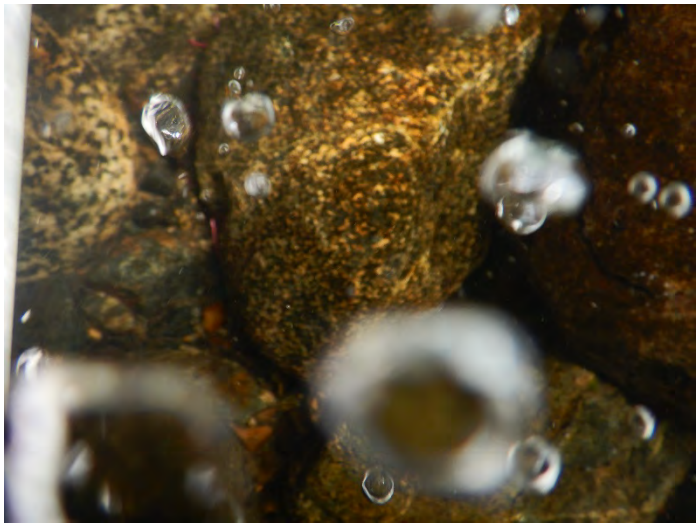


Photo 56 — Representative substrate in replicate 13 (RC-1).

Photo 57 — Label for replicate 14 (RC-1).

Photo 58 — Representative substrate in replicate 14 (RC-1).

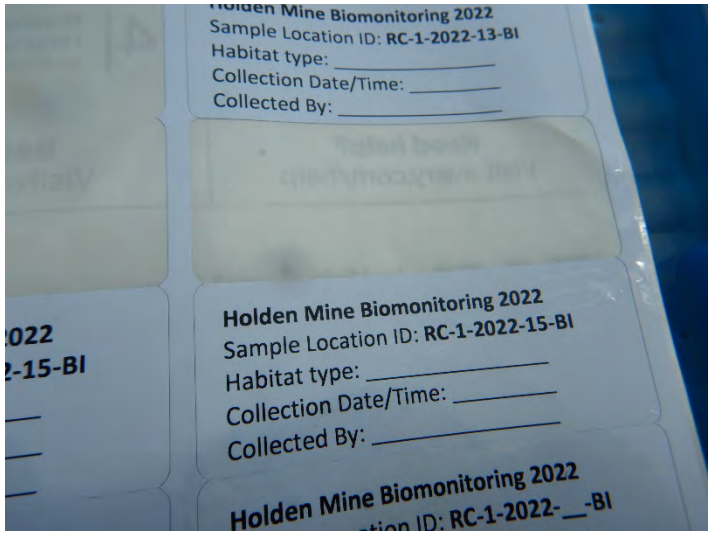


Photo 59 — Label for replicate 15 (RC-1).

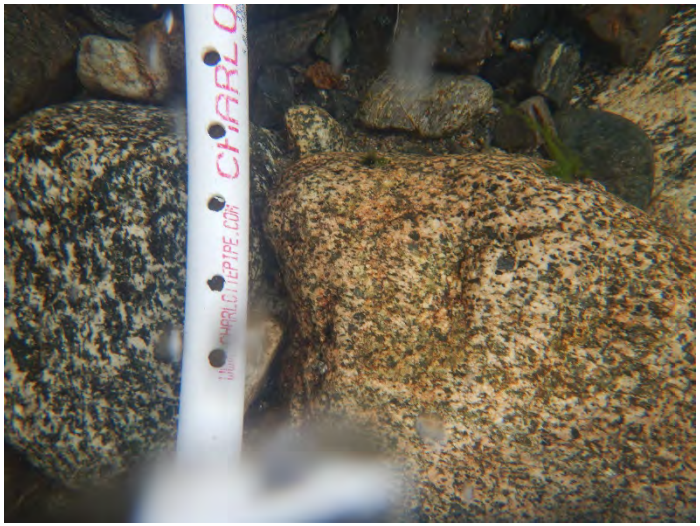


Photo 60 — Representative substrate in replicate 15 (RC-1).

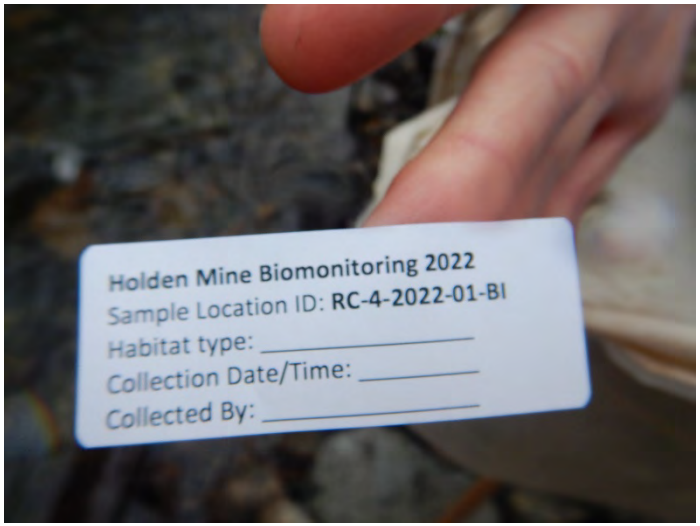


Photo 61 — Label for replicate 1 (RC-4).

Photo 62 — Representative substrate in replicate 1 (RC-4).

Photo 63 — Label for replicate 2 (RC-4).

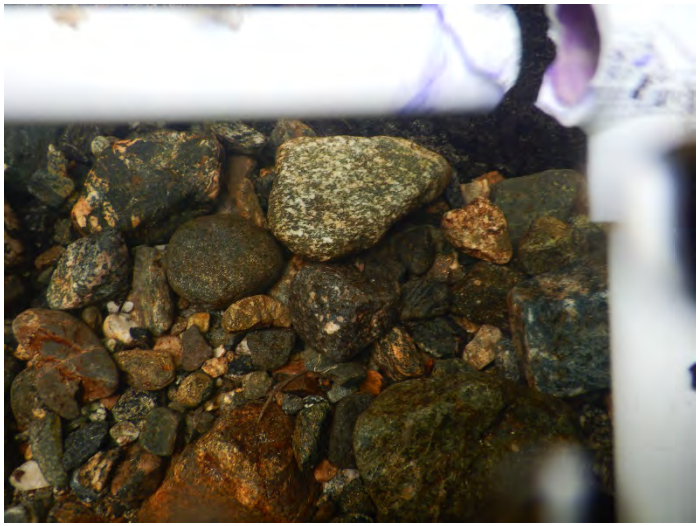


Photo 64 — Representative substrate in replicate 2 (RC-4).

Photo 65 — Label for replicate 3 (RC-4).

Photo 66 — Representative substrate in replicate 3 (RC-4).

Photo 67 — Replicate 4 label (RC-4).

Photo 68 — Representative substrate in replicate 4 (RC-4).

Photo 69 — Label for replicate 5 (RC-4).

Photo 70 — Representative substrate in replicate 5 (RC-4).

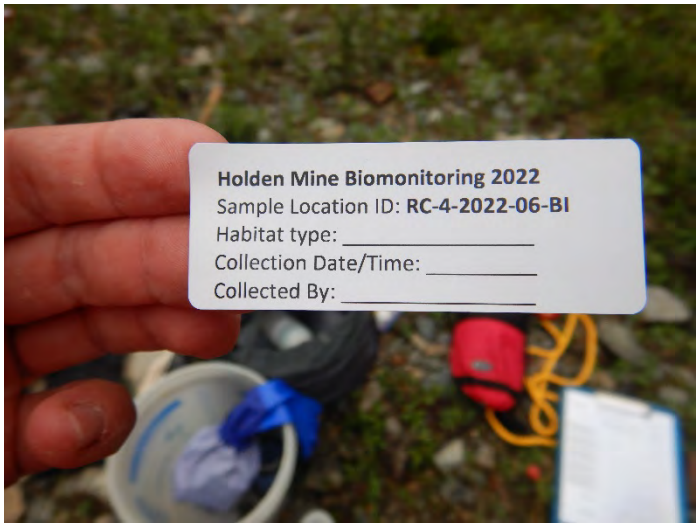


Photo 71— Label for replicate 6 (RC-4).

Photo 72 — Representative substrate in replicate 6 (RC-4).

Photo 73 — Label for replicate 7 (RC-4).

Photo 74 — Representative substrate in replicate 7 (RC-4).

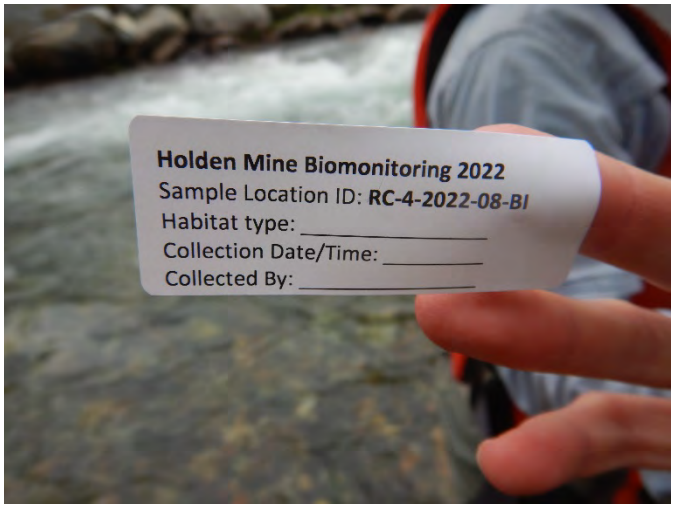


Photo 75 — Label for replicate 8 (RC-4).

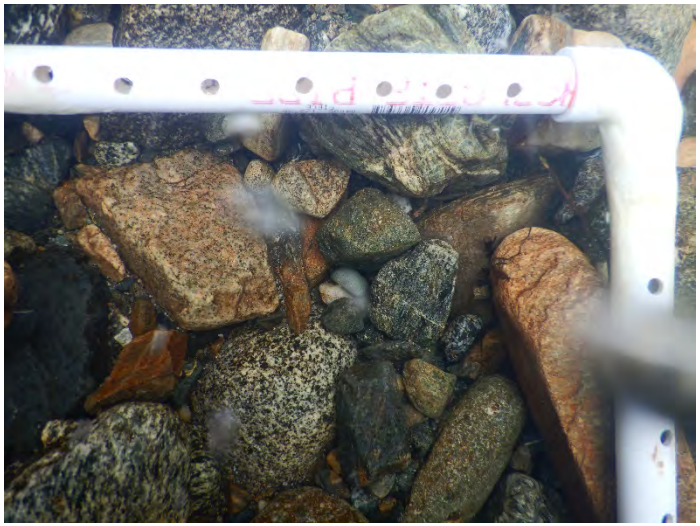


Photo 76 — Representative substrate in replicate 8 (RC-4).

Photo 77 — Label for replicate 9 (RC-4).

Photo 78 — Representative substrate in replicate 9 (RC-4).

Photo 79 — Label for replicate 10 (RC-4).

Photo 80 — Representative substrate in replicate 10 (RC-4).

Photo 81 — Label for replicate 11 (RC-4).

Photo 82 — Representative substrate in replicate 11 (RC-4).

Photo 83 — Label for replicate 12 (RC-4).

Photo 84 — Representative substrate in replicate 12 (RC-4).

Photo 85 — Label for replicate 13 (RC-4).

Photo 86 — Representative substrate in replicate 13 (RC-4).

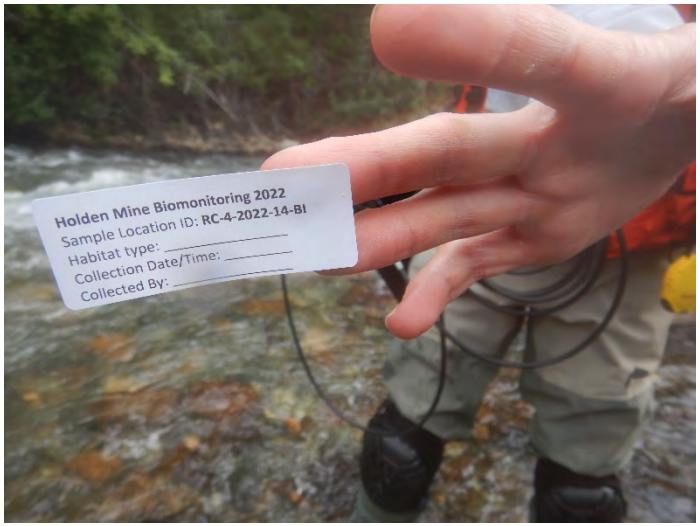


Photo 87 — Label for replicate 14 (RC-4).

Photo 88 — Representative substrate in replicate 14 (RC-4).

Photo 89 — Label for replicate 15 (RC-4).

Photo 90 — Representative substrate in replicate 15 (RC-4).

Photo 91— Label for replicate 1 (RC-2).

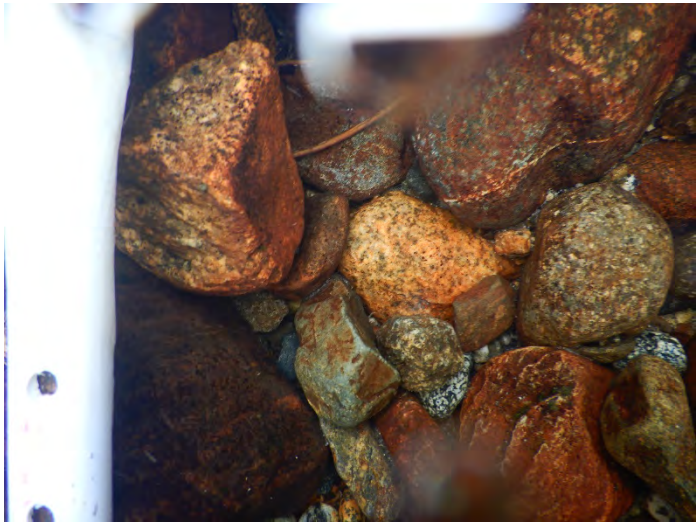


Photo 92— Representative substrate in replicate 1 (RC-2).

Photo 93 — Label for replicate 2 (RC-2).

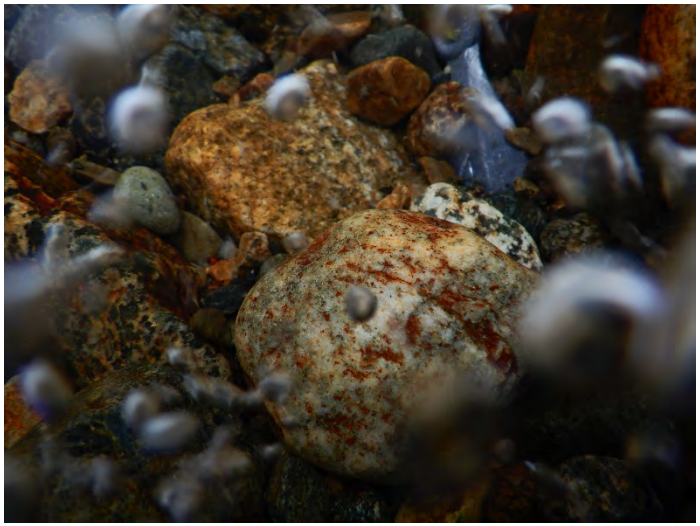


Photo 94 — Representative substrate in replicate 2 (RC-2).

Photo 95 — Label for replicate 3 (RC-2).

Photo 96 — Representative substrate in replicate 3 (RC-2).

Photo 97 — Label for replicate 4 (RC-2).

Photo 98 — Representative substrate in replicate 4 (RC-2).

Photo 99 — Label for replicate 5 (RC-2).

Photo 100 — Representative substrate in replicate 5 (RC-2).

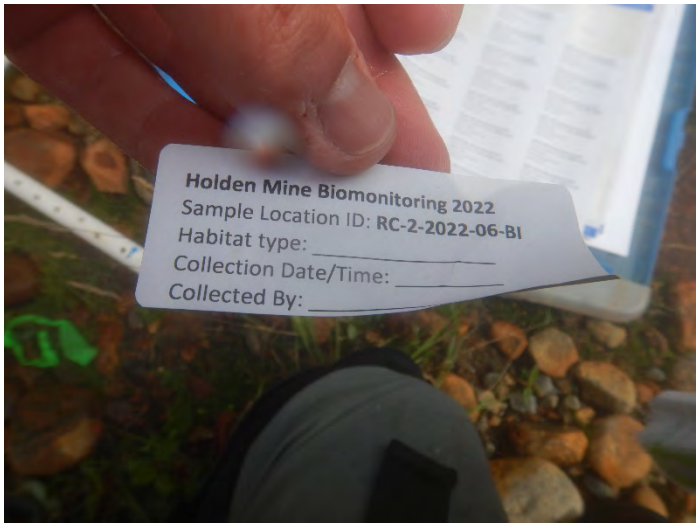


Photo 101 — Label for replicate 6 (RC-2).

Photo 102 — Representative substrate in replicate 6 (RC-2).

Photo 103 — Label for replicate 7 (RC-2).

Photo 104 — Representative substrate in replicate 7 (RC-2).

Photo 105 — Label for replicate 8 (RC-2).

Photo 106 — Representative substrate in replicate 8 (RC-2).

Photo 107 — Label for replicate 9 (RC-2).

Photo 108 — Representative substrate in replicate 9 (RC-2).

Photo 109 — Label for replicate 10 (RC-2).

Photo 110 — Representative substrate in replicate 10 (RC-2).

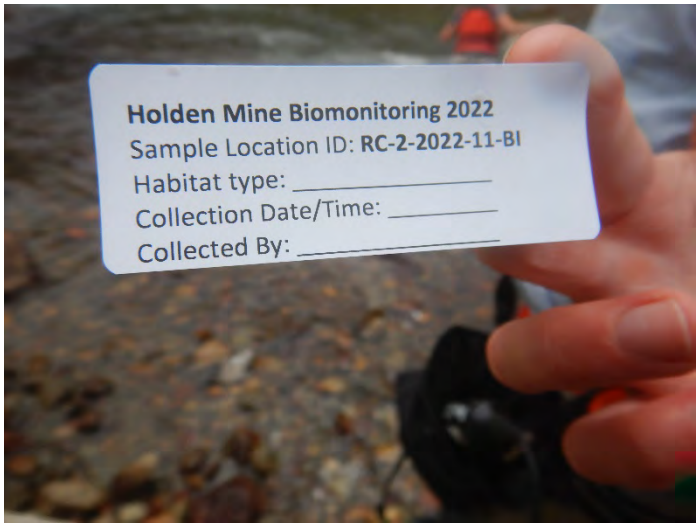


Photo 111 — Label for replicate 11 (RC-2).

Photo 112 — Representative substrate in replicate 11 (RC-2).

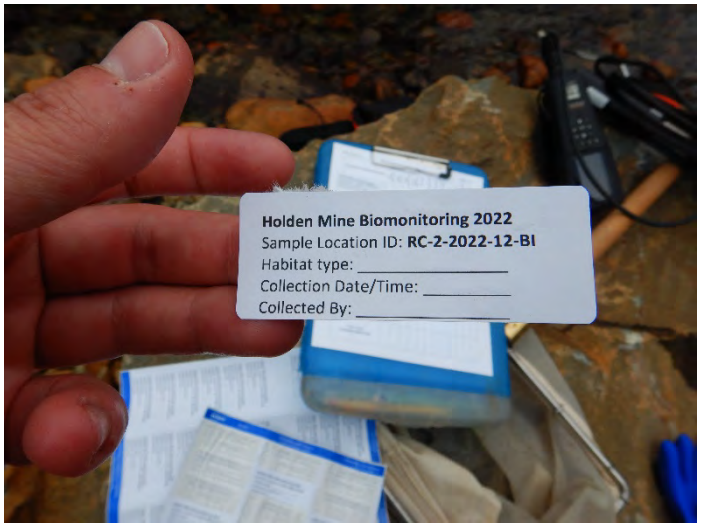


Photo 113 — Label for replicate 12 (RC-2).

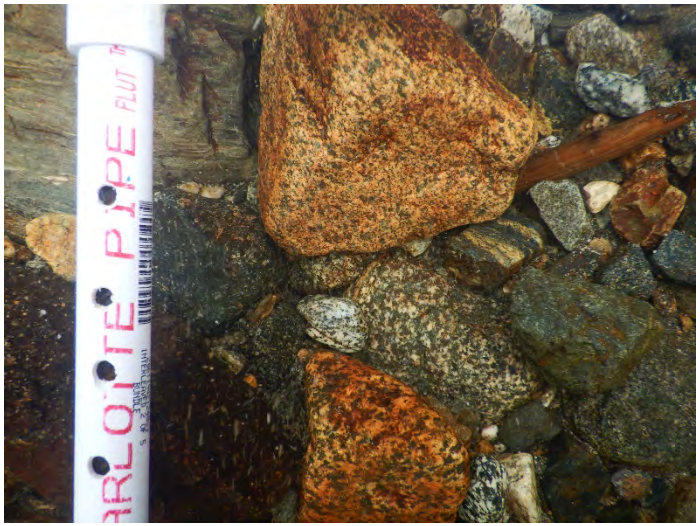


Photo 114 — Representative substrate in replicate 12 (RC-2).

Photo 115 — Label for replicate 13 (RC-2).

Photo 116 — Representative substrate in replicate 13 (RC-2).

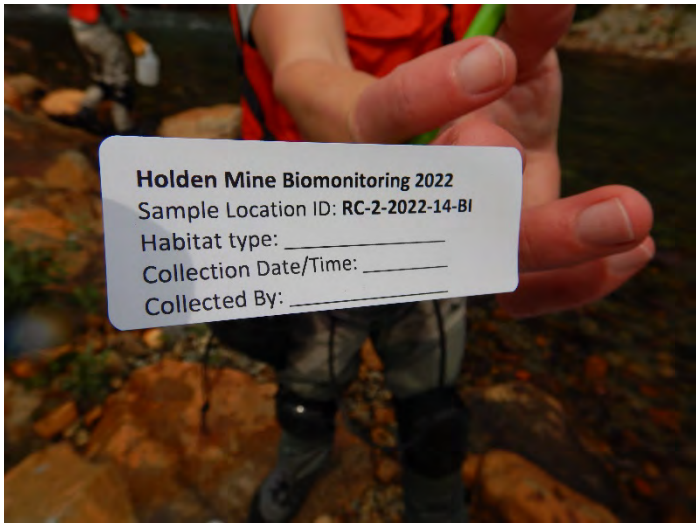


Photo 117 — Label for replicate 14 (RC-2).

Photo 118 — Representative substrate in replicate 14 (RC-2).

Photo 119 — Label for replicate 15 (RC-2).

Photo 120 — Representative substrate in replicate 15 (RC-2).

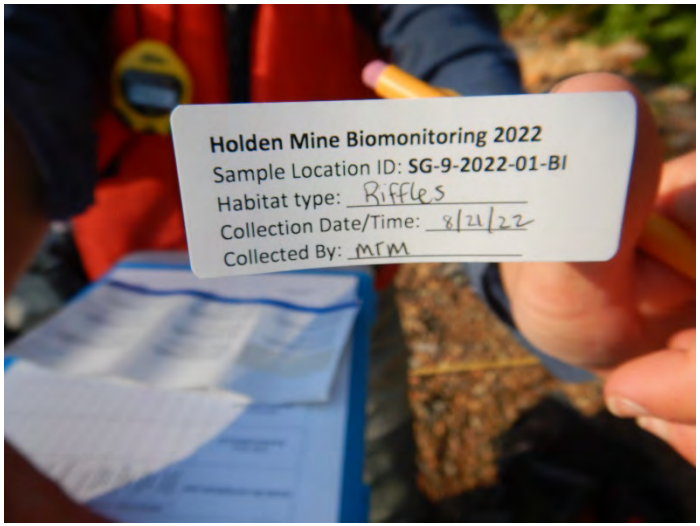


Photo 121 — Label for replicate 1 (SG-9).

Photo 122 — Representative substrate in replicate 1 (SG-9).

Photo 123 — Label for replicate 2 (SG-9).

Photo 124 — Representative substrate in replicate 2 (SG-9).

Photo 125 — Label for replicate 3 (SG-9).

Photo 126 — Representative substrate in replicate 3 (SG-9).

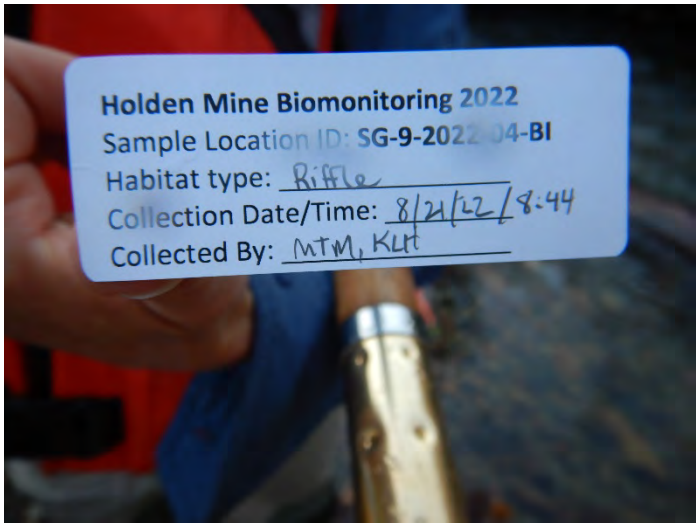


Photo 127 — Label for replicate 4 (SG-9).

Photo 128 — Representative substrate in replicate 4 (SG-9).

Photo 129 — Label for replicate 5 (SG-9).

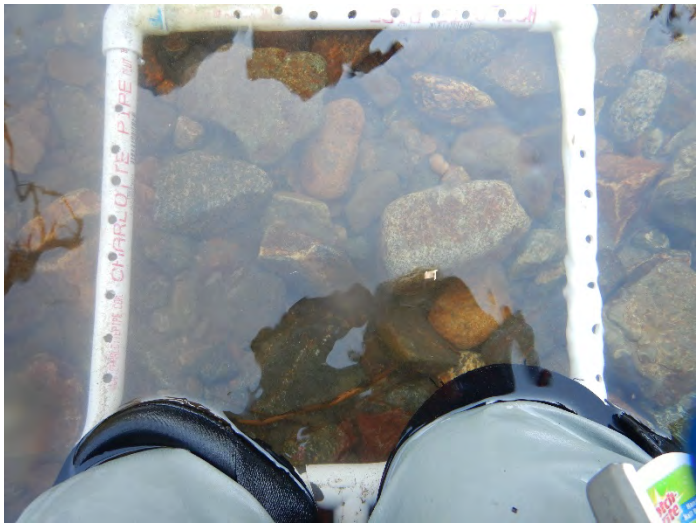


Photo 130 — Representative substrate in replicate 5 (SG-9).

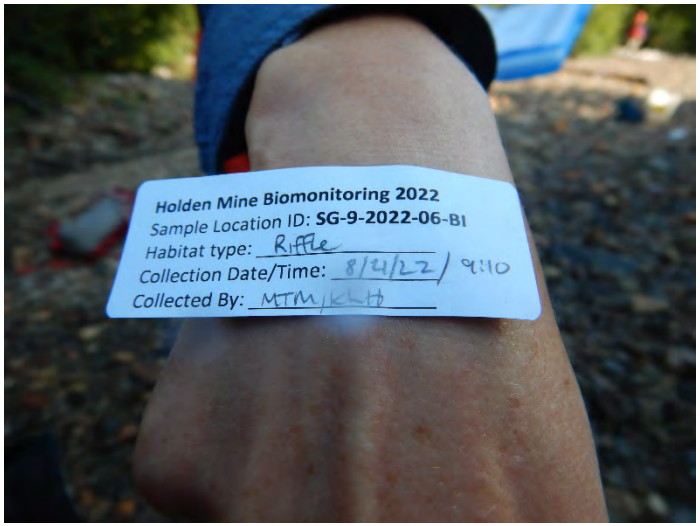


Photo 131 — Label for replicate 6 (SG-9).

Photo 132 — Representative substrate in replicate 6 (SG-9).

Photo 133 — Label for replicate 7 (SG-9).

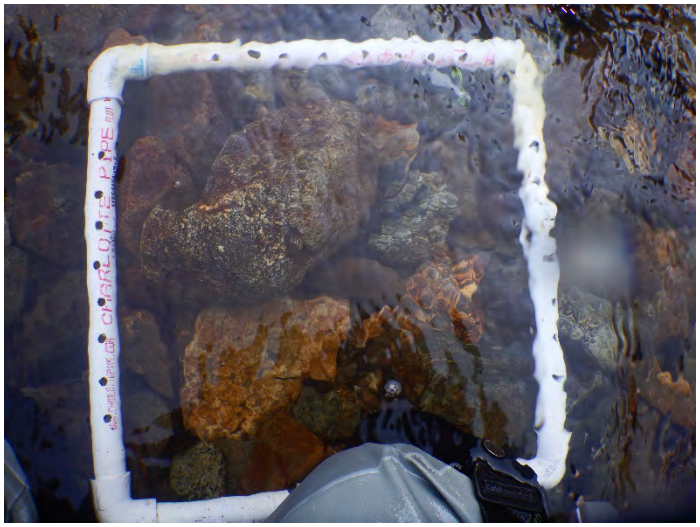


Photo 134 — Representative substrate in replicate 7 (SG-9).

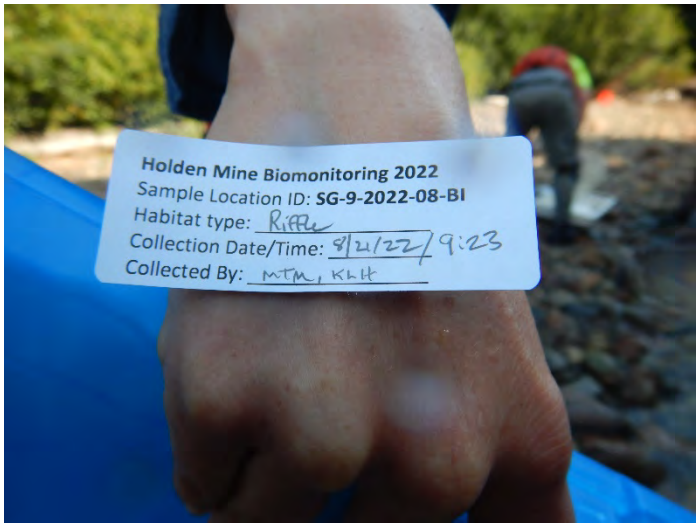


Photo 135 — Label for replicate 8 (SG-9).

Photo 136 — Representative substrate in replicate 8 (SG-9).

Photo 137 — Label for replicate 9 (SG-9).

Photo 138 — Representative substrate in replicate 9 (SG-9).

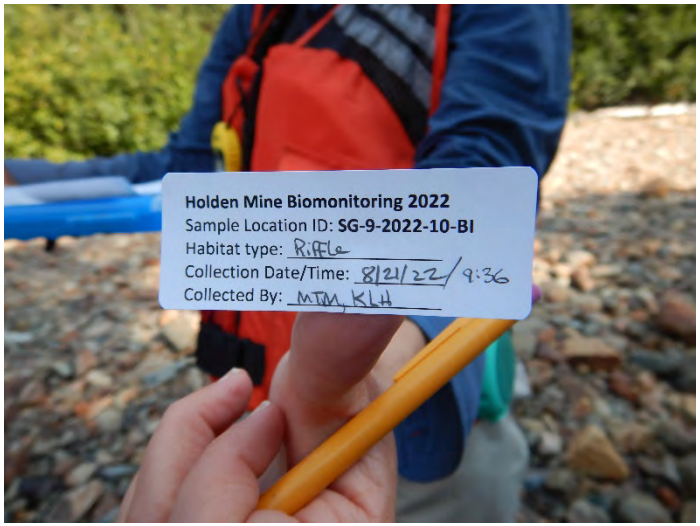


Photo 139 — Label for replicate 10 (SG-9).

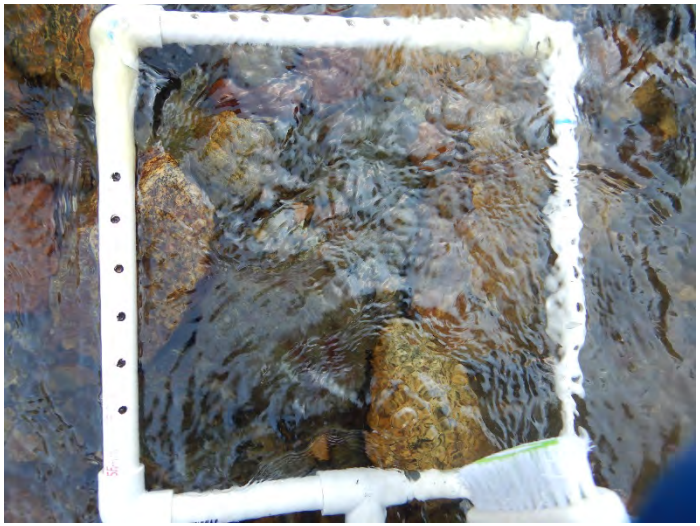


Photo 140 — Representative substrate in replicate 10 (SG-9).

Photo 141 — Label for replicate 11 (SG-9).

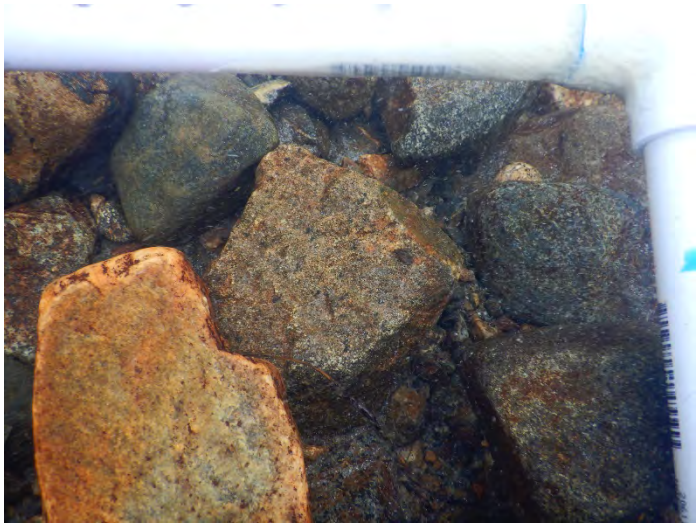


Photo 142 — Representative substrate in replicate 11 (SG-9).

Photo 143 — Label for replicate 12 (SG-9).

Photo 144 — Representative substrate in replicate 12 (SG-9).

Photo 145 — Label for replicate 13 (SG-9).

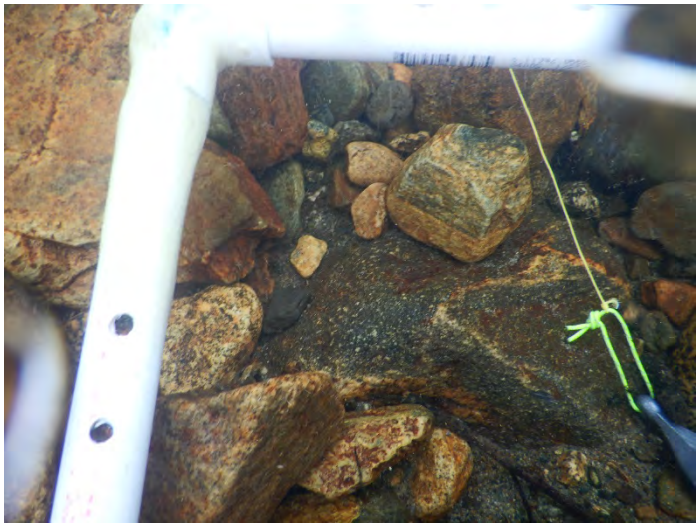


Photo 146 — Representative substrate in replicate 13 (SG-9).

Photo 147— Label for replicate 14 (SG-9).

Image missing.

Photo 148 — Representative substrate in replicate 14 (SG-9).

Photo 149 — Label for replicate 15 (SG-9).

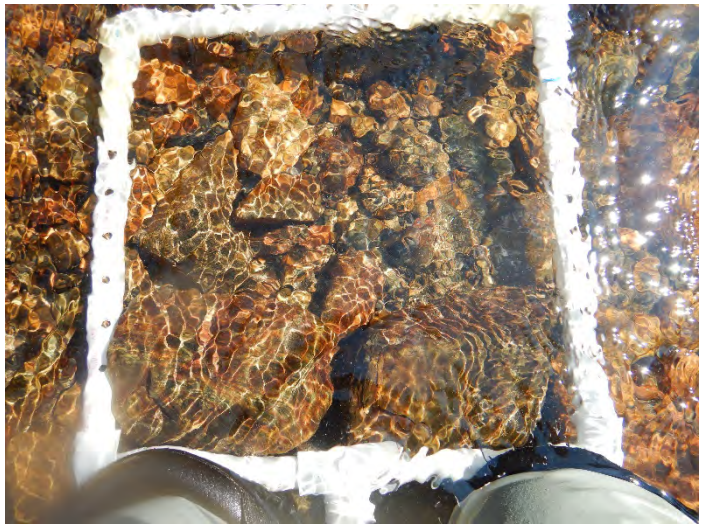


Photo 150 — Representative substrate in replicate 15 (SG-9).

Photo 151 — Label for replicate 1 (RC-10).

Photo 152— Representative substrate in replicate 1 (RC-10).

Photo 153 — Label for replicate 2 (RC-10).

Photo 154 — Representative substrate in replicate 2 (RC-10).

Photo 155 — Label for replicate 3 (RC-10).

Photo 156 — Representative substrate in replicate 3 (RC-10).

Photo 157 — Label for replicate 4 (RC-10).

Photo 158 — Representative substrate in replicate 4 (RC-10).

Photo 159 — Label for replicate 5 (RC-10).

Photo 160 — Representative substrate in replicate 5 (RC-10).

Photo 161 — Label for replicate 6 (RC-10).

Photo 162 — Representative substrate in replicate 6 (RC-10).

Photo 163 — Label for replicate 7 (RC-10).

Photo 164 — Representative substrate in replicate 7 (RC-10).

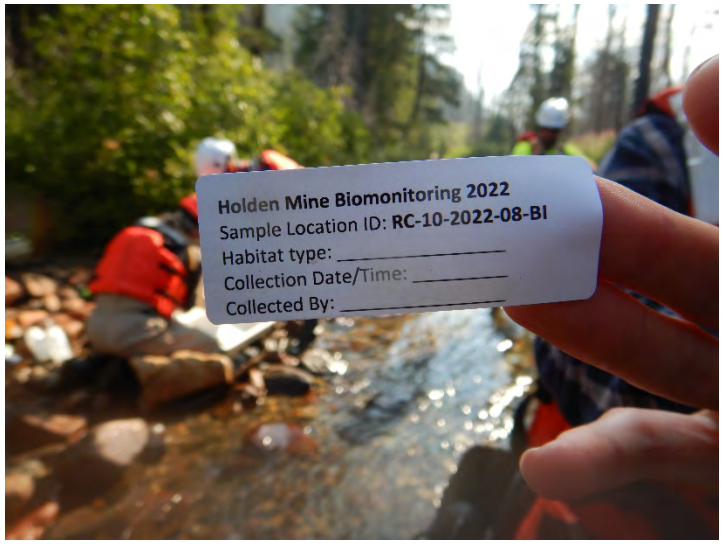


Photo 165 — Label for replicate 8 (RC-10).

Photo 166 — Representative substrate in replicate 8 (RC-10).

Photo 167 — Label for replicate 9 (RC-10).

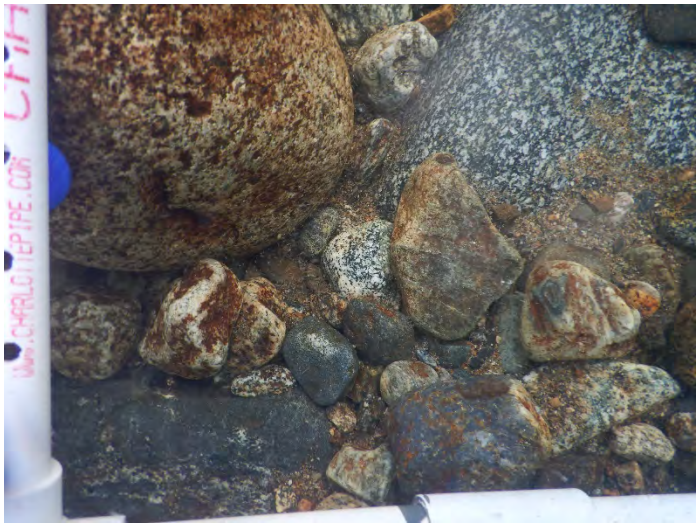


Photo 168 — Representative substrate in replicate 9 (RC-10).

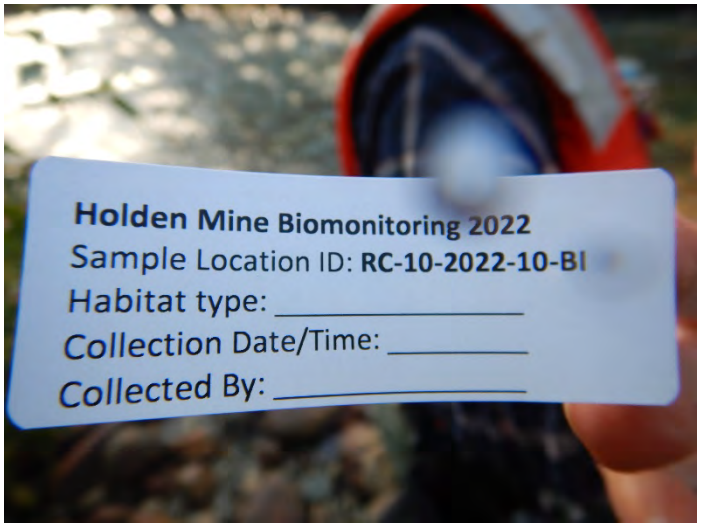


Photo 169 — Label for replicate 10 (RC-10).

Photo 170 — Representative substrate in replicate 10 (RC-10).

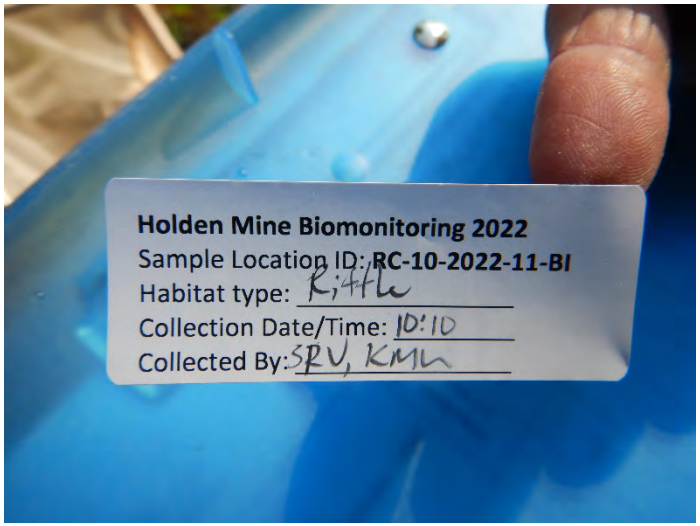


Photo 171 — Label for replicate 11 (RC-10).

Photo 172 — Representative substrate in replicate 11 (RC-10).

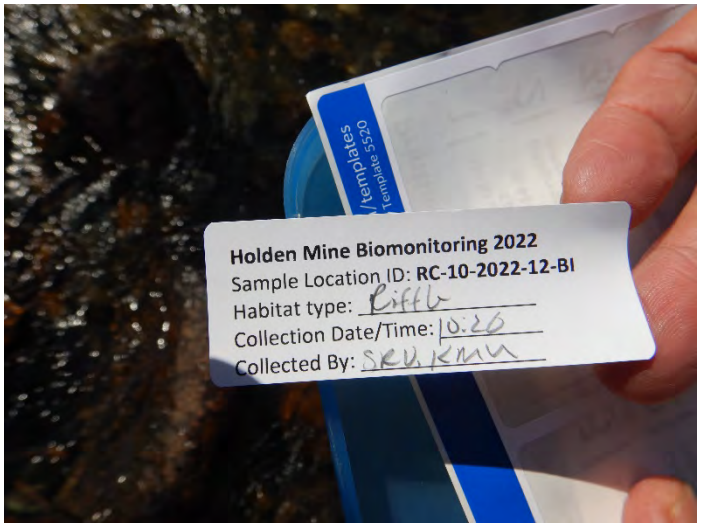


Photo 173 — Label for replicate 12 (RC-10).

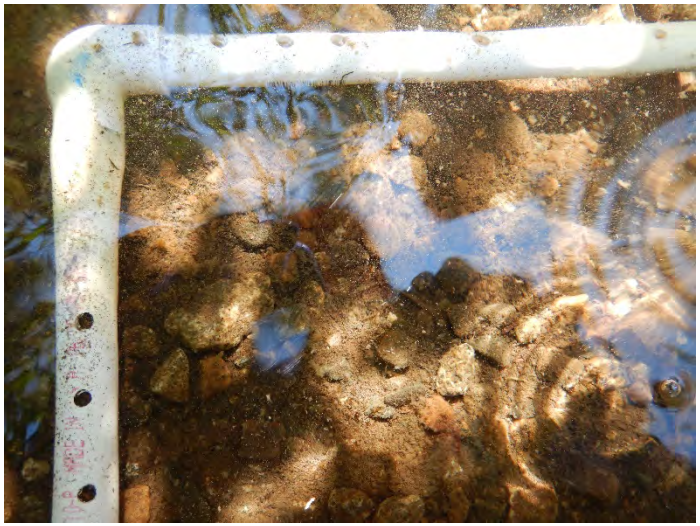


Photo 174 — Representative substrate in replicate 12 (RC-10).

Photo 175 — Label for replicate 13 (RC-10).

Photo 176 — Representative substrate in replicate 13 (RC-10).

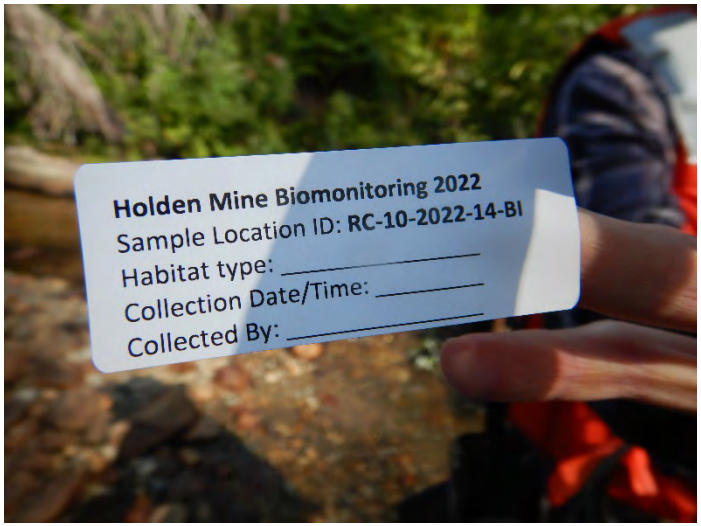


Photo 177 — Label for replicate 14 (RC-10).

Photo 178 — Representative substrate in replicate 14 (RC-10).

Photo 179 — Label for replicate 15 (RC-10).

Photo 180 — Representative substrate in replicate 15 (RC-10).

Photo 181 — Label for replicate 1 (SG-12R).

Photo 182 — Representative substrate in replicate 1 (SG-12R).

Photo 183 — Label for replicate 2 (SG-12R).

Photo 184 — Representative substrate in replicate 2 (SG-12R).

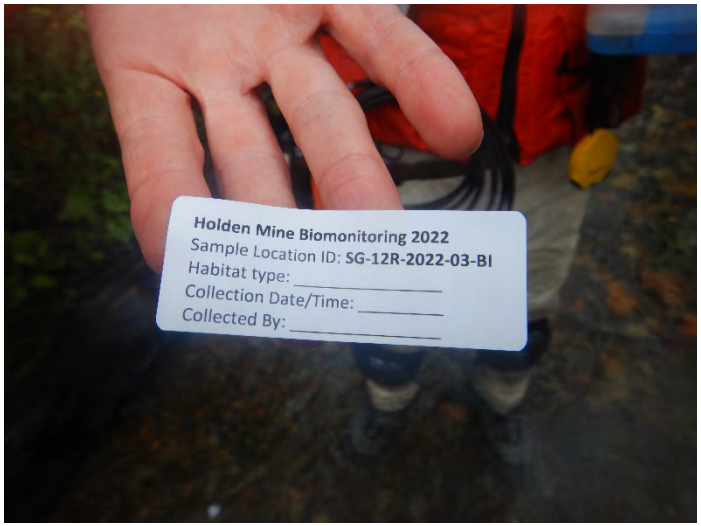


Photo 185 — Label for replicate 3 (SG-12R).

Photo 186 — Representative substrate in replicate 3 (SG-12R).

Photo 187 — Label for replicate 4 (SG-12R).

Photo 188 — Representative substrate in replicate 4 (SG-12R).

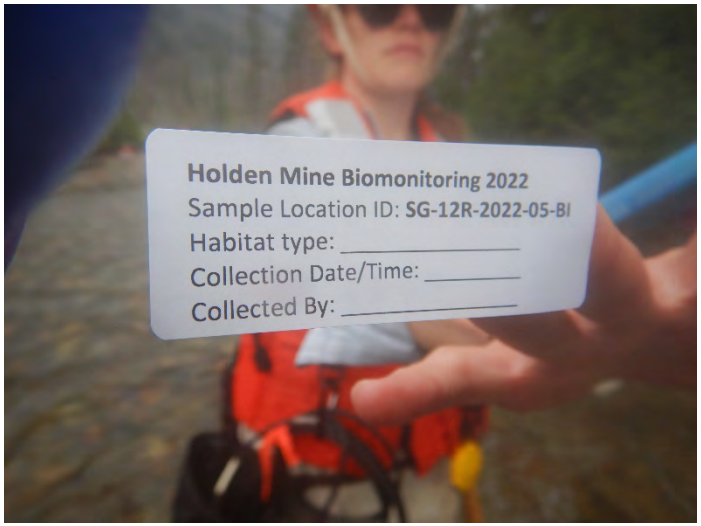


Photo 189 — Label for replicate 5 (SG-12R).

Photo 190 — Representative substrate in replicate 5 (SG-12R).

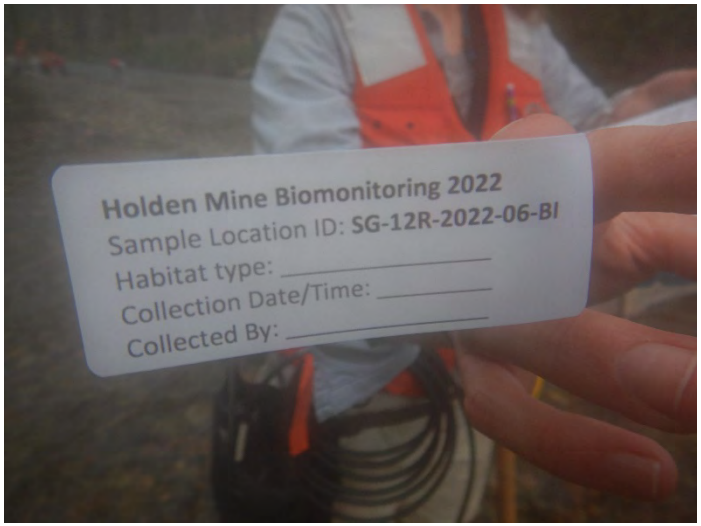


Photo 191 — Label for replicate 6 (SG-12R).

Photo 192 — Representative substrate in replicate 6 (SG-12R).

Photo 193 — Label for replicate 7 (SG-12R).

Photo 194 — Representative substrate in replicate 7 (SG-12R).

Photo 195 — Label for replicate 8 (SG-12R).

Photo 196 — Representative substrate in replicate 8 (SG-12R).

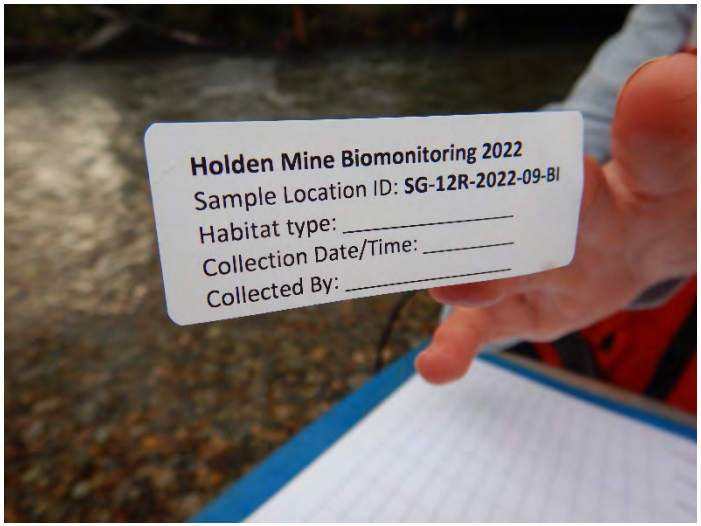


Photo 197 — Label for replicate 9 (SG-12R).

Photo 198 — Representative substrate in replicate 9 (SG-12R).

Photo 199 — Label for replicate 10 (SG-12R).

Photo 200 — Representative substrate in replicate 10 (SG-12R).

Photo 201 — Label for replicate 11 (SG-12R).

Photo 202 — Representative substrate in replicate 11 (SG-12R).

Photo 203 — Label for replicate 12 (SG-12R).

Photo 204 — Representative substrate in replicate 12 (SG-12R).

Photo 205 — Label for replicate 13 (SG-12R).

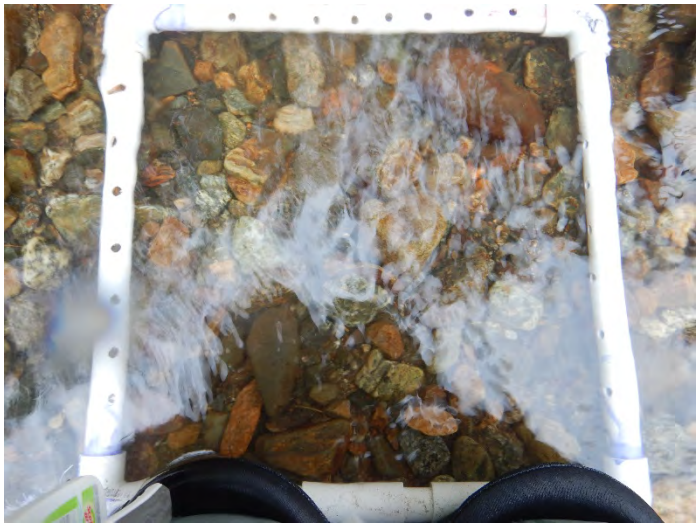


Photo 206 — Representative substrate in replicate 13 (SG-12R).

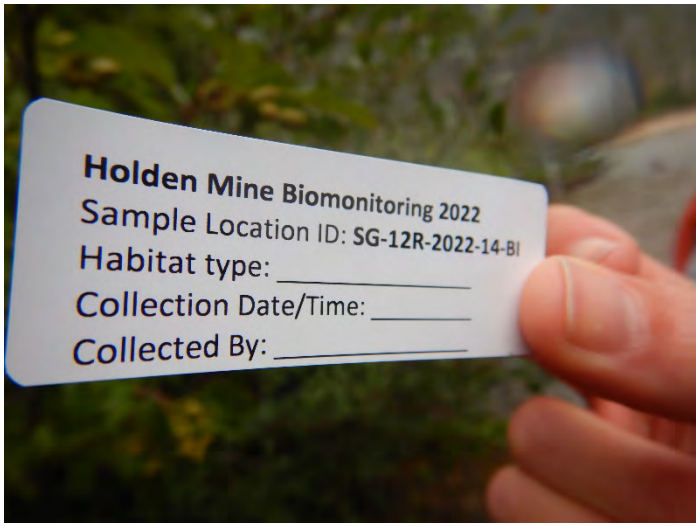


Photo 207— Label for replicate 14 (SG-12R).

Photo 208 — Representative substrate in replicate 14 (SG-12R).

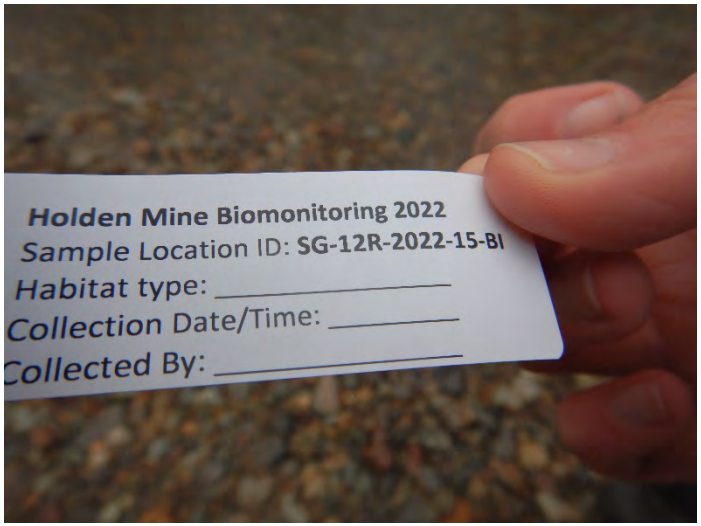


Photo 209 — Label for replicate 15 (SG-12R).

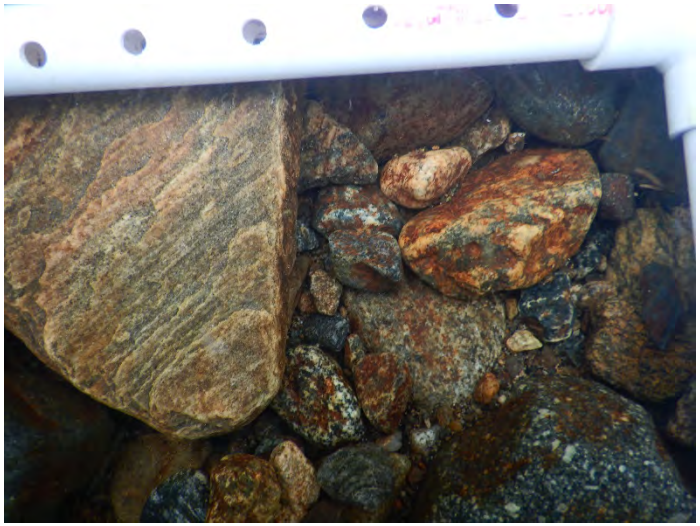


Photo 210 — Representative substrate in replicate 15 (SG-12R).

Overview Station Photos

Photo 211 — Upstream view of RC-6.

Photo 212 — Downstream view of RC-6.

Photo 213 — Upstream view of RC-1.

Photo 214 — Downstream view of RC-1.

Photo 215 — Upstream view of RC-4.

Photo 216 — Downstream view of RC-4.

Photo 217 — Upstream view of RC-2.

Photo 218 — Downstream view of RC-2.

Photo 219 — Upstream view of SG-9.

Photo 220 — Downstream view of SG-9.

Photo 221 — Upstream view of SG-12R.

Photo 222 — Downstream view of SG-12R.

Photo 223 — Upstream View of RC-10.

Photo 224 — Downstream view of RC-10.

Appendix C

Benthic Macroinvertebrate Raw Taxonomic Data

Taxonomy Long Output for 2022 Benthic Macroinvertebrate Data (ID by Aquatic Biology Associates)
Note: Abundance converted to per square meter.

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	2	2022-08-18	1	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	1	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	2	2022-08-18	1	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	2	2022-08-18	1	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	2	2022-08-18	1	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	2	2022-08-18	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	2	2022-08-18	1	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	1	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	2	2022-08-18	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	2	2022-08-18	1	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	2	2022-08-18	1	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	2	2022-08-18	1	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	2	2022-08-18	1	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	2	2022-08-18	1	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	1	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	236.72
Railroad Creek	2	2022-08-18	1	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	1	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	1	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	1	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	1	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	1	Simulium	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	SG12R	2022-08-18	1	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	SG12R	2022-08-18	1	Dolophilodes	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Philopotamidae	caddisflies	10.76
Railroad Creek	SG12R	2022-08-18	1	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	1	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	SG12R	2022-08-18	1	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	SG12R	2022-08-18	1	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	32.28
Railroad Creek	SG12R	2022-08-18	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	SG12R	2022-08-18	1	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	1	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	SG12R	2022-08-18	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	215.2
Railroad Creek	SG12R	2022-08-18	1	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	SG12R	2022-08-18	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	182.92
Railroad Creek	SG12R	2022-08-18	1	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	1	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	129.12
Railroad Creek	SG12R	2022-08-18	1	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	SG12R	2022-08-18	1	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	1	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	1	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	1	Lopescladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	SG12R	2022-08-18	1	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	1	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	SG12R	2022-08-18	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	591.8
Railroad Creek	SG12R	2022-08-18	1	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	1	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	1	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	32.28
Railroad Creek	4	2022-08-19	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	4	2022-08-19	1	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	1	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	1	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	4	2022-08-19	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	4	2022-08-19	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2022-08-19	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	4	2022-08-19	1	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	32.28
Railroad Creek	4	2022-08-19	1	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	4	2022-08-19	1	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	96.84
Railroad Creek	4	2022-08-19	1	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	1	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	1	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	1	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	1	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	1	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	4	2022-08-19	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	21.52
Railroad Creek	4	2022-08-19	1	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	75.32
Railroad Creek	4	2022-08-19	1	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	1	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	1	2022-08-20	1	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	1	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	1	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	1	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	1	2022-08-20	1	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2022-08-20	1	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	43.04
Railroad Creek	1	2022-08-20	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	1	2022-08-20	1	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	1	2022-08-20	1	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	1	2022-08-20	1	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	1	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2022-08-20	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	182.92
Railroad Creek	1	2022-08-20	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	247.48
Railroad Creek	1	2022-08-20	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	1	2022-08-20	1	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	32.28
Railroad Creek	1	2022-08-20	1	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	1	2022-08-20	1	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	1	2022-08-20	1	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2022-08-20	1	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	1	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	1	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	1	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	1	Trombidiformes	U	non-insect	Aquatic	Arachnida: Acari	Trombidiformes	x	mites	10.76
Railroad Creek	1	2022-08-20	1	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	1	2022-08-20	1	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	1	2022-08-20	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	172.16
Railroad Creek	1	2022-08-20	1	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	53.8
Railroad Creek	1	2022-08-20	1	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	1	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	32.28
Railroad Creek	10	2022-08-20	1	Rhyacophila verrula	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	1	Wiedemannia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2022-08-20	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	10	2022-08-20	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	10	2022-08-20	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	10	2022-08-20	1	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	10	2022-08-20	1	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	10	2022-08-20	1	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	21.52
Railroad Creek	10	2022-08-20	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	86.08
Railroad Creek	6	2022-08-21	1	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	1	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	6	2022-08-21	1	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	6	2022-08-21	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	75.32
Railroad Creek	6	2022-08-21	1	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	6	2022-08-21	1	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	1	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	1	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	1	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	32.28
Railroad Creek	SG09	2022-08-21	1	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	1	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	SG09	2022-08-21	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	SG09	2022-08-21	1	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	SG09	2022-08-21	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	SG09	2022-08-21	1	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	SG09	2022-08-21	1	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	SG09	2022-08-21	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	53.8
Railroad Creek	SG09	2022-08-21	1	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	1	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	2	2022-08-18	10	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	10	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	10	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	10	Neophylax	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	10	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	139.88
Railroad Creek	2	2022-08-18	10	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	2	2022-08-18	10	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	2	2022-08-18	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	96.84
Railroad Creek	2	2022-08-18	10	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	2	2022-08-18	10	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	10	Trombidiformes	U	non-insect	Aquatic	Arachnida: Acari	Trombidiformes	x	mites	10.76
Railroad Creek	2	2022-08-18	10	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	2	2022-08-18	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	21.52
Railroad Creek	2	2022-08-18	10	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	2	2022-08-18	10	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	10	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	10	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	10	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	SG12R	2022-08-18	10	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	SG12R	2022-08-18	10	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	SG12R	2022-08-18	10	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	SG12R	2022-08-18	10	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	SG12R	2022-08-18	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	SG12R	2022-08-18	10	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	10	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	10	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	SG12R	2022-08-18	10	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	21.52
Railroad Creek	SG12R	2022-08-18	10	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	10	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	4	2022-08-19	10	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	10	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	10	Dolophilodes	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Philopotamidae	caddisflies	21.52
Railroad Creek	4	2022-08-19	10	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	4	2022-08-19	10	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	10	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	10	Neophylax	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	10	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2022-08-19	10	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	32.28
Railroad Creek	4	2022-08-19	10	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	4	2022-08-19	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	4	2022-08-19	10	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	4	2022-08-19	10	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	10	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	4	2022-08-19	10	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	4	2022-08-19	10	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	279.76
Railroad Creek	4	2022-08-19	10	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2022-08-19	10	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	4	2022-08-19	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	86.08
Railroad Creek	4	2022-08-19	10	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	4	2022-08-19	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	4	2022-08-19	10	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	10	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	4	2022-08-19	10	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	4	2022-08-19	10	Oribatida	U	non-insect	Terrestrial	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2022-08-19	10	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	4	2022-08-19	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	32.28
Railroad Creek	4	2022-08-19	10	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	53.8
Railroad Creek	4	2022-08-19	10	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	4	2022-08-19	10	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	75.32
Railroad Creek	4	2022-08-19	10	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	4	2022-08-19	10	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	10	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	1	2022-08-20	10	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	10	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	10	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2022-08-20	10	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	1	2022-08-20	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	236.72
Railroad Creek	1	2022-08-20	10	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	10	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	10	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	1	2022-08-20	10	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	10	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2022-08-20	10	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	225.96
Railroad Creek	1	2022-08-20	10	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2022-08-20	10	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	1	2022-08-20	10	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	1	2022-08-20	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	1	2022-08-20	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2022-08-20	10	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	10	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	1	2022-08-20	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	247.48
Railroad Creek	1	2022-08-20	10	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	53.8
Railroad Creek	1	2022-08-20	10	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	1	2022-08-20	10	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	10	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2022-08-20	10	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	1	2022-08-20	10	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	10	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	10	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	10	2022-08-20	10	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	10	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2022-08-20	10	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	10	2022-08-20	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	10	2022-08-20	10	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	10	2022-08-20	10	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	10	2022-08-20	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	10	2022-08-20	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2022-08-20	10	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	10	2022-08-20	10	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	10	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	10	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	10	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2022-08-21	10	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2022-08-21	10	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	6	2022-08-21	10	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	6	2022-08-21	10	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	10	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	10	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	6	2022-08-21	10	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	43.04
Railroad Creek	6	2022-08-21	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	6	2022-08-21	10	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2022-08-21	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	6	2022-08-21	10	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	43.04
Railroad Creek	6	2022-08-21	10	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	118.36
Railroad Creek	SG09	2022-08-21	10	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	SG09	2022-08-21	10	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	10	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG09	2022-08-21	10	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG09	2022-08-21	10	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	SG09	2022-08-21	10	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	193.68
Railroad Creek	SG09	2022-08-21	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	SG09	2022-08-21	10	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	10	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	SG09	2022-08-21	10	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	225.96

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	SG09	2022-08-21	10	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	32.28
Railroad Creek	SG09	2022-08-21	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	SG09	2022-08-21	10	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	SG09	2022-08-21	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	225.96
Railroad Creek	SG09	2022-08-21	10	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	SG09	2022-08-21	10	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	10	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	10	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG09	2022-08-21	10	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	10	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG09	2022-08-21	10	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	SG09	2022-08-21	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	322.8
Railroad Creek	SG09	2022-08-21	10	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	32.28
Railroad Creek	SG09	2022-08-21	10	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	10	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	SG09	2022-08-21	10	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	10	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56
Railroad Creek	2	2022-08-18	11	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	86.08
Railroad Creek	2	2022-08-18	11	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	2	2022-08-18	11	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	2	2022-08-18	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	2	2022-08-18	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	290.52
Railroad Creek	2	2022-08-18	11	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2022-08-18	11	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	2	2022-08-18	11	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	11	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	11	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	SG12R	2022-08-18	11	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	SG12R	2022-08-18	11	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	SG12R	2022-08-18	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	139.88
Railroad Creek	SG12R	2022-08-18	11	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	258.24
Railroad Creek	SG12R	2022-08-18	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	SG12R	2022-08-18	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	SG12R	2022-08-18	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	SG12R	2022-08-18	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	SG12R	2022-08-18	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	279.76
Railroad Creek	SG12R	2022-08-18	11	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG12R	2022-08-18	11	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	11	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	11	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	11	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	SG12R	2022-08-18	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	53.8
Railroad Creek	SG12R	2022-08-18	11	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	11	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	11	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	11	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	SG12R	2022-08-18	11	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	SG12R	2022-08-18	11	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	11	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	11	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	4	2022-08-19	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	4	2022-08-19	11	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	4	2022-08-19	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	4	2022-08-19	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2022-08-19	11	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	4	2022-08-19	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	4	2022-08-19	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	269
Railroad Creek	4	2022-08-19	11	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	11	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	11	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	11	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	4	2022-08-19	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	43.04
Railroad Creek	4	2022-08-19	11	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	11	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	11	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	64.56
Railroad Creek	4	2022-08-19	11	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	11	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	11	Isoperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	11	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	1	2022-08-20	11	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	11	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	11	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	1	2022-08-20	11	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	1	2022-08-20	11	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	1	2022-08-20	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	193.68
Railroad Creek	1	2022-08-20	11	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	11	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	1	2022-08-20	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	344.32
Railroad Creek	1	2022-08-20	11	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2022-08-20	11	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2022-08-20	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	1	2022-08-20	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	1	2022-08-20	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	1	2022-08-20	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2022-08-20	11	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	269
Railroad Creek	1	2022-08-20	11	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	1	2022-08-20	11	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	1	2022-08-20	11	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	1	2022-08-20	11	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	11	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	10	2022-08-20	11	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	11	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2022-08-20	11	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2022-08-20	11	Neoplasta	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2022-08-20	11	Dolichopodidae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Dolichopodidae	long-legged flies	10.76
Railroad Creek	10	2022-08-20	11	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	64.56
Railroad Creek	10	2022-08-20	11	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	11	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	11	Siphlonurus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Siphlonuridae	mayflies	10.76
Railroad Creek	10	2022-08-20	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	10	2022-08-20	11	Paracladopelma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	21.52
Railroad Creek	10	2022-08-20	11	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	21.52
Railroad Creek	10	2022-08-20	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	1054.48
Railroad Creek	10	2022-08-20	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	430.4
Railroad Creek	10	2022-08-20	11	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	11	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2022-08-20	11	Heterotrissocladius marcidus group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	64.56
Railroad Creek	10	2022-08-20	11	Hydrobaenus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	11	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	10	2022-08-20	11	Psilometriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2022-08-20	11	Boreochlus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Podonominae	midges	10.76
Railroad Creek	10	2022-08-20	11	Zavrelimyia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	53.8
Railroad Creek	10	2022-08-20	11	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	64.56
Railroad Creek	10	2022-08-20	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	32.28
Railroad Creek	10	2022-08-20	11	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	32.28
Railroad Creek	10	2022-08-20	11	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	11	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	64.56
Railroad Creek	10	2022-08-20	11	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	21.52
Railroad Creek	6	2022-08-21	11	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	6	2022-08-21	11	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2022-08-21	11	Glutops	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Pelecorhynchidae	higher flies	10.76
Railroad Creek	6	2022-08-21	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	6	2022-08-21	11	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	6	2022-08-21	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	6	2022-08-21	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	6	2022-08-21	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2022-08-21	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2022-08-21	11	Parakiefferiella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	11	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	6	2022-08-21	11	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	21.52
Railroad Creek	6	2022-08-21	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	172.16
Railroad Creek	6	2022-08-21	11	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	11	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	11	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	6	2022-08-21	11	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	11	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	11	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG09	2022-08-21	11	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	43.04
Railroad Creek	SG09	2022-08-21	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	SG09	2022-08-21	11	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	11	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	SG09	2022-08-21	11	Epeorus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	SG09	2022-08-21	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	11	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	SG09	2022-08-21	11	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	10.76
Railroad Creek	SG09	2022-08-21	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG09	2022-08-21	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	215.2
Railroad Creek	SG09	2022-08-21	11	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	75.32
Railroad Creek	SG09	2022-08-21	11	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	SG09	2022-08-21	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	150.64
Railroad Creek	SG09	2022-08-21	11	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	11	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	11	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	11	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	11	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56
Railroad Creek	SG09	2022-08-21	11	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	12	Neophylax	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	12	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	2	2022-08-18	12	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	2	2022-08-18	12	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	2	2022-08-18	12	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	2	2022-08-18	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	2	2022-08-18	12	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	12	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	2	2022-08-18	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	182.92
Railroad Creek	2	2022-08-18	12	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	2	2022-08-18	12	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	2	2022-08-18	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	2	2022-08-18	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	2	2022-08-18	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	2	2022-08-18	12	Lopescladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	12	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2022-08-18	12	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	2	2022-08-18	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	150.64
Railroad Creek	2	2022-08-18	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	2	2022-08-18	12	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	12	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	12	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	SG12R	2022-08-18	12	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	SG12R	2022-08-18	12	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	12	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	SG12R	2022-08-18	12	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	182.92
Railroad Creek	SG12R	2022-08-18	12	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	12	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	SG12R	2022-08-18	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	75.32
Railroad Creek	SG12R	2022-08-18	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG12R	2022-08-18	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	SG12R	2022-08-18	12	Parakiefferiella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	12	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	12	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	96.84
Railroad Creek	SG12R	2022-08-18	12	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	12	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	12	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	12	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	12	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	32.28
Railroad Creek	4	2022-08-19	12	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	4	2022-08-19	12	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	4	2022-08-19	12	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	12	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	4	2022-08-19	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	4	2022-08-19	12	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	4	2022-08-19	12	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	12	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	4	2022-08-19	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	4	2022-08-19	12	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	527.24
Railroad Creek	4	2022-08-19	12	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	4	2022-08-19	12	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	301.28
Railroad Creek	4	2022-08-19	12	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	4	2022-08-19	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	4	2022-08-19	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	4	2022-08-19	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	4	2022-08-19	12	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	4	2022-08-19	12	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	96.84
Railroad Creek	4	2022-08-19	12	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	12	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	12	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	12	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	4	2022-08-19	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	225.96
Railroad Creek	4	2022-08-19	12	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	12	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	12	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	4	2022-08-19	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	118.36
Railroad Creek	4	2022-08-19	12	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	4	2022-08-19	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	139.88
Railroad Creek	4	2022-08-19	12	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	86.08
Railroad Creek	4	2022-08-19	12	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	21.52
Railroad Creek	4	2022-08-19	12	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	12	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	43.04
Railroad Creek	1	2022-08-20	12	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	139.88
Railroad Creek	1	2022-08-20	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	1	2022-08-20	12	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	12	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	12	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	12	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	1	2022-08-20	12	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2022-08-20	12	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	32.28
Railroad Creek	1	2022-08-20	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	1	2022-08-20	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	1	2022-08-20	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	204.44
Railroad Creek	1	2022-08-20	12	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	1	2022-08-20	12	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	12	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	12	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	12	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	75.32
Railroad Creek	1	2022-08-20	12	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	1	2022-08-20	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	21.52
Railroad Creek	1	2022-08-20	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	1	2022-08-20	12	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	12	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	12	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	10	2022-08-20	12	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	43.04
Railroad Creek	10	2022-08-20	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	10	2022-08-20	12	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	10	2022-08-20	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	10	2022-08-20	12	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	10	2022-08-20	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	10	2022-08-20	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	10	2022-08-20	12	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	12	Heterotrissocladius marcidus group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	12	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2022-08-20	12	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	10	2022-08-20	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	172.16
Railroad Creek	10	2022-08-20	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	12	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	10	2022-08-20	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2022-08-20	12	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	12	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	12	Neothremma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	12	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	6	2022-08-21	12	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	12	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	12	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	258.24
Railroad Creek	6	2022-08-21	12	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	12	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	12	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	21.52
Railroad Creek	6	2022-08-21	12	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	6	2022-08-21	12	Yoraperla mariana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Peltoperlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	12	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	12	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	64.56
Railroad Creek	SG09	2022-08-21	12	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	12	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	12	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	32.28
Railroad Creek	SG09	2022-08-21	12	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	12	Rhyacophila angelita group	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	12	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	53.8
Railroad Creek	SG09	2022-08-21	12	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG09	2022-08-21	12	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	43.04
Railroad Creek	SG09	2022-08-21	12	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	172.16
Railroad Creek	SG09	2022-08-21	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	139.88
Railroad Creek	SG09	2022-08-21	12	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	12	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	SG09	2022-08-21	12	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	12	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	SG09	2022-08-21	12	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	225.96
Railroad Creek	SG09	2022-08-21	12	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	12	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	43.04
Railroad Creek	SG09	2022-08-21	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	SG09	2022-08-21	12	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	10.76
Railroad Creek	SG09	2022-08-21	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	150.64
Railroad Creek	SG09	2022-08-21	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	1495.64
Railroad Creek	SG09	2022-08-21	12	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	SG09	2022-08-21	12	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	96.84
Railroad Creek	SG09	2022-08-21	12	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	SG09	2022-08-21	12	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG09	2022-08-21	12	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	12	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	12	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	12	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	12	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	12	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	12	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	SG09	2022-08-21	12	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	SG09	2022-08-21	12	Mideopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	SG09	2022-08-21	12	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	SG09	2022-08-21	12	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	SG09	2022-08-21	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	602.56
Railroad Creek	SG09	2022-08-21	12	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	53.8
Railroad Creek	SG09	2022-08-21	12	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	96.84
Railroad Creek	SG09	2022-08-21	12	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	12	Moselia	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	12	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	SG09	2022-08-21	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56
Railroad Creek	SG09	2022-08-21	12	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	12	Zapada oregonensis group	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	12	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	12	Isoperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	12	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	13	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	2	2022-08-18	13	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	2	2022-08-18	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	2	2022-08-18	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	2	2022-08-18	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	2	2022-08-18	13	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	2	2022-08-18	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	2	2022-08-18	13	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	2	2022-08-18	13	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	2	2022-08-18	13	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	13	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	32.28
Railroad Creek	SG12R	2022-08-18	13	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	32.28
Railroad Creek	SG12R	2022-08-18	13	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	SG12R	2022-08-18	13	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	64.56
Railroad Creek	SG12R	2022-08-18	13	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	SG12R	2022-08-18	13	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	13	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	SG12R	2022-08-18	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	13	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	SG12R	2022-08-18	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	SG12R	2022-08-18	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	301.28
Railroad Creek	SG12R	2022-08-18	13	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	13	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG12R	2022-08-18	13	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	13	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	13	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	SG12R	2022-08-18	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	828.52
Railroad Creek	SG12R	2022-08-18	13	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	43.04
Railroad Creek	SG12R	2022-08-18	13	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	13	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	13	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	129.12
Railroad Creek	SG12R	2022-08-18	13	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	13	Moselia	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	13	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	SG12R	2022-08-18	13	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	13	Isoperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	13	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	4	2022-08-19	13	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	4	2022-08-19	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	4	2022-08-19	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	484.2
Railroad Creek	4	2022-08-19	13	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	4	2022-08-19	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	419.64
Railroad Creek	4	2022-08-19	13	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	4	2022-08-19	13	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	86.08
Railroad Creek	4	2022-08-19	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	4	2022-08-19	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	129.12
Railroad Creek	4	2022-08-19	13	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	13	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	13	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	13	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	4	2022-08-19	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	21.52
Railroad Creek	4	2022-08-19	13	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	53.8
Railroad Creek	4	2022-08-19	13	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	64.56
Railroad Creek	4	2022-08-19	13	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	13	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	13	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	32.28
Railroad Creek	4	2022-08-19	13	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	13	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	129.12
Railroad Creek	1	2022-08-20	13	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	21.52
Railroad Creek	1	2022-08-20	13	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	1	2022-08-20	13	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	1	2022-08-20	13	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	1	2022-08-20	13	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	1	2022-08-20	13	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2022-08-20	13	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	32.28
Railroad Creek	1	2022-08-20	13	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	1	2022-08-20	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	204.44
Railroad Creek	1	2022-08-20	13	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	13	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	13	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	1	2022-08-20	13	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	13	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	1	2022-08-20	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	344.32
Railroad Creek	1	2022-08-20	13	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	1	2022-08-20	13	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	1	2022-08-20	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	1	2022-08-20	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2022-08-20	13	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2022-08-20	13	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	13	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	21.52
Railroad Creek	1	2022-08-20	13	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	1	2022-08-20	13	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	13	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2022-08-20	13	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	172.16
Railroad Creek	1	2022-08-20	13	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	13	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	21.52
Railroad Creek	10	2022-08-20	13	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	10	2022-08-20	13	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	13	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2022-08-20	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	10	2022-08-20	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	10	2022-08-20	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	10	2022-08-20	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	10	2022-08-20	13	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	10	2022-08-20	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2022-08-20	13	Symbiocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	387.36
Railroad Creek	10	2022-08-20	13	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	13	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	6	2022-08-21	13	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	13	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	13	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	6	2022-08-21	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	6	2022-08-21	13	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	6	2022-08-21	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	6	2022-08-21	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	6	2022-08-21	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	6	2022-08-21	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2022-08-21	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2022-08-21	13	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	161.4
Railroad Creek	6	2022-08-21	13	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	6	2022-08-21	13	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	13	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	13	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	SG09	2022-08-21	13	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	13	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	13	Neothremma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	13	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG09	2022-08-21	13	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	SG09	2022-08-21	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	129.12
Railroad Creek	SG09	2022-08-21	13	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	13	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	13	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	SG09	2022-08-21	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	365.84
Railroad Creek	SG09	2022-08-21	13	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	SG09	2022-08-21	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	SG09	2022-08-21	13	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	13	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	SG09	2022-08-21	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG09	2022-08-21	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	86.08
Railroad Creek	SG09	2022-08-21	13	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	13	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG09	2022-08-21	13	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	13	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	13	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	SG09	2022-08-21	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	451.92
Railroad Creek	SG09	2022-08-21	13	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	13	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	13	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	13	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	SG09	2022-08-21	13	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	SG09	2022-08-21	13	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	14	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	2	2022-08-18	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	2	2022-08-18	14	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	2	2022-08-18	14	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	2	2022-08-18	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	2	2022-08-18	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	2	2022-08-18	14	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	2	2022-08-18	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	2	2022-08-18	14	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	2	2022-08-18	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	225.96
Railroad Creek	2	2022-08-18	14	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	14	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	2	2022-08-18	14	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2022-08-18	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	53.8
Railroad Creek	2	2022-08-18	14	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	14	Moselia	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	2	2022-08-18	14	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	14	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	14	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	SG12R	2022-08-18	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	SG12R	2022-08-18	14	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	SG12R	2022-08-18	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	SG12R	2022-08-18	14	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	SG12R	2022-08-18	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	SG12R	2022-08-18	14	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG12R	2022-08-18	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG12R	2022-08-18	14	Synorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	14	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	SG12R	2022-08-18	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	96.84
Railroad Creek	SG12R	2022-08-18	14	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	14	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	14	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	14	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2022-08-19	14	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	32.28
Railroad Creek	4	2022-08-19	14	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	53.8
Railroad Creek	4	2022-08-19	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	4	2022-08-19	14	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	4	2022-08-19	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	4	2022-08-19	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	4	2022-08-19	14	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	4	2022-08-19	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	4	2022-08-19	14	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	236.72
Railroad Creek	4	2022-08-19	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	247.48
Railroad Creek	4	2022-08-19	14	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	14	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	14	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	4	2022-08-19	14	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	14	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	4	2022-08-19	14	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	14	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	14	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	4	2022-08-19	14	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	53.8
Railroad Creek	4	2022-08-19	14	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	4	2022-08-19	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	86.08
Railroad Creek	4	2022-08-19	14	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	32.28
Railroad Creek	4	2022-08-19	14	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	14	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	107.6
Railroad Creek	4	2022-08-19	14	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	4	2022-08-19	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	14	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	14	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	14	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	14	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	14	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	14	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	1	2022-08-20	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	172.16
Railroad Creek	1	2022-08-20	14	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	1	2022-08-20	14	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	1	2022-08-20	14	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	1	2022-08-20	14	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	1	2022-08-20	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2022-08-20	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	1	2022-08-20	14	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	14	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	1	2022-08-20	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	14	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2022-08-20	14	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	10	2022-08-20	14	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2022-08-20	14	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2022-08-20	14	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	10	2022-08-20	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	118.36
Railroad Creek	10	2022-08-20	14	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	10	2022-08-20	14	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	10	2022-08-20	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	215.2
Railroad Creek	10	2022-08-20	14	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2022-08-20	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	10	2022-08-20	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	10	2022-08-20	14	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	10	2022-08-20	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	225.96
Railroad Creek	10	2022-08-20	14	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	14	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	14	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	14	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	10	2022-08-20	14	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	10	2022-08-20	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	494.96
Railroad Creek	10	2022-08-20	14	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	10	2022-08-20	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	10	2022-08-20	14	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2022-08-20	14	Frisonia picticeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	14	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	6	2022-08-21	14	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	21.52
Railroad Creek	6	2022-08-21	14	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	14	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	14	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2022-08-21	14	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	6	2022-08-21	14	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	6	2022-08-21	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	6	2022-08-21	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	75.32
Railroad Creek	6	2022-08-21	14	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	6	2022-08-21	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	6	2022-08-21	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	6	2022-08-21	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	6	2022-08-21	14	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	6	2022-08-21	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2022-08-21	14	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	6	2022-08-21	14	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	6	2022-08-21	14	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	21.52
Railroad Creek	6	2022-08-21	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	64.56
Railroad Creek	6	2022-08-21	14	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	14	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2022-08-21	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	14	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2022-08-21	14	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	14	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	SG09	2022-08-21	14	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	14	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	43.04
Railroad Creek	SG09	2022-08-21	14	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	SG09	2022-08-21	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	312.04
Railroad Creek	SG09	2022-08-21	14	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	14	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	SG09	2022-08-21	14	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	SG09	2022-08-21	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	290.52
Railroad Creek	SG09	2022-08-21	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	355.08
Railroad Creek	SG09	2022-08-21	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	SG09	2022-08-21	14	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	SG09	2022-08-21	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	SG09	2022-08-21	14	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	SG09	2022-08-21	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	236.72
Railroad Creek	SG09	2022-08-21	14	Diamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	SG09	2022-08-21	14	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	118.36
Railroad Creek	SG09	2022-08-21	14	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	SG09	2022-08-21	14	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG09	2022-08-21	14	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	14	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	14	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	14	Stilocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	14	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	SG09	2022-08-21	14	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	SG09	2022-08-21	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	1301.96
Railroad Creek	SG09	2022-08-21	14	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	32.28
Railroad Creek	SG09	2022-08-21	14	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	SG09	2022-08-21	14	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	14	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	86.08
Railroad Creek	SG09	2022-08-21	14	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	75.32
Railroad Creek	SG09	2022-08-21	14	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	14	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	53.8
Railroad Creek	2	2022-08-18	15	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	15	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	2	2022-08-18	15	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	2	2022-08-18	15	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	2	2022-08-18	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	2	2022-08-18	15	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	2	2022-08-18	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	355.08
Railroad Creek	2	2022-08-18	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	2	2022-08-18	15	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	2	2022-08-18	15	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	2	2022-08-18	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	2	2022-08-18	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	2	2022-08-18	15	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	2	2022-08-18	15	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	15	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	21.52
Railroad Creek	2	2022-08-18	15	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	2	2022-08-18	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	290.52
Railroad Creek	2	2022-08-18	15	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	64.56
Railroad Creek	2	2022-08-18	15	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	2	2022-08-18	15	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	15	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	15	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	15	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	SG12R	2022-08-18	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	75.32
Railroad Creek	SG12R	2022-08-18	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	SG12R	2022-08-18	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	SG12R	2022-08-18	15	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	SG12R	2022-08-18	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	SG12R	2022-08-18	15	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	SG12R	2022-08-18	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	SG12R	2022-08-18	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG12R	2022-08-18	15	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	322.8
Railroad Creek	SG12R	2022-08-18	15	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	21.52
Railroad Creek	4	2022-08-19	15	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	15	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	15	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	4	2022-08-19	15	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	4	2022-08-19	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	4	2022-08-19	15	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2022-08-19	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	4	2022-08-19	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	451.92
Railroad Creek	4	2022-08-19	15	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	4	2022-08-19	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	4	2022-08-19	15	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	4	2022-08-19	15	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	4	2022-08-19	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	4	2022-08-19	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	4	2022-08-19	15	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	15	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	15	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	15	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	161.4
Railroad Creek	4	2022-08-19	15	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	75.32
Railroad Creek	4	2022-08-19	15	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	15	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	4	2022-08-19	15	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	15	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	1	2022-08-20	15	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	53.8
Railroad Creek	1	2022-08-20	15	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	15	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2022-08-20	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	129.12
Railroad Creek	1	2022-08-20	15	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	15	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	1	2022-08-20	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	408.88
Railroad Creek	1	2022-08-20	15	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2022-08-20	15	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2022-08-20	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	1	2022-08-20	15	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	1	2022-08-20	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	1	2022-08-20	15	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	15	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	1	2022-08-20	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	301.28
Railroad Creek	1	2022-08-20	15	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	1	2022-08-20	15	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	15	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	15	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	10	2022-08-20	15	Dolophilodes	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Philopotamidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	15	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	15	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	15	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	43.04
Railroad Creek	10	2022-08-20	15	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2022-08-20	15	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	10	2022-08-20	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	139.88
Railroad Creek	10	2022-08-20	15	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	15	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	15	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	10	2022-08-20	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	312.04
Railroad Creek	10	2022-08-20	15	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2022-08-20	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	10	2022-08-20	15	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	10	2022-08-20	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2022-08-20	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	10	2022-08-20	15	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	15	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	15	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	10	2022-08-20	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	581.04
Railroad Creek	10	2022-08-20	15	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	15	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	10	2022-08-20	15	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	10	2022-08-20	15	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56
Railroad Creek	10	2022-08-20	15	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	10	2022-08-20	15	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	15	Frisonia picticeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	15	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	86.08
Railroad Creek	6	2022-08-21	15	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	15	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	15	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	15	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2022-08-21	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	6	2022-08-21	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	6	2022-08-21	15	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	6	2022-08-21	15	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	15	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	6	2022-08-21	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	6	2022-08-21	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	6	2022-08-21	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	6	2022-08-21	15	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	118.36
Railroad Creek	6	2022-08-21	15	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	15	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	15	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	15	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	SG09	2022-08-21	15	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	15	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	15	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	15	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	SG09	2022-08-21	15	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	SG09	2022-08-21	15	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	SG09	2022-08-21	15	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	107.6
Railroad Creek	SG09	2022-08-21	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	96.84
Railroad Creek	SG09	2022-08-21	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	15	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	15	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	15	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	SG09	2022-08-21	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	SG09	2022-08-21	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	344.32
Railroad Creek	SG09	2022-08-21	15	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	SG09	2022-08-21	15	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	SG09	2022-08-21	15	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	10.76
Railroad Creek	SG09	2022-08-21	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	SG09	2022-08-21	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	258.24
Railroad Creek	SG09	2022-08-21	15	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	86.08
Railroad Creek	SG09	2022-08-21	15	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	SG09	2022-08-21	15	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	15	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	15	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	15	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	43.04
Railroad Creek	SG09	2022-08-21	15	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	21.52
Railroad Creek	SG09	2022-08-21	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	118.36
Railroad Creek	SG09	2022-08-21	15	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	64.56
Railroad Creek	SG09	2022-08-21	15	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	15	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	SG09	2022-08-21	15	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	SG09	2022-08-21	15	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	SG09	2022-08-21	15	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	15	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	2	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	2	2022-08-18	2	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	2	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	2	2022-08-18	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	2	2022-08-18	2	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	2	2022-08-18	2	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	2	2022-08-18	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	2	2022-08-18	2	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	2	2022-08-18	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	2	2022-08-18	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	301.28
Railroad Creek	2	2022-08-18	2	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	2	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	2	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	2	2022-08-18	2	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	2	2022-08-18	2	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	2	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	2	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	2	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	SG12R	2022-08-18	2	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	SG12R	2022-08-18	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	SG12R	2022-08-18	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	SG12R	2022-08-18	2	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	SG12R	2022-08-18	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG12R	2022-08-18	2	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	SG12R	2022-08-18	2	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	SG12R	2022-08-18	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	43.04
Railroad Creek	SG12R	2022-08-18	2	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	2	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	2	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	64.56
Railroad Creek	SG12R	2022-08-18	2	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	2	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	2	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	2	Neothremma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	2	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	4	2022-08-19	2	Neoplasta	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	4	2022-08-19	2	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	4	2022-08-19	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	4	2022-08-19	2	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2022-08-19	2	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	4	2022-08-19	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	4	2022-08-19	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	4	2022-08-19	2	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	32.28
Railroad Creek	4	2022-08-19	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	4	2022-08-19	2	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	4	2022-08-19	2	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	2	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	2	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	75.32
Railroad Creek	4	2022-08-19	2	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	4	2022-08-19	2	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	4	2022-08-19	2	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	64.56
Railroad Creek	4	2022-08-19	2	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	75.32
Railroad Creek	4	2022-08-19	2	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2022-08-20	2	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	1	2022-08-20	2	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	2	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	2	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	1	2022-08-20	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	1	2022-08-20	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	182.92
Railroad Creek	1	2022-08-20	2	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	1	2022-08-20	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2022-08-20	2	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	1	2022-08-20	2	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	2	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	2	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	2	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	1	2022-08-20	2	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	2	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	1	2022-08-20	2	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	2	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	2	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	2	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	2	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2022-08-20	2	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	10	2022-08-20	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	75.32
Railroad Creek	10	2022-08-20	2	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	10	2022-08-20	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	10	2022-08-20	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2022-08-20	2	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2022-08-20	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	64.56
Railroad Creek	10	2022-08-20	2	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2022-08-20	2	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	2	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	2	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	6	2022-08-21	2	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	32.28
Railroad Creek	6	2022-08-21	2	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	2	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	2	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	2	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	2	Neothremma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	2	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	6	2022-08-21	2	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	6	2022-08-21	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	6	2022-08-21	2	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	6	2022-08-21	2	Trombidiformes	U	non-insect	Aquatic	Arachnida: Acari	Trombidiformes	x	mites	10.76
Railroad Creek	6	2022-08-21	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	75.32
Railroad Creek	6	2022-08-21	2	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	2	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	SG09	2022-08-21	2	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	SG09	2022-08-21	2	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	SG09	2022-08-21	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	SG09	2022-08-21	2	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	2	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	SG09	2022-08-21	2	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	32.28
Railroad Creek	SG09	2022-08-21	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG09	2022-08-21	2	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	SG09	2022-08-21	2	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	SG09	2022-08-21	2	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	SG09	2022-08-21	2	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	2	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	21.52
Railroad Creek	SG09	2022-08-21	2	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	SG09	2022-08-21	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	355.08
Railroad Creek	SG09	2022-08-21	2	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	2	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	2	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	64.56
Railroad Creek	SG09	2022-08-21	2	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	3	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	2	2022-08-18	3	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	2	2022-08-18	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	2	2022-08-18	3	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	2	2022-08-18	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	279.76
Railroad Creek	2	2022-08-18	3	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	2	2022-08-18	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	2	2022-08-18	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	2	2022-08-18	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	2	2022-08-18	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	2	2022-08-18	3	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	2	2022-08-18	3	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	3	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2022-08-18	3	Lopescladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	3	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	3	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	3	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2022-08-18	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	279.76
Railroad Creek	2	2022-08-18	3	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	3	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	2	2022-08-18	3	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	2	2022-08-18	3	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	3	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	3	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	3	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	3	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	SG12R	2022-08-18	3	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	SG12R	2022-08-18	3	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	SG12R	2022-08-18	3	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	3	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	SG12R	2022-08-18	3	Trepaxonemata	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	x	flat worms	10.76
Railroad Creek	SG12R	2022-08-18	3	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	64.56
Railroad Creek	SG12R	2022-08-18	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	SG12R	2022-08-18	3	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	3	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	SG12R	2022-08-18	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	172.16
Railroad Creek	SG12R	2022-08-18	3	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	10.76
Railroad Creek	SG12R	2022-08-18	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	SG12R	2022-08-18	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	215.2
Railroad Creek	SG12R	2022-08-18	3	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	3	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	3	Lopescladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG12R	2022-08-18	3	Parakiefferiella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	SG12R	2022-08-18	3	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	3	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	SG12R	2022-08-18	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	462.68
Railroad Creek	SG12R	2022-08-18	3	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	3	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	3	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	3	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	75.32
Railroad Creek	SG12R	2022-08-18	3	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	3	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	4	2022-08-19	3	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	4	2022-08-19	3	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2022-08-19	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	4	2022-08-19	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	4	2022-08-19	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2022-08-19	3	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	4	2022-08-19	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	4	2022-08-19	3	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	3	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	3	Synorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	3	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	4	2022-08-19	3	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2022-08-19	3	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	3	Dolophilodes	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Philopotamidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	3	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	3	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2022-08-20	3	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2022-08-20	3	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2022-08-20	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	1	2022-08-20	3	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	3	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	1	2022-08-20	3	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	1	2022-08-20	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	1	2022-08-20	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	1	2022-08-20	3	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	43.04
Railroad Creek	1	2022-08-20	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	1	2022-08-20	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	1	2022-08-20	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	1	2022-08-20	3	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	3	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2022-08-20	3	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	1	2022-08-20	3	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	1	2022-08-20	3	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	1	2022-08-20	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	355.08
Railroad Creek	1	2022-08-20	3	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	3	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	1	2022-08-20	3	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	3	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	3	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	10	2022-08-20	3	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	10	2022-08-20	3	Neothremma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	3	Trepaxonemata	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	x	flat worms	10.76
Railroad Creek	10	2022-08-20	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	118.36
Railroad Creek	10	2022-08-20	3	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	10	2022-08-20	3	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	10	2022-08-20	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	301.28
Railroad Creek	10	2022-08-20	3	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2022-08-20	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	10	2022-08-20	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	10	2022-08-20	3	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	204.44
Railroad Creek	10	2022-08-20	3	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	3	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	43.04
Railroad Creek	6	2022-08-21	3	Micrasema	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Brachycentridae	caddisflies	10.76
Railroad Creek	6	2022-08-21	3	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	96.84
Railroad Creek	6	2022-08-21	3	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	3	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	3	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	3	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	3	Neoplasta	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	6	2022-08-21	3	Glutops	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Pelecorhynchidae	higher flies	10.76
Railroad Creek	6	2022-08-21	3	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	3	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	6	2022-08-21	3	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	3	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	6	2022-08-21	3	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2022-08-21	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	6	2022-08-21	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2022-08-21	3	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	6	2022-08-21	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	32.28
Railroad Creek	6	2022-08-21	3	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2022-08-21	3	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	3	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	SG09	2022-08-21	3	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	3	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	SG09	2022-08-21	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	SG09	2022-08-21	3	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	SG09	2022-08-21	3	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	SG09	2022-08-21	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	SG09	2022-08-21	3	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	SG09	2022-08-21	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	SG09	2022-08-21	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG09	2022-08-21	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	SG09	2022-08-21	3	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG09	2022-08-21	3	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	3	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	3	Lopescladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG09	2022-08-21	3	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	3	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	SG09	2022-08-21	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	75.32
Railroad Creek	SG09	2022-08-21	3	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	3	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	3	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	4	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	4	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	2	2022-08-18	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	2	2022-08-18	4	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	2	2022-08-18	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	182.92
Railroad Creek	2	2022-08-18	4	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	2	2022-08-18	4	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	2	2022-08-18	4	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	2	2022-08-18	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	2	2022-08-18	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	2	2022-08-18	4	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	4	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	172.16
Railroad Creek	2	2022-08-18	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	4	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	4	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	SG12R	2022-08-18	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	SG12R	2022-08-18	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	SG12R	2022-08-18	4	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	SG12R	2022-08-18	4	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	SG12R	2022-08-18	4	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	SG12R	2022-08-18	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG12R	2022-08-18	4	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	225.96
Railroad Creek	SG12R	2022-08-18	4	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	4	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	4	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	4	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	4	2022-08-19	4	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	64.56
Railroad Creek	4	2022-08-19	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	4	2022-08-19	4	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2022-08-19	4	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	75.32
Railroad Creek	4	2022-08-19	4	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	4	2022-08-19	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	4	2022-08-19	4	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	4	2022-08-19	4	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	4	2022-08-19	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	4	2022-08-19	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	172.16
Railroad Creek	4	2022-08-19	4	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	4	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	4	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	4	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	4	Synorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	4	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	4	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	4	2022-08-19	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	96.84
Railroad Creek	4	2022-08-19	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	4	2022-08-19	4	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	4	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	4	2022-08-19	4	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	4	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	1	2022-08-20	4	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	4	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	4	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	4	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2022-08-20	4	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	1	2022-08-20	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	1	2022-08-20	4	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	1	2022-08-20	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	225.96
Railroad Creek	1	2022-08-20	4	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	1	2022-08-20	4	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	1	2022-08-20	4	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	1	2022-08-20	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2022-08-20	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	86.08
Railroad Creek	1	2022-08-20	4	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2022-08-20	4	Parakiefferiella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	4	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	4	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	4	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	1	2022-08-20	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	258.24
Railroad Creek	1	2022-08-20	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	1	2022-08-20	4	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2022-08-20	4	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	10	2022-08-20	4	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	4	Eloeophila	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2022-08-20	4	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2022-08-20	4	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	10	2022-08-20	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	75.32
Railroad Creek	10	2022-08-20	4	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	4	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	4	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	10	2022-08-20	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	10	2022-08-20	4	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2022-08-20	4	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	10	2022-08-20	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2022-08-20	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	10	2022-08-20	4	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	75.32
Railroad Creek	10	2022-08-20	4	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2022-08-20	4	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	4	Helodon/Prosimulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	6	2022-08-21	4	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	6	2022-08-21	4	Agraylea	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	4	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	4	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	6	2022-08-21	4	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	6	2022-08-21	4	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	6	2022-08-21	4	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	6	2022-08-21	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	6	2022-08-21	4	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	4	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	4	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	6	2022-08-21	4	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	6	2022-08-21	4	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2022-08-21	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2022-08-21	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	6	2022-08-21	4	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	6	2022-08-21	4	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	6	2022-08-21	4	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	6	2022-08-21	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2022-08-21	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	6	2022-08-21	4	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	6	2022-08-21	4	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	6	2022-08-21	4	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2022-08-21	4	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	4	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	21.52
Railroad Creek	6	2022-08-21	4	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	4	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	64.56
Railroad Creek	SG09	2022-08-21	4	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	4	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	4	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	SG09	2022-08-21	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	SG09	2022-08-21	4	Limnophyes	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	4	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	32.28
Railroad Creek	SG09	2022-08-21	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	4	Zapada	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	5	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	2	2022-08-18	5	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	2	2022-08-18	5	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	2	2022-08-18	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	2	2022-08-18	5	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	2	2022-08-18	5	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2022-08-18	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	32.28
Railroad Creek	2	2022-08-18	5	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	5	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	5	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	5	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	SG12R	2022-08-18	5	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	SG12R	2022-08-18	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	SG12R	2022-08-18	5	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	SG12R	2022-08-18	5	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	SG12R	2022-08-18	5	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	SG12R	2022-08-18	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG12R	2022-08-18	5	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG12R	2022-08-18	5	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	5	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	5	Lopescladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG12R	2022-08-18	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	96.84
Railroad Creek	SG12R	2022-08-18	5	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	5	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	5	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	SG12R	2022-08-18	5	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	5	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	4	2022-08-19	5	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	5	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	5	Rhyacophila vagrita group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	32.28
Railroad Creek	4	2022-08-19	5	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	53.8

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	4	2022-08-19	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	4	2022-08-19	5	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	4	2022-08-19	5	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	5	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	4	2022-08-19	5	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	355.08
Railroad Creek	4	2022-08-19	5	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	75.32
Railroad Creek	4	2022-08-19	5	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	64.56
Railroad Creek	4	2022-08-19	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	4	2022-08-19	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	4	2022-08-19	5	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	32.28
Railroad Creek	4	2022-08-19	5	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	4	2022-08-19	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	4	2022-08-19	5	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	4	2022-08-19	5	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	4	2022-08-19	5	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	5	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	5	Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	5	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	118.36
Railroad Creek	4	2022-08-19	5	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	290.52
Railroad Creek	4	2022-08-19	5	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	5	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	32.28
Railroad Creek	4	2022-08-19	5	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2022-08-19	5	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	4	2022-08-19	5	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	32.28
Railroad Creek	4	2022-08-19	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	279.76
Railroad Creek	4	2022-08-19	5	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	5	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	4	2022-08-19	5	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	4	2022-08-19	5	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	118.36
Railroad Creek	4	2022-08-19	5	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	118.36
Railroad Creek	4	2022-08-19	5	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	5	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	5	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	5	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	53.8
Railroad Creek	1	2022-08-20	5	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	1	2022-08-20	5	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	43.04
Railroad Creek	1	2022-08-20	5	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	1	2022-08-20	5	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	1	2022-08-20	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	1	2022-08-20	5	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	5	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	1	2022-08-20	5	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2022-08-20	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	1	2022-08-20	5	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	1	2022-08-20	5	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	1	2022-08-20	5	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	613.32
Railroad Creek	1	2022-08-20	5	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	53.8
Railroad Creek	1	2022-08-20	5	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	1	2022-08-20	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	1	2022-08-20	5	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	1	2022-08-20	5	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	1	2022-08-20	5	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	1	2022-08-20	5	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	1	2022-08-20	5	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	1	2022-08-20	5	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	1	2022-08-20	5	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	1	2022-08-20	5	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	75.32
Railroad Creek	1	2022-08-20	5	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	5	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2022-08-20	5	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	150.64
Railroad Creek	1	2022-08-20	5	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	5	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	5	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	21.52
Railroad Creek	10	2022-08-20	5	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	10	2022-08-20	5	Simulium	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	32.28
Railroad Creek	10	2022-08-20	5	Rhyacophila	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	5	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	10	2022-08-20	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	10	2022-08-20	5	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	10	2022-08-20	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	10	2022-08-20	5	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2022-08-20	5	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	10	2022-08-20	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	161.4
Railroad Creek	6	2022-08-21	5	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	32.28
Railroad Creek	6	2022-08-21	5	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	5	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	5	Rhyacophila verrula	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	5	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2022-08-21	5	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	6	2022-08-21	5	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	6	2022-08-21	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	6	2022-08-21	5	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	5	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	5	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	6	2022-08-21	5	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	6	2022-08-21	5	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	6	2022-08-21	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2022-08-21	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	6	2022-08-21	5	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	6	2022-08-21	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	6	2022-08-21	5	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	6	2022-08-21	5	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	5	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	5	Pseudorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	5	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	6	2022-08-21	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	21.52
Railroad Creek	6	2022-08-21	5	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	5	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	5	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	75.32
Railroad Creek	6	2022-08-21	5	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	21.52
Railroad Creek	6	2022-08-21	5	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	5	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	21.52
Railroad Creek	SG09	2022-08-21	5	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	21.52
Railroad Creek	SG09	2022-08-21	5	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	SG09	2022-08-21	5	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	SG09	2022-08-21	5	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	SG09	2022-08-21	5	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	419.64
Railroad Creek	SG09	2022-08-21	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	SG09	2022-08-21	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	SG09	2022-08-21	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	5	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	SG09	2022-08-21	5	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	SG09	2022-08-21	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	SG09	2022-08-21	5	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	408.88
Railroad Creek	SG09	2022-08-21	5	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	SG09	2022-08-21	5	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	5	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	5	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	SG09	2022-08-21	5	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	21.52
Railroad Creek	SG09	2022-08-21	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	75.32
Railroad Creek	SG09	2022-08-21	5	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	5	Paraperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	5	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	5	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	5	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	SG09	2022-08-21	5	Zapada oregonensis group	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	6	Lepidostoma-panel case larvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	6	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	107.6
Railroad Creek	2	2022-08-18	6	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	2	2022-08-18	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	2	2022-08-18	6	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	2	2022-08-18	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	2	2022-08-18	6	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	10.76
Railroad Creek	2	2022-08-18	6	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	225.96
Railroad Creek	2	2022-08-18	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	322.8
Railroad Creek	2	2022-08-18	6	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	2	2022-08-18	6	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	2	2022-08-18	6	Heterotrissocladius marcidus group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2022-08-18	6	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	6	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2022-08-18	6	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2022-08-18	6	Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	10.76
Railroad Creek	2	2022-08-18	6	Zavrelimyia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	10.76
Railroad Creek	2	2022-08-18	6	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	21.52
Railroad Creek	2	2022-08-18	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	215.2
Railroad Creek	2	2022-08-18	6	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	118.36
Railroad Creek	2	2022-08-18	6	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	2	2022-08-18	6	Zapada frigida	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	6	Rhyacophila	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	SG12R	2022-08-18	6	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	SG12R	2022-08-18	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	SG12R	2022-08-18	6	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	SG12R	2022-08-18	6	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	6	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	SG12R	2022-08-18	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	236.72
Railroad Creek	SG12R	2022-08-18	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	322.8
Railroad Creek	SG12R	2022-08-18	6	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	SG12R	2022-08-18	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	SG12R	2022-08-18	6	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	SG12R	2022-08-18	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	129.12
Railroad Creek	SG12R	2022-08-18	6	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	6	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	6	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	SG12R	2022-08-18	6	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	SG12R	2022-08-18	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	53.8
Railroad Creek	SG12R	2022-08-18	6	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	6	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	6	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	SG12R	2022-08-18	6	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	6	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	6	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	6	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	6	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	4	2022-08-19	6	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	6	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	4	2022-08-19	6	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	4	2022-08-19	6	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2022-08-19	6	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	43.04
Railroad Creek	4	2022-08-19	6	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	4	2022-08-19	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	4	2022-08-19	6	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	6	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	4	2022-08-19	6	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	4	2022-08-19	6	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	4	2022-08-19	6	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2022-08-19	6	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2022-08-19	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	4	2022-08-19	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	376.6
Railroad Creek	4	2022-08-19	6	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2022-08-19	6	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	96.84
Railroad Creek	4	2022-08-19	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	75.32
Railroad Creek	4	2022-08-19	6	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	86.08
Railroad Creek	4	2022-08-19	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	4	2022-08-19	6	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	4	2022-08-19	6	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	4	2022-08-19	6	Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	6	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	6	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	4	2022-08-19	6	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	6	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	4	2022-08-19	6	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	6	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	6	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	4	2022-08-19	6	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2022-08-19	6	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2022-08-19	6	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	4	2022-08-19	6	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	4	2022-08-19	6	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	4	2022-08-19	6	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	4	2022-08-19	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	301.28
Railroad Creek	4	2022-08-19	6	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	4	2022-08-19	6	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	75.32
Railroad Creek	4	2022-08-19	6	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	21.52
Railroad Creek	4	2022-08-19	6	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	118.36
Railroad Creek	4	2022-08-19	6	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	225.96
Railroad Creek	4	2022-08-19	6	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	4	2022-08-19	6	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	4	2022-08-19	6	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	6	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	6	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	6	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	1	2022-08-20	6	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	6	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	6	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	1	2022-08-20	6	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2022-08-20	6	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	86.08
Railroad Creek	1	2022-08-20	6	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	1	2022-08-20	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	1	2022-08-20	6	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	6	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	1	2022-08-20	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	1	2022-08-20	6	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	1	2022-08-20	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	1	2022-08-20	6	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	1	2022-08-20	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	613.32
Railroad Creek	1	2022-08-20	6	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	6	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	6	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2022-08-20	6	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	6	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	1	2022-08-20	6	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	1	2022-08-20	6	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	53.8
Railroad Creek	1	2022-08-20	6	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	1	2022-08-20	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	139.88
Railroad Creek	1	2022-08-20	6	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	1	2022-08-20	6	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	86.08
Railroad Creek	1	2022-08-20	6	Moselia	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	10	2022-08-20	6	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	10	2022-08-20	6	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	6	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	6	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	10	2022-08-20	6	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	10	2022-08-20	6	Glutops	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Pelecorhynchidae	higher flies	10.76
Railroad Creek	10	2022-08-20	6	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	10	2022-08-20	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	10	2022-08-20	6	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	10	2022-08-20	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	10	2022-08-20	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	10	2022-08-20	6	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2022-08-20	6	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	10	2022-08-20	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2022-08-20	6	Lopescladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	150.64
Railroad Creek	10	2022-08-20	6	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	6	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	6	2022-08-21	6	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	6	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	6	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	6	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2022-08-21	6	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	6	2022-08-21	6	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	53.8
Railroad Creek	6	2022-08-21	6	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	6	2022-08-21	6	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	6	2022-08-21	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	6	2022-08-21	6	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	6	2022-08-21	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	6	2022-08-21	6	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	6	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	6	2022-08-21	6	Pseudorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	6	Psilometriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2022-08-21	6	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	6	2022-08-21	6	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	21.52
Railroad Creek	6	2022-08-21	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	204.44
Railroad Creek	6	2022-08-21	6	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	6	2022-08-21	6	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	75.32
Railroad Creek	6	2022-08-21	6	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	6	Zapada oregonensis group	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2022-08-21	6	Isoperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	6	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	6	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	43.04
Railroad Creek	SG09	2022-08-21	6	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	6	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	6	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	SG09	2022-08-21	6	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	SG09	2022-08-21	6	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	SG09	2022-08-21	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	150.64
Railroad Creek	SG09	2022-08-21	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	SG09	2022-08-21	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	215.2
Railroad Creek	SG09	2022-08-21	6	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	SG09	2022-08-21	6	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	SG09	2022-08-21	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	SG09	2022-08-21	6	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	SG09	2022-08-21	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	150.64
Railroad Creek	SG09	2022-08-21	6	Diamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	SG09	2022-08-21	6	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG09	2022-08-21	6	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	6	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	6	Eukiefferiella tirolensis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	6	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	6	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	6	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG09	2022-08-21	6	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	SG09	2022-08-21	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	182.92
Railroad Creek	SG09	2022-08-21	6	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	6	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	6	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	6	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	SG09	2022-08-21	6	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	86.08
Railroad Creek	SG09	2022-08-21	6	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	6	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	7	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	7	Rhyacophila betteni group	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	2	2022-08-18	7	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	2	2022-08-18	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	2	2022-08-18	7	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	2	2022-08-18	7	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	2	2022-08-18	7	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	2	2022-08-18	7	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	2	2022-08-18	7	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	2	2022-08-18	7	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	2	2022-08-18	7	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	2	2022-08-18	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	75.32
Railroad Creek	2	2022-08-18	7	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	7	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	7	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	7	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	7	Rhyacophila	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	SG12R	2022-08-18	7	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	SG12R	2022-08-18	7	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	182.92
Railroad Creek	SG12R	2022-08-18	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	SG12R	2022-08-18	7	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	SG12R	2022-08-18	7	Chironomidae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	SG12R	2022-08-18	7	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	SG12R	2022-08-18	7	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	SG12R	2022-08-18	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	43.04
Railroad Creek	SG12R	2022-08-18	7	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	7	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	7	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	21.52
Railroad Creek	4	2022-08-19	7	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	7	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	4	2022-08-19	7	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	4	2022-08-19	7	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	4	2022-08-19	7	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	4	2022-08-19	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	4	2022-08-19	7	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	7	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	4	2022-08-19	7	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	4	2022-08-19	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2022-08-19	7	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	4	2022-08-19	7	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	4	2022-08-19	7	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	7	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	7	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	7	Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	7	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2022-08-19	7	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	4	2022-08-19	7	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	7	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	4	2022-08-19	7	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2022-08-19	7	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	7	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	32.28
Railroad Creek	1	2022-08-20	7	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	7	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	7	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	7	Dolophilodes	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Philopotamidae	caddisflies	21.52
Railroad Creek	1	2022-08-20	7	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	32.28
Railroad Creek	1	2022-08-20	7	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	1	2022-08-20	7	Neothremma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	7	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2022-08-20	7	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2022-08-20	7	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	1	2022-08-20	7	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	1	2022-08-20	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	204.44
Railroad Creek	1	2022-08-20	7	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	7	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	64.56
Railroad Creek	1	2022-08-20	7	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2022-08-20	7	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	1	2022-08-20	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	1	2022-08-20	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	763.96
Railroad Creek	1	2022-08-20	7	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	1	2022-08-20	7	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	602.56
Railroad Creek	1	2022-08-20	7	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	64.56
Railroad Creek	1	2022-08-20	7	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	1	2022-08-20	7	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	139.88
Railroad Creek	1	2022-08-20	7	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	419.64
Railroad Creek	1	2022-08-20	7	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2022-08-20	7	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2022-08-20	7	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	7	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	7	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2022-08-20	7	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	7	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	129.12
Railroad Creek	1	2022-08-20	7	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	1	2022-08-20	7	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	1	2022-08-20	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	441.16
Railroad Creek	1	2022-08-20	7	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	1	2022-08-20	7	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	1	2022-08-20	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	182.92
Railroad Creek	1	2022-08-20	7	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	7	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	7	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2022-08-20	7	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	1	2022-08-20	7	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	32.28
Railroad Creek	1	2022-08-20	7	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	21.52
Railroad Creek	10	2022-08-20	7	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2022-08-20	7	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	10	2022-08-20	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	75.32
Railroad Creek	10	2022-08-20	7	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	10	2022-08-20	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	10	2022-08-20	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	312.04
Railroad Creek	10	2022-08-20	7	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	10	2022-08-20	7	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	10	2022-08-20	7	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	10	2022-08-20	7	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	10	2022-08-20	7	Boreoheptagyia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	10	2022-08-20	7	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	10	2022-08-20	7	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	7	Eukiefferiella tirolensis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	7	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	204.44
Railroad Creek	10	2022-08-20	7	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	7	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2022-08-20	7	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2022-08-20	7	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	7	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	6	2022-08-21	7	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	7	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	7	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2022-08-21	7	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	6	2022-08-21	7	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2022-08-21	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	139.88
Railroad Creek	6	2022-08-21	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	7	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	7	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG09	2022-08-21	7	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	SG09	2022-08-21	7	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	SG09	2022-08-21	7	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	269
Railroad Creek	SG09	2022-08-21	7	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	SG09	2022-08-21	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	SG09	2022-08-21	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	SG09	2022-08-21	7	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	7	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	53.8
Railroad Creek	SG09	2022-08-21	7	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	SG09	2022-08-21	7	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	21.52
Railroad Creek	SG09	2022-08-21	7	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	SG09	2022-08-21	7	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	290.52
Railroad Creek	SG09	2022-08-21	7	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	SG09	2022-08-21	7	Eukiefferiella tirolensis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	7	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	7	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	SG09	2022-08-21	7	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	SG09	2022-08-21	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	172.16
Railroad Creek	SG09	2022-08-21	7	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	7	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	7	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	75.32
Railroad Creek	SG09	2022-08-21	7	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	7	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	2	2022-08-18	8	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	2	2022-08-18	8	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	8	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	8	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	32.28
Railroad Creek	2	2022-08-18	8	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	2	2022-08-18	8	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	32.28
Railroad Creek	2	2022-08-18	8	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	2	2022-08-18	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	2	2022-08-18	8	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	8	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2022-08-18	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	2	2022-08-18	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	2	2022-08-18	8	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	2	2022-08-18	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	2	2022-08-18	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	2	2022-08-18	8	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	2	2022-08-18	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	2	2022-08-18	8	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2022-08-18	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	139.88
Railroad Creek	2	2022-08-18	8	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	2	2022-08-18	8	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	8	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	SG12R	2022-08-18	8	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	SG12R	2022-08-18	8	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	SG12R	2022-08-18	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	8	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	8	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	290.52
Railroad Creek	SG12R	2022-08-18	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	SG12R	2022-08-18	8	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	SG12R	2022-08-18	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	SG12R	2022-08-18	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	SG12R	2022-08-18	8	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	8	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	8	Lopescladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG12R	2022-08-18	8	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	581.04
Railroad Creek	SG12R	2022-08-18	8	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	8	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	8	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	SG12R	2022-08-18	8	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	8	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	4	2022-08-19	8	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	8	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2022-08-19	8	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	53.8
Railroad Creek	4	2022-08-19	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	4	2022-08-19	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	8	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2022-08-19	8	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2022-08-19	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	4	2022-08-19	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2022-08-19	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	32.28
Railroad Creek	4	2022-08-19	8	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	1	2022-08-20	8	Dicosmoecus atripes	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	8	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	32.28
Railroad Creek	1	2022-08-20	8	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	8	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2022-08-20	8	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2022-08-20	8	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	1	2022-08-20	8	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	8	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	1	2022-08-20	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	312.04
Railroad Creek	1	2022-08-20	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	1	2022-08-20	8	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	1	2022-08-20	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	1	2022-08-20	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	1	2022-08-20	8	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	8	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2022-08-20	8	Parakiefferiella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2022-08-20	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	172.16
Railroad Creek	1	2022-08-20	8	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	1	2022-08-20	8	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	8	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	8	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	10	2022-08-20	8	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	8	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	8	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	8	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	43.04
Railroad Creek	10	2022-08-20	8	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2022-08-20	8	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	10	2022-08-20	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	10	2022-08-20	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2022-08-20	8	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	10	2022-08-20	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	10	2022-08-20	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	10	2022-08-20	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	10	2022-08-20	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	10	2022-08-20	8	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2022-08-20	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	10	2022-08-20	8	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	8	Lopescladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	8	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2022-08-20	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	419.64
Railroad Creek	10	2022-08-20	8	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	8	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	10	2022-08-20	8	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	8	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	21.52
Railroad Creek	10	2022-08-20	8	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	6	2022-08-21	8	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	8	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	8	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	6	2022-08-21	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	6	2022-08-21	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	6	2022-08-21	8	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2022-08-21	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2022-08-21	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2022-08-21	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	6	2022-08-21	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	6	2022-08-21	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	21.52
Railroad Creek	6	2022-08-21	8	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	8	Malenka	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	8	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	8	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	8	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	8	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	SG09	2022-08-21	8	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	43.04
Railroad Creek	SG09	2022-08-21	8	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG09	2022-08-21	8	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG09	2022-08-21	8	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	107.6
Railroad Creek	SG09	2022-08-21	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	SG09	2022-08-21	8	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	SG09	2022-08-21	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	SG09	2022-08-21	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	SG09	2022-08-21	8	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	SG09	2022-08-21	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	SG09	2022-08-21	8	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	SG09	2022-08-21	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	SG09	2022-08-21	8	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	SG09	2022-08-21	8	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	8	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	8	Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG09	2022-08-21	8	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	SG09	2022-08-21	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	118.36
Railroad Creek	SG09	2022-08-21	8	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	8	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	SG09	2022-08-21	8	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	2	2022-08-18	9	Lepidostoma-panel case larvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	10.76
Railroad Creek	2	2022-08-18	9	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	2	2022-08-18	9	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	2	2022-08-18	9	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	2	2022-08-18	9	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	129.12
Railroad Creek	2	2022-08-18	9	Diphetor hageni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	2	2022-08-18	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	2	2022-08-18	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	2	2022-08-18	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	2	2022-08-18	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	2	2022-08-18	9	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	10.76
Railroad Creek	2	2022-08-18	9	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	2	2022-08-18	9	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	9	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	9	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2022-08-18	9	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	462.68
Railroad Creek	2	2022-08-18	9	Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	10.76
Railroad Creek	2	2022-08-18	9	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	21.52
Railroad Creek	2	2022-08-18	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	118.36
Railroad Creek	2	2022-08-18	9	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	75.32
Railroad Creek	2	2022-08-18	9	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2022-08-18	9	Isoperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	9	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	SG12R	2022-08-18	9	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	SG12R	2022-08-18	9	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG12R	2022-08-18	9	Clinocera/Trichoclinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	SG12R	2022-08-18	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	SG12R	2022-08-18	9	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	9	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	9	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	SG12R	2022-08-18	9	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	SG12R	2022-08-18	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	269
Railroad Creek	SG12R	2022-08-18	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	204.44
Railroad Creek	SG12R	2022-08-18	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	SG12R	2022-08-18	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	SG12R	2022-08-18	9	Polypedilum	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae	midges	10.76
Railroad Creek	SG12R	2022-08-18	9	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	SG12R	2022-08-18	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	139.88
Railroad Creek	SG12R	2022-08-18	9	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG12R	2022-08-18	9	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	SG12R	2022-08-18	9	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	SG12R	2022-08-18	9	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	SG12R	2022-08-18	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	279.76
Railroad Creek	SG12R	2022-08-18	9	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	9	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	9	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	21.52
Railroad Creek	SG12R	2022-08-18	9	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	9	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	43.04
Railroad Creek	4	2022-08-19	9	Rhyacophila atrata complex	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	9	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	32.28
Railroad Creek	4	2022-08-19	9	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2022-08-19	9	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2022-08-19	9	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2022-08-19	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	4	2022-08-19	9	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2022-08-19	9	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	4	2022-08-19	9	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2022-08-19	9	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	4	2022-08-19	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	204.44
Railroad Creek	4	2022-08-19	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	742.44
Railroad Creek	4	2022-08-19	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	290.52
Railroad Creek	4	2022-08-19	9	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	4	2022-08-19	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	4	2022-08-19	9	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	4	2022-08-19	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	4	2022-08-19	9	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	9	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	9	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	9	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	9	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2022-08-19	9	Trombidiformes	U	non-insect	Aquatic	Arachnida: Acari	Trombidiformes	x	mites	10.76
Railroad Creek	4	2022-08-19	9	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	32.28
Railroad Creek	4	2022-08-19	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	419.64
Railroad Creek	4	2022-08-19	9	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	9	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2022-08-19	9	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	4	2022-08-19	9	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	9	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2022-08-20	9	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	1	2022-08-20	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	1	2022-08-20	9	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	9	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2022-08-20	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	1	2022-08-20	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	182.92
Railroad Creek	1	2022-08-20	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	1	2022-08-20	9	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	1	2022-08-20	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	1	2022-08-20	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	1	2022-08-20	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	32.28
Railroad Creek	1	2022-08-20	9	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	9	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	1	2022-08-20	9	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	9	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2022-08-20	9	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2022-08-20	9	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	1	2022-08-20	9	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	1	2022-08-20	9	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	9	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	10	2022-08-20	9	Simulium	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	32.28
Railroad Creek	10	2022-08-20	9	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2022-08-20	9	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2022-08-20	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	10	2022-08-20	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	10	2022-08-20	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	301.28
Railroad Creek	10	2022-08-20	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	10	2022-08-20	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	10	2022-08-20	9	Symbiocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2022-08-20	9	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	10	2022-08-20	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	355.08
Railroad Creek	10	2022-08-20	9	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	10	2022-08-20	9	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	10	2022-08-20	9	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	9	Lepidostoma cascadense	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	10.76
Railroad Creek	6	2022-08-21	9	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	6	2022-08-21	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	6	2022-08-21	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	6	2022-08-21	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	6	2022-08-21	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	64.56
Railroad Creek	6	2022-08-21	9	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	6	2022-08-21	9	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	6	2022-08-21	9	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2022-08-21	9	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	SG09	2022-08-21	9	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	SG09	2022-08-21	9	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	SG09	2022-08-21	9	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	SG09	2022-08-21	9	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	118.36
Railroad Creek	SG09	2022-08-21	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	SG09	2022-08-21	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	SG09	2022-08-21	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	SG09	2022-08-21	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	96.84
Railroad Creek	SG09	2022-08-21	9	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	SG09	2022-08-21	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	290.52
Railroad Creek	SG09	2022-08-21	9	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	9	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	9	Suwalliini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	SG09	2022-08-21	9	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52

Taxonomy Long Output for 2022 Benthic Macroinvertebrate Data (ID by Aquatic Biology Associates)
Note: Abundance converted to per square meter.

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	SG09	2022-08-21	9	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52

Trait Data for Identified Taxa
Information Used to Calculate Metrics in Data Output and Report

Taxon	Stage	Family	Common.name	Insect.	Higher.classification	Origin	Order	BCG.Attribute	Feeding.Group	CA.feeding.group	Habit	Tolerance	WY.HBI	PSSB.tolerance	CA.tolerance	Metals.tolerance	BCI.TV	PSSB.long.lived	Voltinism	Development	Occurrence.in.drift	Size.at.maturity	Rheophily	Thermal.preference	a	b
Oligochaeta	U	x	segmented worms	non-insect	Annelida: Oligochaeta	Aquatic	miscellaneous non-insect	4	CG	CG	BU	0	5	0	5	11	108	0	2	2	1	2	2	2	0.0758	0.74
Pisidium	U	Sphaeriidae	pea clams	non-insect	Mollusca: Bivalvia	Aquatic	x	4	CF	CF	BU	0	8	0	8	3	108	0	1	3	1	1	2	2	0.0163	2.477
Trombidiformes	U	x	mites	non-insect	Arachnida: Acari	Aquatic	Trombidiformes	4	PA	PR	SW	0	5	0	5	11	108	0	3	2	2	1	2	2	0.053	2.494
Ameletus	L	Ameletidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	2	SC	CG	CL	MI	1	0	0	1	48	0	2	1	1	2	2	1	0.0077	2.588
Baetis tricaudatus complex	L	Baetidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	4	CG	CG	CL	0	6	0	6	11	72	0	3	1	3	1	2	2	0.0053	2.875
Drunella doddsii	L	Ephemerellidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	2	SC	CG	CL	MI	1	0	0	0	4	0	1	2	1	3	3	1	0.0019	3.46
Drunella spinifera	L	Ephemerellidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	2	PR	PR	CL	HI	0	0	0	1	24	0	1	2	1	3	3	1	0.0019	3.46
Ephemerella tibialis	L	Ephemerellidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	3	CG	CG	CL	0	2	0	2	11	48	0	2	2	2	2	2	2	0.0104	2.83
Cinygma	L	Heptageniidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	4	SC	SC	CL	0	2	0	2	11	48	0	2	1	2	2	2	2	0.0108	2.754
Cinygmula	L	Heptageniidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	3	SC	SC	CL	0	4	0	4	11	21	0	2	1	2	2	3	1	0.0108	2.754
Epeorus deceptivus	L	Heptageniidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	2	SC	SC	CL	HI	0	0	0	11	21	0	2	2	1	2	3	1	0.0108	2.754
Rhithrogena	L	Heptageniidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	3	SC	SC	CL	0	0	0	0	2	21	0	2	1	2	2	3	2	0.0108	2.754
Neoleptophlebia/Paraleptophlebia	L	Leptophlebiidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	4	CG	CG	SP	0	4	0	4	1	24	0	2	1	2	1	2	2	0.0047	2.686
Sweltsa	L	Chloroperlidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	3	PR	PR	BU	0	1	0	1	2	24	0	1	2	2	2	2	2	0.0065	2.724
Megarcys	L	Perlodidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	2	PR	PR	CL	HI	2	0	2	1	24	0	1	2	1	3	2	1	0.0196	2.742
Glossosoma	L	Glossosomatidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	3	SC	SC	CL	0	1	0	1	11	24	0	3	3	1	2	3	2	0.0082	2.958
Ecclisomyia	L	Limnephilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	OM	OM	CL	MI	2	0	2	2	24	0	1	2	1	2	2	1	0.004	2.933
Rhyacophila narvae	L	Rhyacophilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	PR	PR	CL	MI	1	0	0	11	18	0	2	2	1	2	3	1	0.0099	2.48
Ceratopogoninae	L	Ceratopogonidae	no-see-um midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	PR	PR	SP	0	6	0	6	4	108	0	2	1	1	2	2	2	0.0025	2.469
Chelifera/Metachela	L	Empididae	dance flies	insect	Arthropoda: Insecta	Aquatic	Diptera	4	PR	PR	SP	0	6	0	6	4	95	0	2	2	1	2	2	2	0.0054	2.546
Hexatoma	L	Tipulidae	crane flies	insect	Arthropoda: Insecta	Aquatic	Diptera	3	PR	PR	BU	0	2	0	2	2	36	0	1	2	1	3	2	2	0.0029	2.681
Chironomidae	P	Chironomidae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	BU	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Brillia	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	SH	SP	0	5	0	5	4	108	0	3	1	3	1	2	2	0.0018	2.617
Chaetocladius	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	MT	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Eukiefferiella claripennis group	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	OM	SP	MT	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Micropsectra	L	Chironomidae: Chironominae: Tanytarsini	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	CL	0	7	0	7	1	108	0	3	1	3	1	2	2	0.0018	2.617
Stempellinella	L	Chironomidae: Chironominae: Tanytarsini	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	3	CG	CG	SP	0	4	0	4	0	108	0	3	1	3	1	2	2	0.0018	2.617
Thienemanniella	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	6	0	6	4	108	0	3	1	3	1	2	2	0.0018	2.617
Drunella coloradensis/flavilinea	L	Ephemerellidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	3	SC	PR	CL	0	2	0	0	0	18	0	2	2	1	2	2	2	0.0019	3.46
Suwalliini	L	Chloroperlidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	3	PR	PR	BU	0	1	0	1	2	24	0	2	2	2	2	2	2	0.0065	2.724
Leuctridae	L	Leuctridae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	3	SH	SH	SP	MI	1	0	0	11	18	0	2	1	1	2	2	1	0.0028	2.719
Zapada cinctipes	L	Nemouridae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	4	SH	SH	SP	0	2	0	2	3	16	0	2	1	1	2	2	2	0.0056	2.762
Calineuria californica	L	Perlidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	2	PR	PR	CL	0	2	0	2	11	24	0	1	2	1	3	3	2	0.0099	2.879
Pteronarcys princeps	L	Pteronarcyidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	2	OM	OM	SP	MI	1	0	0	1	24	0	1	2	1	3	2	1	0.0324	2.573
Orthocladius	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	3	CG	CG	SP	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Parametriocnemus	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	5	0	5	11	108	0	3	1	3	1	2	2	0.0018	2.617
Rheocricotopus	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Sperchonopsis	U	x	mites	non-insect	Arachnida: Acari	Aquatic	x	4	PA	PR	SW	MT	5	0	8	11	108	0	3	2	2	1	2	2	0.053	2.494
Capniidae	L	Capniidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	3	SH	SH	SP	MI	1	0	1	0	32	0	2	1	1	2	2	1	0.0049	2.562
Visoka cataractae	L	Nemouridae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	2	SH	SH	SP	HI	2	0	2	11	36	0	1	1	1	2	3	1	0.0056	2.762
Zapada columbiana	L	Nemouridae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	2	SH	SH	SP	HI	2	0	2	11	16	0	1	1	1	2	2	1	0.0056	2.762
Dolophilodes	L	Philopotamidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	CF	CF	CL	MI	2	0	2	11	24	0	2	2	1	2	3	1	0.005	2.511
Oreogeton	L	Empididae	dance flies	insect	Arthropoda: Insecta	Aquatic	Diptera	3	PR	PR	SP	HI	5	0	6	11	95	0	1	2	1	2	2	1	0.0054	2.546
Dicranota	L	Tipulidae	crane flies	insect	Arthropoda: Insecta	Aquatic	Diptera	4	PR	PR	CL	0	3	0	3	2	24	0	2	2	1	2	2	2	0.0029	2.681
Tvetenia bavarica group	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	5	0	5	4	108	0	3	1	3	1	2	2	0.0018	2.617
Glossosoma	P	Glossosomatidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	3	SC	SC	CL	0	1	0	1	11	24	0	3	3	1	2	3	2	0.0082	2.958
Rhyacophila betteni group	L	Rhyacophilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	3	PR	PR	CL	0	1	0	1	11	18	0	1	2	1	3	3	2	0.0099	2.48
Clinocera/Trichoclinocera	L	Empididae	dance flies	insect	Arthropoda: Insecta	Aquatic	Diptera	3	PR	PR	CL	0	6	0	6	4	95	0	2	2	1	2	2	2	0.0054	2.546
Simulium	L	Simuliidae	black flies	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CF	CF	CL	0	6	0	6	11	108	0	3	1	3	1	3	2	0.002	3.011
Corynoneura	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	7	0	7	4	108	0	3	1	3	1	2	2	0.0018	2.617
Parakiefferiella	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	4	0	4	11	108	0	3	1	3	1	2	2	0.0018	2.617
Parorthocladius	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	3	CG	CG	SP	0	6	0	5	11	108	0	3	1	3	1	2	2	0.0018	2.617
Nemata	U	x	round worms	non-insect	Nemata	Aquatic	miscellaneous non-insect	4	PA	PR	BU	0	5	0	6	11	108	0	2	2	1	2	2	2	0.0758	0.74
Baetis bicaudatus complex	L	Baetidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	2	CG	CG	CL	HI	4	0	4	11	72	0	3	1	3	1	2	1	0.0053	2.875
Epeorus longimanus	L	Heptageniidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	3	SC	SC	CL	MI	0	0	0	11	21	0	2	1	1	2	3	1	0.0108	2.754
Epeorus grandis group	L	Heptageniidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	2	SC	SC	CL	HI	0	0	0	11	21	0	2	2	1	2	3	1	0.0108	2.754
Arctopsychinae	L	Hydropsychidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	3	PR	PR	CL	0	1	0	1	11	18	0	1	2	1	3	3	2	0.0046	2.926
Eukiefferiella brehmi group	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	OM	SP	0	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Ostracoda	U	x	seed shrimp	non-insect	Crustacea: Ostracoda	Aquatic	x	4	CG	CG	SW	0	8	0	6	11	108	0	3	2	1	1	2	2	0.006753	2.27
Moselia	L	Leuctridae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	2	SH	SH	SP	HI	1	0	0	11	18	0	1	1	1	2	2	1	0.0028	2.719
Pedomoecus sierra	L	Apataniidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	1	UN	UN	BU	HI	0	0	0	11	110	0	1	2	1	2	2	1	0.0056	2.839
Rhyacophila atrata complex	L	Rhyacophilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	PR	PR	CL	MI	1	0	0	11	18	0	2	2	1	2	3	2	0.0099	2.48
Ephemerella alleni	L	Ephemerellidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	2	CG	CG	CL	HI	3	0	1	11	48	0	2	2	1	2	2	1	0.0097	2.663
Caudatella hystrix	L	Ephemerellidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	2	CG	CG	CL	HI	1	0	1	0	24	0	2	2	1	2	2	1	0.0103	2.676
Chloroperlidae	L	Chloroperlidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	3	PR	PR	BU	0	1	0	1	2	24	0	2	2	1	2	2	2	0.0065	2.724
Apatania	L	Apataniidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	SC	SC	CL	MI	2	0	1	11	18	0	2	2	1	2	2	1	0.0056	2.839
Parapsyche elsis	L	Hydropsychidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	PR	PR	CL	HI	1	0	1	11	6	0	1	3	1	3	3	1	0.0046	2.926
Rhyacophila brunnea/vemna group	L	Rhyacophilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	3	PR	PR	CL	0	1	0	1	11	18	0	1	2	1	3	3	2	0.0099	2.48
Neothremma	L	Uenoidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	SC	SC	CL	HI	0	0	0	11	8	0	1	2	1	2	3	1	0.0056	2.839
Dicosmoecus atripes	L	Limnephilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	PR	OM	SP	MI	2	0	1	1	24	0	1	2	1	3	2	1	0.004	2.933
Doroneuria	L	Perlidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	2	PR	PR	CL	MI	1	0	1	11	18	0	1	2	1	3	3	1	0.0099	2.879
Kogotus/Rickera	L	Perlodidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	3	PR	PR	CL	MI	2	0	2	11	18	0	2	2	1	3	2	1	0.0196	2.742
Polycelis	U	Planariidae	flat worms	non-insect	Turbellaria	Aquatic	miscellaneous non-insect	3	PR	PR	CL	HI	4	0	1	11	108	0	2	2	1	1	2	1	0.0082	2.168
Sperchon	U	x	mites	non-insect	Arachnida: Acari	Aquatic	x	4	PA	PR	SW	MT	5	0	8	11	108	0	3	2	2	1	2	2	0.053	2.494
Rhabdomastix (Rhabdomastix)	L	Tipulidae	crane flies	insect	Arthropoda: Insecta	Aquatic	Diptera	2	SH	SH	BU	MI	3	0	3	11	72	0	1	2	1	3	2	1	0.0029	2.681
Krenosmittia	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	3	CG	CG	SP	HI	1	0	1	11	108	0	3	1	3	1	2	1	0.0018	2.617
Taeniopterygidae	L	Taeniopterygidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	3	SH	OM	SP	0	2	0	2	1	48	0	2	1	1	2	2	1	0.0072	2.655
Lopescladius	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Arctopsyche	L	Hydropsychidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	PR	PR	CL	0	1	0	1	11	18	0	1	2	1	3	3	2	0.0046	2.926
Zapada frigida	L	Nemouridae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	2	SH	SH	SP	MI	2	0	2	11	16	0	2	1	1	2	2	1	0.0056	2.762
Lepidostoma-panel case larvae	L	Lepidostomatidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	4	SH	SH	CM	0	1	0	1	1	18	0	2	1	1	2	1	2	0.0079	2.649
Heterotrissocladius marcidus group	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	3	CG	CG	SP	MI	0	0	0	11	108	0	3	1	3	1	2	1	0.0018	2.617
Polypedilum	L	Chironomidae: Chironominae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	MH	MH	CL	0	6	0	6	4	108	0	3	1	3	1	2	2	0.0018	2.617
Thienemannimyia complex	L	Chironomidae: Tanypodinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	PR	PR	SP	0	6	0	6	3	108	0	3	1	3	1	2	2	0.0018	2.617
Zavrelimyia	L	Chironomidae: Tanypodinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	PR	PR	SP	MT	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Rhyacophila betteni group	P	Rhyacophilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	3	PR	PR	CL	0	1	0	1	11	18	0	1	2	1	3	3	2	0.0099	2.48
Diphetor hageni	L	Baetidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	3	CG	CG	CL	0	5	0	5	11	72	0	3	1	2	1	2	2	0.0053	2.875
Isoperla	L	Perlodidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	3	PR	PR	CL	0	2	0	2	3	48	0	2	2	2	2	2	2	0.0196	2.742
Lebertia	U	x	mites	non-insect	Arachnida: Acari	Aquatic	x	4	PA	PR	SW	MT	5	0	8	11	108	0	3	2	2	1	2	2	0.053	2.494
Neophylax	L	Uenoidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	3	SC	SC	CL	0	3	0	3	2	24	0	2	2	1	2	3	2	0.0056	2.839
Pagastia	L	Chironomidae: Diamesinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	1	0	1	9	108	0	3	1	3	1	2	2	0.0018	2.617
Neoplasta	P	Empididae	dance flies	insect	Arthropoda: Insecta	Aquatic	Diptera	4	PR	PR	SP	0	6	0	6	11	95	0	2	2	1	2	2	2	0.0054	2.546
Synorthocladius	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	3	CG	CG	SP	0	2	0	2	1	108	0	3	1	3	1	2	2	0.0018	2.617
Rhyacophila vagrita group	L	Rhyacophilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	PR	PR	CL	HI	0	0	0	11	18	0	2	2	1	2	3	1	0.0099	2.48
Cricotopus	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	CL	0	7	0	7	10	108	0	3	1	3	1	2	2	0.0018	2.617
Oribatida	U	x	mites	non-insect	Arachnida: Acari	Terrestrial	x	4	PA	PR	SW	0	5	0	5	11	108	0	3	2	2	1	2	2	0.053	2.494
Micrasema	L	Brachycentridae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	3	CG	MH	CL	0	1	0	1	2	24	0	1	2	1	1	2	2	0.0181	2.41
Neoplasta	L	Empididae	dance flies	insect	Arthropoda: Insecta	Aquatic	Diptera	4	PR	PR	SP	0	6	0	6	11	95	0	2	2	1	2	2	2	0.0054	2.546
Glutops	L	Pelecorhynchidae	higher flies	insect	Arthropoda: Insecta	Aquatic	Diptera	2	PR	PR	BU	MI	3	0	3	11	110	0	1	2	1	2	2	1	0.0025	2.692
Agraylea	L	Hydroptilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	PH	PH	CM	0	8	0	8	11	108	0	2	2	1	1	2	1	0.0056	2.839
Helodon/Prosimulium	L	Simuliidae	black flies	insect	Arthropoda: Insecta	Aquatic	Diptera	3	CF	CF	CL	MI	3	0	3	11	108	0	2	2	2	1	3	1	0.002	3.011
Rhyacophila verrula	L	Rhyacophilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	MH	MH	CL	HI	1	0	0	11	18	0	1	2	1	3	3	1	0.0099	2.48
Pseudorthocladius	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	0	0	5	11	108	0	3	1	3	1	2	2	0.0018	2.617
Zapada oregonensis group	L	Nemouridae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	3	SH	SH	SP	MI	2	0	2	11	16	0	1	1	1	2	2	1	0.0056	2.762
Psilometriocnemus	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	6	0	5	11	108	0	3	1	3	1	2	2	0.0018	2.617
Malenka	L	Nemouridae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	4	SH	SH	SP	0	2	0	2	11	36	0	2	1	1	2	2	2	0.0056	2.762
Lepidostoma cascadense	L	Lepidostomatidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	SH	SH	CM	MI	1	0	1	1	18	0	2	2	1	2	2	1	0.0079	2.649
Yoraperla mariana	L	Peltoperlidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	2	SH	SH	SP	HI	1	0	1	11	12	0	1	3	1	2	2	1	0.017	2.737
Rhyacophila verrula	P	Rhyacophilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	2	MH	MH	CL	HI	1	0	0	11	18	0	1	2	1	3	3	1	0.0099	2.48
Wiedemannia	L	Empididae	dance flies	insect	Arthropoda: Insecta	Aquatic	Diptera	3	PR	PR	CL	MI	6	0	6	11	95	0	2	2	1	2	2	1	0.0054	2.546
Trepaxonemata	U	x	flat worms	non-insect	Turbellaria	Aquatic	miscellaneous non-insect	4	PR	PR	CL	0	4	0	4	11	108	0	2	2	1	2	2	2	0.0082	2.168
Eloeophila	L	Tipulidae	crane flies	insect	Arthropoda: Insecta	Aquatic	Diptera	3	PR	PR	BU	0	2	0	3	11	72	0	2	2	1	2	2	2	0.0029	2.681
Rhyacophila	L	Rhyacophilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	3	PR	PR	CL	0	0	0	0	11	18	0	2	2	1	2	3	2	0.0099	2.48
Simulium	P	Simuliidae	black flies	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CF	CF	CL	0	6	0	6	11	108	0	3	1	3	1	3	2	0.002	3.011
Boreoheptagyia	L	Chironomidae: Diamesinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	3	CG	CG	SP	MI	6	0	6	11	108	0	3	1	3	1	2	1	0.0018	2.617
Eukiefferiella tirolensis group	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	OM	SP	0	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Symbiocladius	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	0	PA	PA	BU	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Siphlonurus	L	Siphlonuridae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	4	CG	CG	SP	MT	7	0	7	11	72	0	2	2	2	2	1	2	0.0027	3.446
Dolichopodidae	L	Dolichopodidae	long-legged flies	insect	Arthropoda: Insecta	Aquatic	Diptera	5	PR	PR	SP	MT	4	0	4	4	108	0	2	2	1	2	1	2	0.0054	2.546
Boreochlus	L	Chironomidae: Podonominae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Hydrobaenus	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	SC	SC	SP	MT	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Paracladopelma	L	Chironomidae: Chironominae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	0	7	0	7	4	108	0	3	1	3	1	1	2	0.0018	2.617
Frisonia picticeps	L	Perlodidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	1	PR	PR	CL	HI	2	0	2	11	48	0	2	2	1	2	2	1	0.0196	2.742
Zapada	L	Nemouridae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	3	SH	SH	SP	0	2	0	2	11	16	0	2	1	1	2	2	2	0.0056	2.762
Limnophyes	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	SP	MT	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Paraperla	L	Chloroperlidae	stoneflies	insect	Arthropoda: Insecta	Aquatic	Plecoptera	2	PR	PR	BU	MI	1	0	0	2	24	0	1	2	1	2	2	1	0.0065	2.724
Diamesa	L	Chironomidae: Diamesinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	3	CG	CG	SP	HI	5	0	2	9	108	0	3	1	3	2	2	1	0.0018	2.617
Epeorus	L	Heptageniidae	mayflies	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	3	SC	SC	CL	0	0	0	0	11	21	0	2	1	1	2	3	1	0.0108	2.754
Mideopsis	U	x	mites	non-insect	Arachnida: Acari	Aquatic	x	4	PA	PR	SW	0	5	0	5	11	108	0	3	2	2	1	2	2	0.053	2.494
Rhyacophila angelita group	P	Rhyacophilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	3	PR	PR	CL	0	0	0	0	1	18	0	2	2	1	3	3	2	0.0099	2.48
Stilocladius	L	Chironomidae: Orthocladiinae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	3	CG	CG	SP	MI	6	0	5	11	108	0	3	1	3	1	2	1	0.0018	2.617
Rhyacophila	P	Rhyacophilidae	caddisflies	insect	Arthropoda: Insecta	Aquatic	Trichoptera	3	PR	PR	CL	0	0	0	0	11	18	0	2	2	1	2	3	2	0.0099	2.48
Chironomidae	L	Chironomidae	midges	insect	Arthropoda: Insecta	Aquatic	Diptera	4	CG	CG	BU	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617

Appendix D

Benthic Macroinvertebrate Responses to Metals in the Environment

Macroinvertebrate assemblages can exhibit predictable responses to different types of environmental stress. However, the sensitivity of individual metrics varies with the type of environmental stress. Some metrics are known to be good indicators of stress associated with metals contamination, while other metrics are more sensitive to organic/nutrient enrichment, excessive sediment deposition, temperature or dissolved oxygen conditions, or partial dewatering. It is important to note that each metric alone represents only 1 aspect of the community structure. It is the suite of metrics evaluated together that provides an indication of the health of the ecological system. The documented response of each of these metrics and associated taxa to impacts from metals, according to a review of available literature, and the environmental significance of the response are provided below in Tables D.1 and D.2.

Table D.1. Benthic Macroinvertebrate Metrics – Response to Metals (Adapted from McGuire 2009)

Metric	Metals	Response to Metals	Response Significance[1]	Location of Studies
Productivity				
Abundance	Mg, Al, Zn, Cd, Cu, Pb, Hg, Fe, Mn	Variable	-Abundance is a measure of population size, which is expected to decrease in response to metals. - Species abundances, however, can vary dramatically as a result of natural environmental variation, meaning abundance is not typically a reliable indicator of human influence (Karr and Chu 1997).	-North Fork Holston River, TN (Karr and Chu 1997) -Eagle River, CO (Fore 2002) -Southern Rocky Mountains, CO (Clements et al. 2000)
Richness				
Taxa richness	Zn, Cd, Cu, Pb, Hg, Fe, Mn, Al	Decreases (season dependent with maximum effect in the spring)	-Taxa richness is a measure of taxonomic diversity, which is expected to decrease when chemicals and metals are introduced to the stream as the ecological conditions in the stream cannot support a wide range of species (Reif 2012). -Tolerant species tend to dominate the community structure as sensitive species disappear in response to metal contamination.	-Arkansas River, CO (Clements 1994, Clements and Kiffney 1994) -Southern Rocky Mountains, CO (Clements et al. 2000)
Ephemeroptera, Plecoptera, Trichoptera (EPT) index	Zn, Cu, Cd, Al, Pb, Mn, Fe	Decrease	-The EPT index is a measure of the richness of Ephemeroptera, Plecoptera, and Trichoptera – 3 groups of macroinvertebrates considered especially sensitive to pollution. -EPT values are expected to decrease in response to metals due to associated changes to water chemistry and food availability (Normandeau Associates, Inc. 2012).	-Clark Fork River, MT (McGuire 1993) -Southern Rocky Mountains, CO (Clements et al. 2000)
Plecoptera richness	Zn, Cd, Cu, Pb, Hg, Al, Fe, Mn	Decrease (although some studies have found some genera to be tolerant of metals, ie., *Perlodidae* and *Alloperla*) (Roline 1988)	-Plecoptera richness is a measure of the diversity in Plecoptera species. -Stoneflies are particularly sensitive to human disturbance and are typically the first to disappear in response to external stressors, including metal contamination (Puget Sound Stream Benthos 2020). -Habitat requirements include cool water with high oxygen content. -Plecoptera richness is expected to decrease in response to metals due to associated changes to water chemistry and food resources (Clements 1994).	-Arkansas River, CO (Clements 1994, Clements and Kiffney 1994) -Eagle River, CO (Fore 2002) -Southern Rocky Mountains, CO (Clements et al. 2000)
Trichoptera richness	Zn, Cd, Cu, Pb, Hg, Al, Fe, Mn	-Variable response -Some genera (ie., *Rhyacophila*, *Brachycentrus*, *Hydropsyche, Arctopsche*) found to be tolerant of metals and positively associated with Zn concentration (Clements 1994)	-Trichoptera richness is a measure of the diversity in Trichoptera species. -Though caddisflies are diverse in feeding mechanisms and habit, taxa richness of caddisflies tends to decline in response to human disturbance, meaning that low values are often indicative of unhealthy stream conditions with limited habitat complexity. -However, several studies have reported the relative tolerance of Trichoptera to heavy metals as compared to other groups of benthic macroinvertebrates, meaning that taxa richness may reflect mixed responses to metals (Clements 1994). -Habitat complexity is an important variable that must be considered when evaluating this metric in response to metals.	-Arkansas River, CO (Clements 1994, Roline 1988) -Silver Bow Creek and Prickly Pear Creek, MT (Chadwick et al. 1986, Hughes 1985) -Eagle River, CO (Fore 2002) -Southern Rocky Mountains, CO (Clements et al. 2000)
Clinger richness	Zn, Cd, Cu, Pb,	Decrease	-Clinger richness is a measure of the diversity in clinger species, which is expected to decrease in response to metals due to changes in water chemistry, sedimentation, and food resources.	-Arkansas River, CO (Clements 1994) -Clark Fork River, MT (McGuire 1993)

Metric	Metals	Response to Metals	Response Significance[1]	Location of Studies
	Hg, Al, Fe, Mn		-Clingers fall within multiple orders of insects including Ephemeroptera, Trichoptera, and Diptera (Cummins et al. 2008). -Clingers typically occupy the interstitial spaces between cobble and gravel along the bottom of a stream, which they are able to do because of physical adaptations that allow them to hold onto smooth/slick substrates in fast-moving water. -Clingers are sensitive to finer sediments that fill those interstitial spaces as fine sediment reduces the habitat available to them and limits their ability to move deeper into the stream bed (Karr and Chu 1997). -Though clingers fall within multiple orders of insects, many of which are sensitive to metals, clinger richness is typically more reflective of substrate conditions than metal pollution (Karr and Chu 1997).	-Eagle River, CO (Fore 2002)
Trophic/Habit				
% Shredders	Mg, Al, Zn, Pb, Fe, Cu, Cd	Variable	-The % shredders metric is a measure of the abundance of shredders within the overall population. -Shredders fall within multiple orders of insects including Ephemeroptera and Plecoptera. -Shredders refer to those species of benthic macroinvertebrates that feed by way of tearing and shredding leaves and therefore tend to be present in reaches of the stream that are high in coarse, organic matter (Karr and Chu 1997). -The abundance of shredders is primarily influenced by the interaction between streams and riparian zones (Cummins et. al 1989), meaning the % of shredders within the population is not necessarily a reliable indicator of metal pollution (Kerans and Karr 1994). -Though shredders fall within multiple orders of insects, many of which are sensitive to metals, the % shredders metric is more reflective of riparian conditions (Cummins et al. 1989).	-Tennessee Valley (Kerans and Karr 1994) -Eastern Oregon (Karr and Chu 1997) -Northwest Wyoming (Karr and Chu 1997) -Southern Rocky Mountains, CO (Clements et al. 2000)
Ratio of scrapers / scrapers plus filtering collectors	Mg, Al	Decrease	-This metric is a measure of the range of trophic strategies in the benthic macroinvertebrate community and the relative abundance of specialist versus generalist feeders. -Scrapers (or grazers) are specialist feeders that consume algae and other associated material, while filterers are generalists that collect fine particulate organic matter from the water column. -The ratio is expected to decrease in response to metals as the proportion of specialist feeders declines in areas polluted by metals, likely due to declines in primary productivity (periphyton) (Ecology 1994).	-Tennessee Valley (Karr and Chu 1997) -Eastern Oregon (Karr and Chu 1997)
% Clingers	Zn, Cd, Cu, Pb, Hg	Decrease	-The % clingers metric is a measure of the abundance of clingers within the overall population. -Clingers fall within multiple orders of insects including Ephemeroptera, Trichoptera, and Diptera (Cummins et al. 2008). -Clingers typically occupy the interstitial spaces between cobble and gravel along the bottom of a stream, which they are able to do because of physical adaptations that allow them to hold onto smooth/slick substrates in fast-moving water.	-Arkansas River, CO (Clements 1994) -Clark Fork River, MT (McGuire 1993)

Metric	Metals	Response to Metals	Response Significance[1]	Location of Studies
			-Clingers are sensitive to finer sediments that fill those interstitial spaces as fine sediment reduces the habitat available to them and limits their ability to move deeper into the stream bed (Karr and Chu 1997). -Note that while clingers are typically sensitive to metals, their abundance is influenced primarily by substrate conditions.	
% Filterers	Mg, Al, Zn, Pb, Mn, Fe, Cu, Cd	Variable	-The % filterers metric is a measure of the abundance of filterers within the overall population. -Filterers are generalist feeders that collect fine particulate organic matter in the water column or sediment using a variety of filters (EPA 2020). -Because filterers are generalist feeders, they have a broad range of acceptable food materials, meaning high abundance values may be an indicator of polluted stream conditions that alter food resources, such as metal pollution (EPA 2020). -The variable response of this metric to metals suggests other factors may be involved, such as include food availability and habitat complexity (Kerans and Karr 1994).	-Tennessee Valley (Karr and Chu 1997 and Kerans and Karr 1994) -Southern Rocky Mountains, CO (Clements et al. 2000)
Composition				
Percent contribution of dominant taxon	Mg, Al	Increase	-This metric is a measure of the dominance of the single most abundant taxon. -Elevated metal concentrations in a stream environment causes a decrease in diversity among macroinvertebrates as those taxa less sensitive to disturbance and with fewer habitat requirements dominate the composition of species (Puget Sound Stream Benthos 2020).	-Tennessee Valley (Karr and Chu 1997, Kerans and Karr 1994)
% Ephemeroptera	Zn, Cu, As, Cd, Al, Fe, Mn, Hg, Pb	Decrease	-This metric is a measure of the abundance of Ephemeroptera within the overall population. -Ephemeroptera are sensitive to most types of human influence, so a lower percentage can indicate that the community structure has been impacted by pollution, disturbance, or other environmental stressors (Puget Sound Stream Benthos 2020). -Given that many species of mayflies graze on algae, they are particularly sensitive to metals and other toxic pollutants that can interfere with their food sources (Kuwabara 1985, Genter and Lehman 2000). -Mayflies in the Heptageniidae family are especially sensitive to heavy metals, which is thought to be because the metals damage their gills (Clements et al.. 2000). -Note that some Ephemeroptera families, such as Baetidae, are more tolerant of metal pollution than other mayfly families and can quickly colonize disturbed areas (Clements and Kiffney 1994).	-Arkansas River, CO (Clements and Kiffney 1994, Clements 1994, Courtney and Clements 2000) -Silver Bow and Prickly Pear Creeks, MT (Hughes 1985) -Coal Creek, CO (Peckarsky and Cook 1981) -Eagle River, CO (Fore 2002) -Southern Rocky Mountains, CO (Clements et al. 2000)
Ratio of EPT to EPT plus chironomidae abundances (EPT/EPT-C)	Zn, Cu	Decrease	-The EPT/EPT-C metric is a measure of relative abundance of indicator groups. EPT are considered sensitive to environmental stresses, while Chironamidae, generally, are more tolerant (McGuire 2009). -An even distribution of individuals among the 4 groups suggests a good biotic condition with low concentrations of pollutants (ie. metals), while an increase in the ratio of pollution-tolerant chironomids to EPT can indicate environmental stress within a system (McGuire 2009). -Note that some Ephemeroptera (e.g., Baetidae) and Trichoptera (e.g., Hydropsychinae) families are relatively tolerant of pollution and in cases where	-Clark Fork River, MT (McGuire 2009)

Metric	Metals	Response to Metals	Response Significance[1]	Location of Studies
			large populations of these tolerant EPT taxa are present, the EPT/EPT-C values can be skewed, which can be avoided by using metrics that evaluate the percent of those families (McGuire 2009).	
Tolerance				
Hilsenhoff Biotic Index (HBI)	N/A	N/A	-The HBI metric is a measure of the macroinvertebrate community's tolerance to nutrient enrichment (Ecology 1994). The metric assigns pollution-tolerance values to individual taxa, which are used to weight abundance and estimate overall organic pollution levels (EPA 2020). -High values indicate that the macroinvertebrate community is dominated by pollution-tolerant organisms, which indicates the stream reach is contaminated by organic pollution (Gazendam et al. 2011). -Because this metric evaluates organic pollution, which excludes inorganic pollutants such as heavy metals, the metric is not informative as it relates to metal pollution.	N/A
% Tolerant taxa	Zn, Cu, Mg, Al,	Increase	-This metric is a measure of the abundance of benthic macroinvertebrates considered tolerant (those considered tolerant represent the 5-10% most tolerant taxa in a region) of various types of human disturbance (Puget Sound Stream Benthos 2020). -Tolerance is generally non-specific to the type of stressor (EPA 2020). -While tolerant taxa are present at most stream sites, their abundance will increase in areas contaminated by metals, and more sensitive taxa will disappear due to unsuitable conditions (Puget Sound Stream Benthos 2020). -This metric is considered one of the most reliable indicators of human influence (Karr and Chu 1997).	-Arkansas River (Courtney and Clements 2000) -Eagle River, CO (Fore 2002) -Tennessee Valley (Karr and Chu 1997 and Kerans and Karr 1994) -Southwest Oregon (Fore et al. 1996)
Metals Tolerance Index (MTI)	Zn, Cu	Increase	-MTI measures the changes in community composition that are attributable to metals. Tolerance values are assigned to each taxon based on sensitivity to metals. -Higher MTI values indicate that the community composition is tolerant of metals and therefore the stream environment has been subjected to metal pollution and is unable to support sensitive taxa (McGuire 1993). -Note that the sensitivity rankings were developed for the Clark Fork River basin, which may not be applicable to Railroad Creek due to differences in community composition (McGuire 1993).	Clark Fork River, MT (McGuire 1993).

[1]Note that natural environmental variation between seasons and changes in elevation must also be considered when analyzing macroinvertebrate metrics, particularly in oligotrophic, mountain stream systems (Clements 1994).

Table D.2. Benthic Macroinvertebrate Taxa and Response to Metals

Taxon (Order)	Overall Sensitivity	Response to Metals	Findings	Location of Studies (Author and year)
Ameletidae (Ephemeroptera)	Sensitive	Cu, Zn, Mn, Pb – sensitive	Strongest reaction to experimental exposure to metal concentrations. Absent in observations of urban, polluted streams.	British Columbia and laboratory (Richardson and Kiffney 2000)
Baetidae (Ephemeroptera)	Moderate	Zn – moderately tolerant	Biomass high across Zn pollution gradient.	Colorado (Carlisle and Clements 2003)
		Cu, Zn, Mn, Pb - sensitive	Strongest reaction to experimental exposure to metal concentrations. Absent in observations of urban, polluted streams.	British Columbia and laboratory (Richardson and Kiffney 2000)
		Cr, Cd, Cu, Fe, Mn, Zn, Pb – moderately sensitive to aquatic concentrations	Among taxa with moderate statistical association with impact by water column concentrations of mining metals.	Basque Country, Spain (Marques et al. 2003)
Capniidae (Plecoptera)	Sensitive	Zn – sensitive	Shredder (stonefly nymphs including Capniidae) biomass was lower in streams with high Zn concentration	Colorado (Niyogi et al. 2002)
Ceratopogonidae (Diptera)	Sensitive	Cr, Cd, Cu, Fe, Mn, Zn, Pb – sensitive to sediment concentrations	Low abundance strongly statistically associated with higher mining pollution.	Basque Country, Spain (Marques et al. 2003)
Chironomidae (Diptera)	Moderate	Zn – tolerant	Abundant in high-Zn streams.	Colorado (Carlisle and Clements 2003)
		Cu, Zn, Mn, Pb – tolerant	No significant impact by experimental exposure to high metal concentrations in laboratory.	British Columbia and laboratory (Richardson and Kiffney 2000)
		Al, Fe, Mn, Cd, Cu, Pb, Zn – moderately sensitive	Abundance and richness reduced in high metal concentration streams.	Colorado (Clements et al. 2000)

Taxon (Order)	Overall Sensitivity	Response to Metals	Findings	Location of Studies (Author and year)
Chironomidae (cont.)	Moderate	Dissolved metals (Al, Cr, Fe, Ni, Cu, Zn, Pb) – tolerant	Most tolerant to higher concentrations of metal (Burgess 2015)	Cordillera Blanca, Peru (Burgess 2015)
		Zn, Pb – mixed response to pond sediment concentrations	Macroinvertebrate biodiversity was unaffected by metal accumulation in pond sediments. But high concentration of toxic metals was associated with chromosomal abnormalities in Chironomid larvae.	Olkusz, southern Poland (Michaeilova et al. 2012)
Chloroperlidae (Plecoptera)	Tolerant	Zn, Ni, Pb, Fe, Cu, Cr, Cd – tolerant	Among most likely families to occur in streams with high concentrations of listed metals.	Yorkshire, UK (Beasley and Kneale 2003)
Ephemerellidae (Ephemeroptera)	Sensitive	Zn, Pb, Cu, Cd, Cr – mixed to sensitive	Varies seasonally (Beasley and Kneale 2003); highly sensitive in September sampling, but more tolerant in May data. Life stage differences likely.	Yorkshire, UK (Beasley and Kneale 2003; 2004)
		Zn, Cd – sensitive but variable among species	Differences according to ion channel and osmoregulatory anatomy and physiology	Laboratory (Buchwalter and Luoma 2005)
Glossosomatidae (Trichoptera)	Tolerant	Cd, Cu, Zn, Pb, Ni – tolerant	Present in riffles with pH < 4, strongly associated with metallic and acidic mine runoff.	High Andes, Bolivia (Van Damme et al. 2008)
Heptageniidae (Ephemeroptera)	Sensitive	Fe – sensitive	Low abundance in streams with high concentration of Fe. Other water quality parameters (DO, pH, conductivity, e.g.) influence abundance.	Yorkshire, UK (Beasley and Kneale 2003; 2004)
		Ni – tolerant	Abundance less affected by Ni pollution.	Cordillera Blanca, Peru (Burgess 2015)

Taxon (Order)	Overall Sensitivity	Response to Metals	Findings	Location of Studies (Author and year)
		Zn, Cd – sensitive	Zn and Cd uptake rates high in laboratory experiments.	Laboratory (Buchwalter and Luoma 2005)
		US EPA CCU (Al, Fe, Mn, Cd, Cu, Pb, Zn) – highly sensitive	Lowest abundance associated with highest concentrations of pollutants.	Colorado (Carlisle and Clements 2003; Clements et al. 2000)
Hydropsychidae (Trichoptera)	Sensitive	Zn, Cd – sensitive	Multiple species showed high rate of uptake of Zn and Cd in laboratory experiments	Laboratory (Buchwalter and Luoma 2005)
Leptophlebiidae (Ephemeroptera)	Sensitive	Zn, Ni, Pb, Cu, Cr, Cd – sensitive	Among least likely families to occur in streams with higher concentrations of listed metals.	Yorkshire, UK (Beasley and Kneale 2003)
		Cu, Zn, Mn, Pb – sensitive	Strongest reaction to experimental exposure to metal concentrations. Absent in observations of urban, polluted streams.	British Columbia and laboratory (Richardson and Kiffney 2000)
		Cr, Cd, Cu, Fe, Mn, Zn, Pb – sensitive to sediment concentrations	Among most sensitive families in field observations; low abundance statistically associated with metal pollution.	Basque Country, Spain (Marques et al. 2003)
Nemouridae (Plecoptera)	Moderate	Cu, Zn, Mn, Pb – moderately sensitive	Mildly affected by exposure to higher experimental concentrations of metals in laboratory.	British Columbia and laboratory (Richardson and Kiffney 2000)
Perlidae (Plecoptera)	Sensitive	Zn, Cd – sensitive	Multiple species showed high rate of uptake of Zn and Cd in laboratory experiments	Laboratory (Buchwalter and Luoma 2005)

Taxon (Order)	Overall Sensitivity	Response to Metals	Findings	Location of Studies (Author and year)
Perlodidae (Plecoptera)	Moderate	Zn – moderately sensitive	Low abundance in high Zn concentrations	Colorado (Carlisle and Clements 2003)
Rhyacophilidae (Trichiptera)	Tolerant	Ni, Zn, Pb, Cu, Cd, Cr, Fe – tolerant	Among most likely families to occur in streams with high concentrations of listed metals.	Yorkshire, UK (Beasley and Kneale 2003)
		Zn – moderately tolerant	Abundance less strongly correlated with Zn concentration gradient than other taxa.	Colorado (Carlisle and Clements 2003)
Simuliidae (Diptera)	Tolerant	Zn, Ni, Cu, Cr, Cd – tolerant	Among most likely families to occur in streams with high concentrations of listed metals.	Yorkshire, UK (Beasley and Kneale 2003)
Simuliidae (cont.)	Tolerant	US EPA CCU (Al, Fe, Mn, Cd, Cu, Pb, Zn) – tolerant	Abundance higher in streams with high CCU scores	Colorado (Clements et al 2000)
		Cr, Cd, Cu, Fe, Mn, Zn, Pb – tolerant to sediment concentrations	Among families least affected by sediment metal concentrations.	Basque Country, Spain (Marques et al. 2003)
Taeniopterygidae (Plecoptera)	Sensitive	Zn – sensitive	Low abundance in moderate to high Zn concentrations	Colorado (Carlisle and Clements 2003)
Tipulidae (Diptera)	Moderate	Cr, Cd, Cu, Fe, Mn, Zn, Pb – moderately tolerant to sediment concentrations	Among taxa with moderate statistical association between sediment metal concentrations and reduced abundance	Basque Country, Spain (Marques et al. 2003)

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Appendix E

Benthic Macroinvertebrate Trend Plots for Non-Significant Metrics

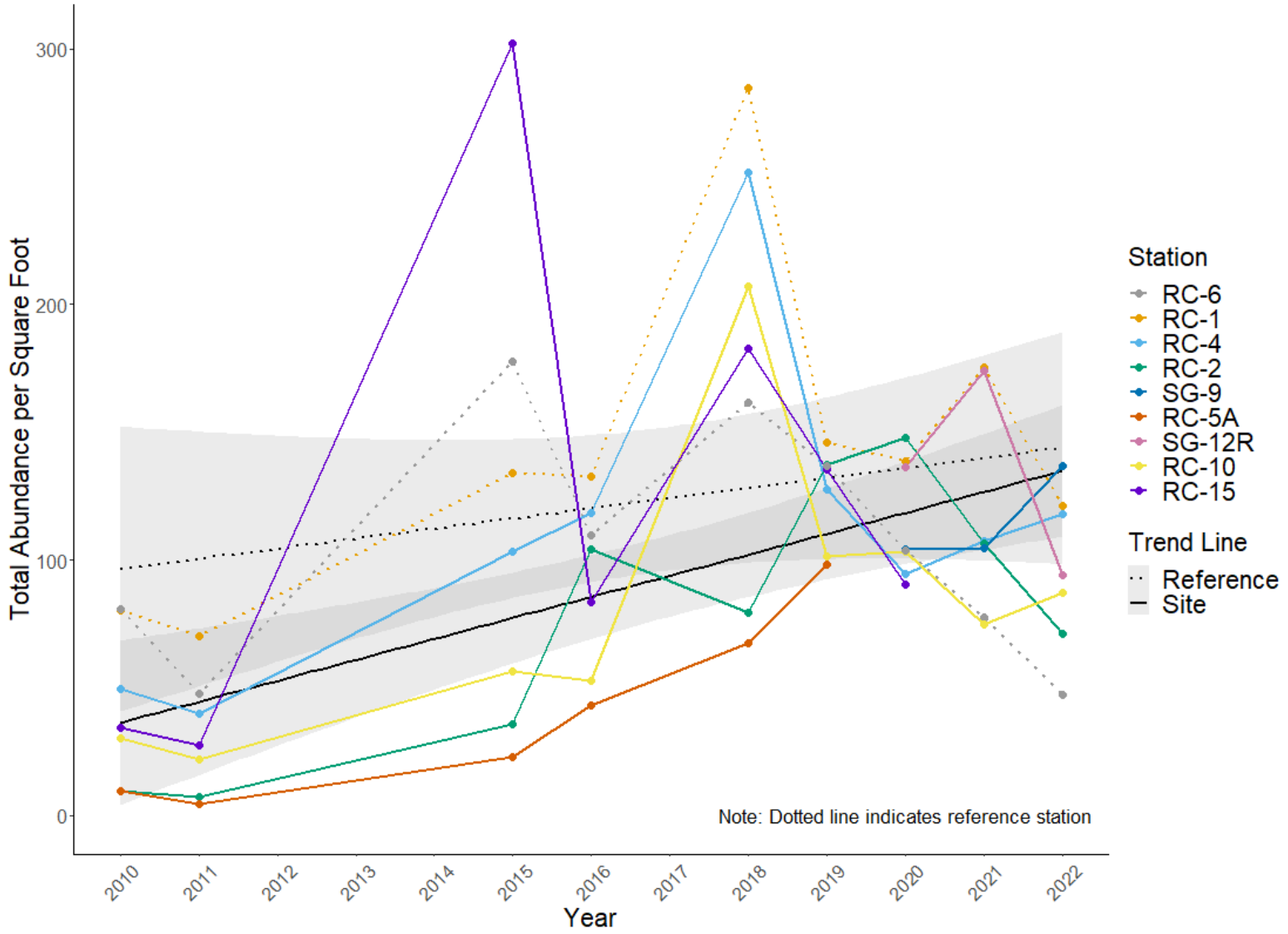

Figure E.1. Total Abundance per square foot by Station, All Years

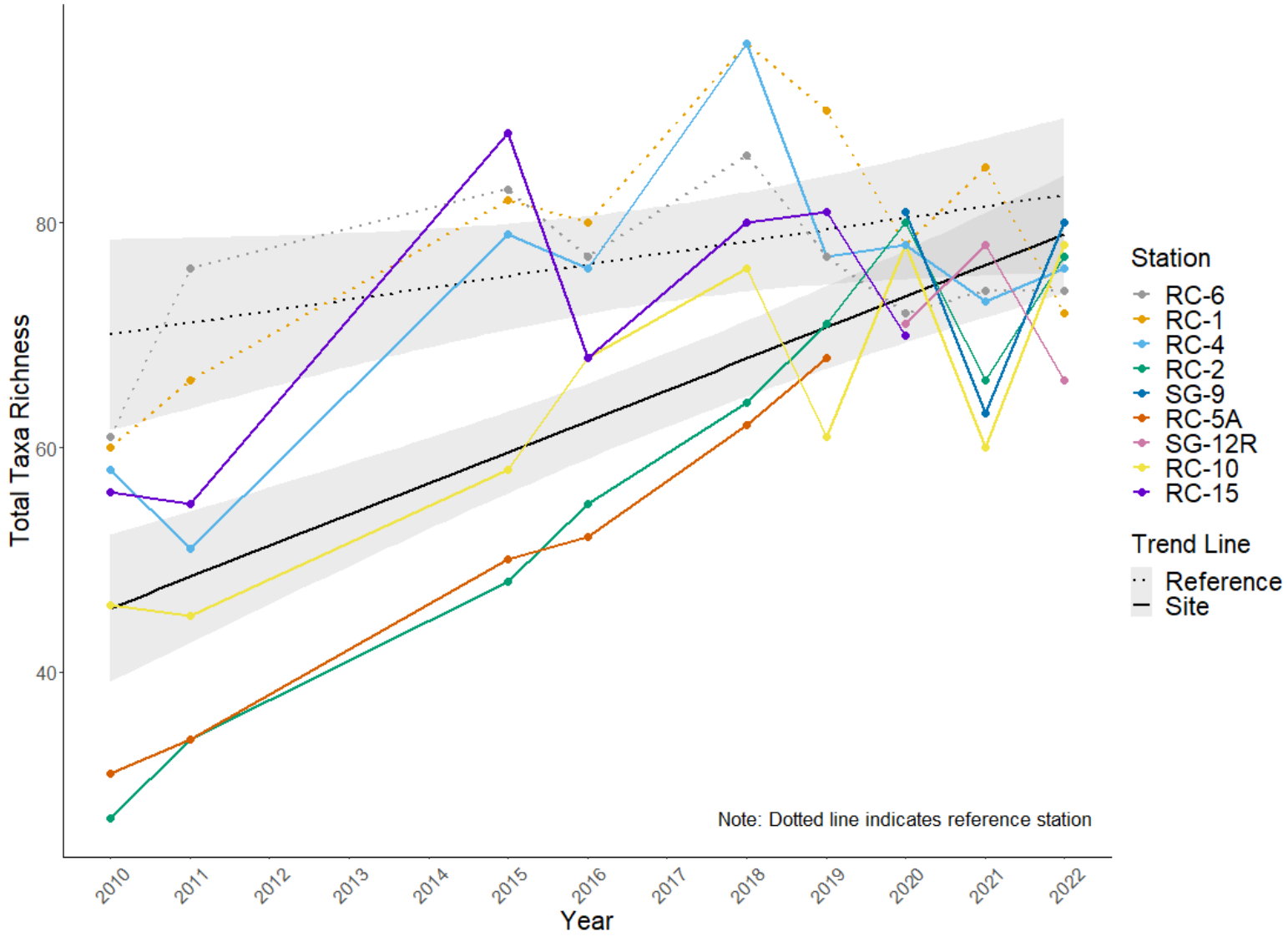

Figure E.2. Total Taxa richness by Station, All Years

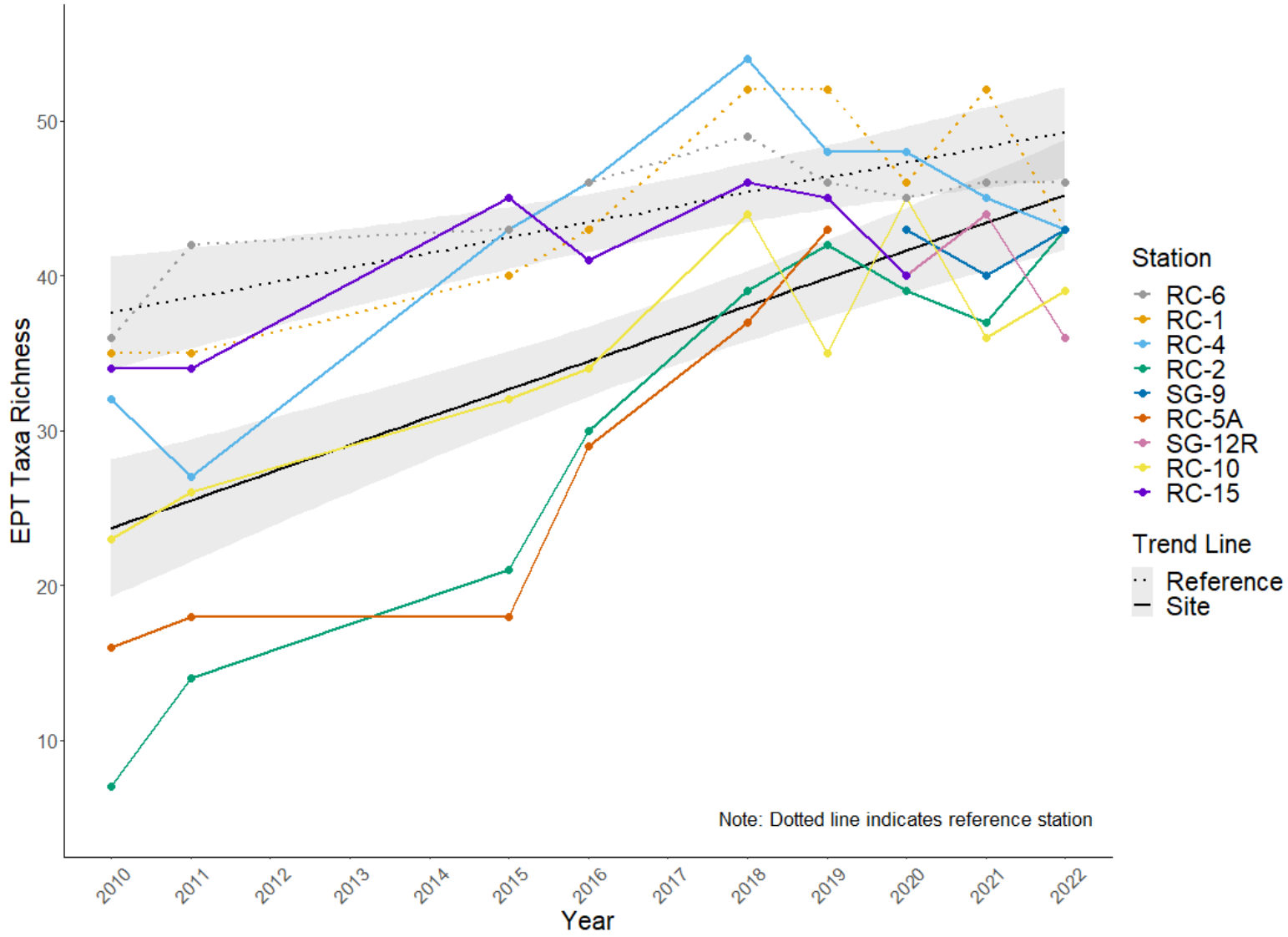

Figure E.3. EPT Taxa richness by Station, All Years

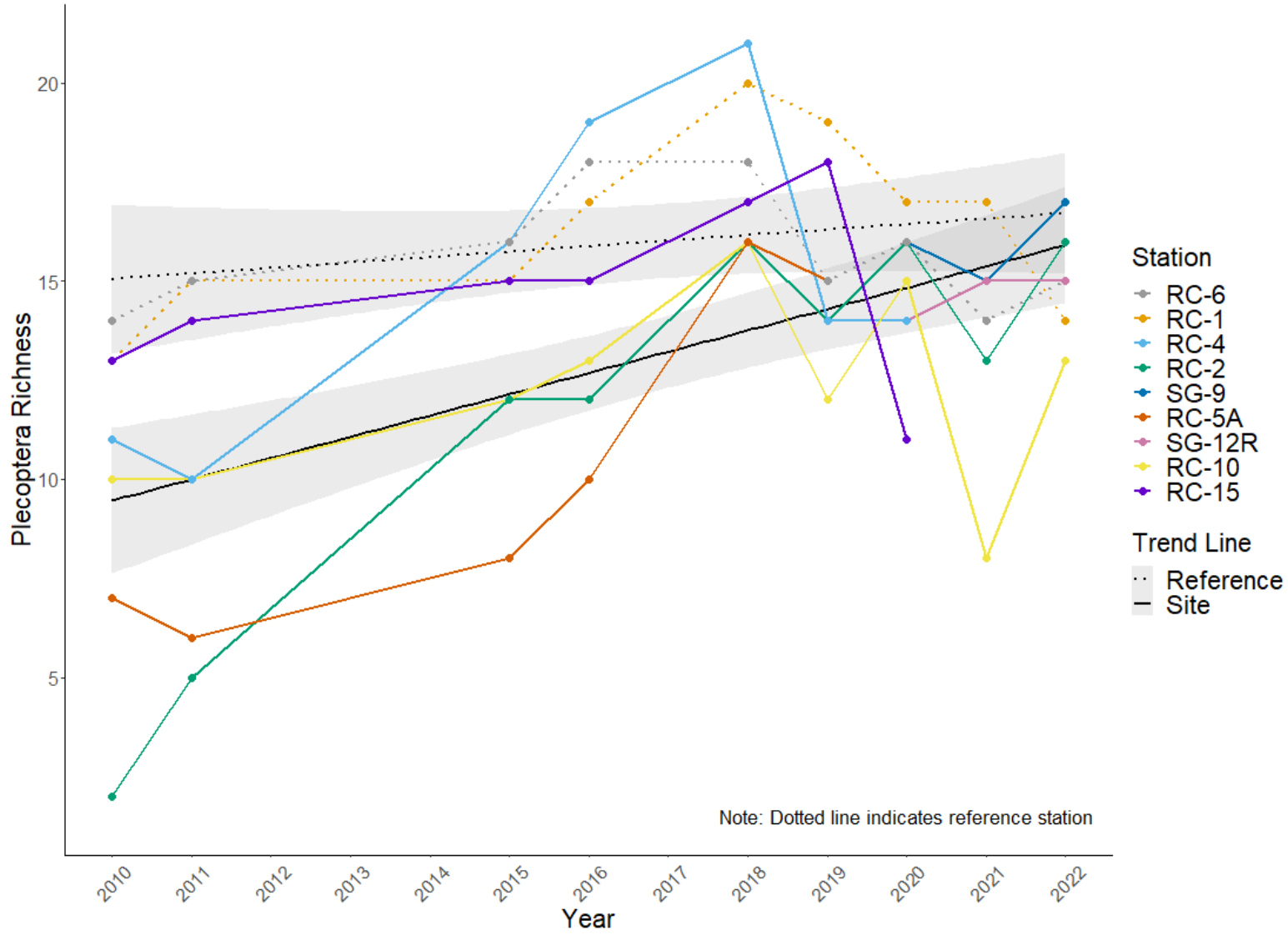

Figure E.4. Plecoptera richness by Station, All Years

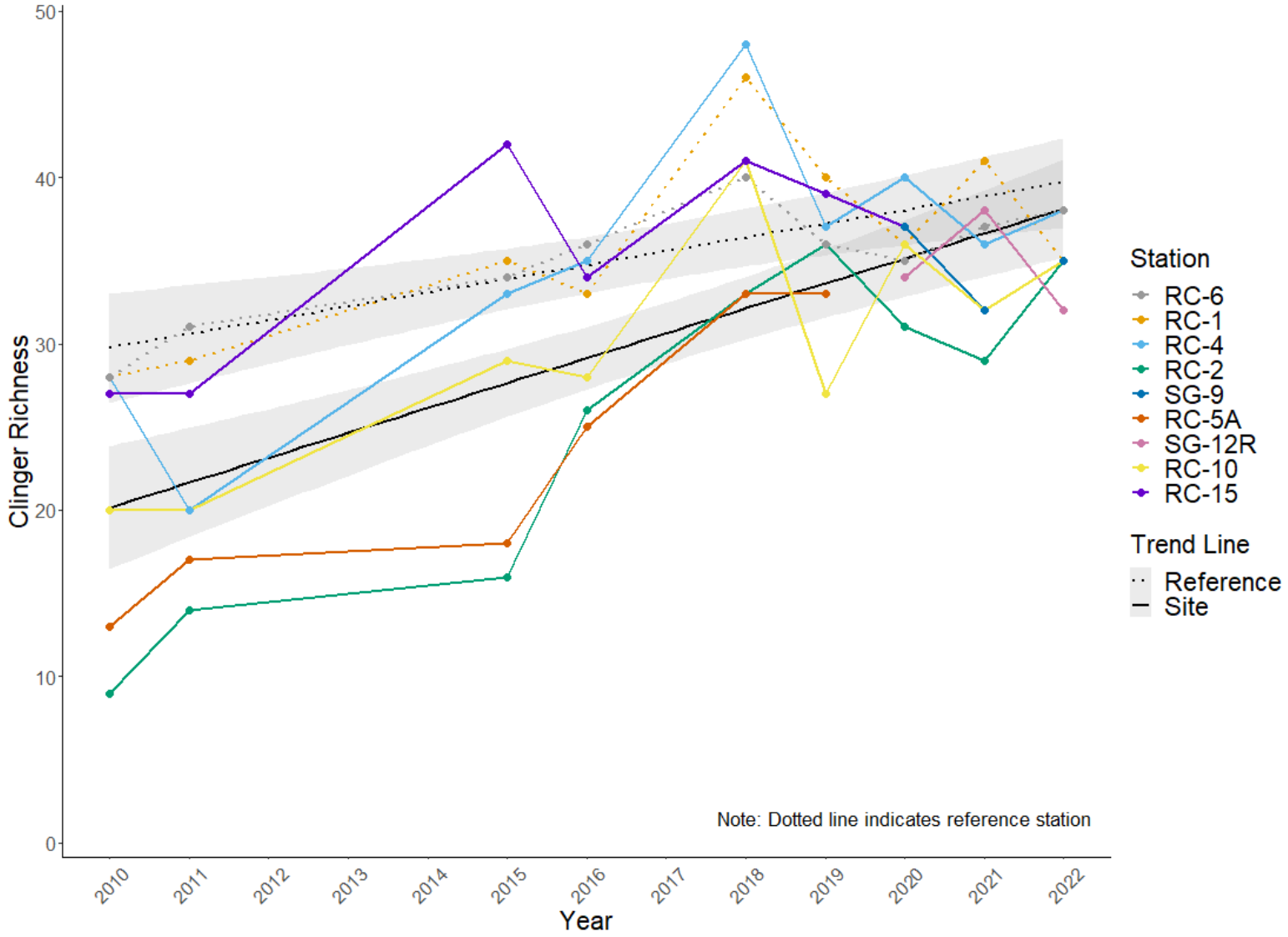

Figure E.5. Clinger richness by Station, All Years

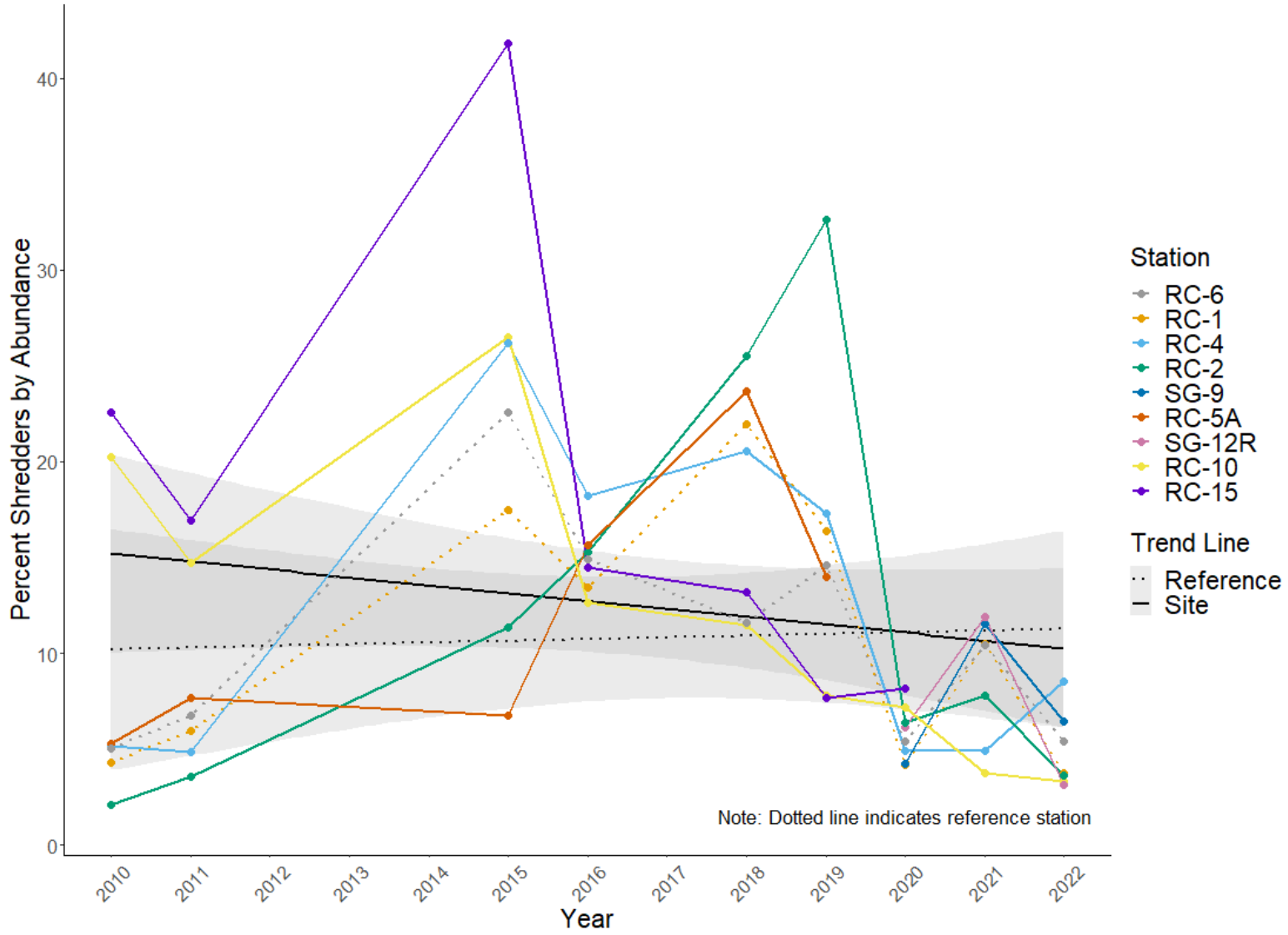

Figure E.6. Percent Shredders by Station, All Years

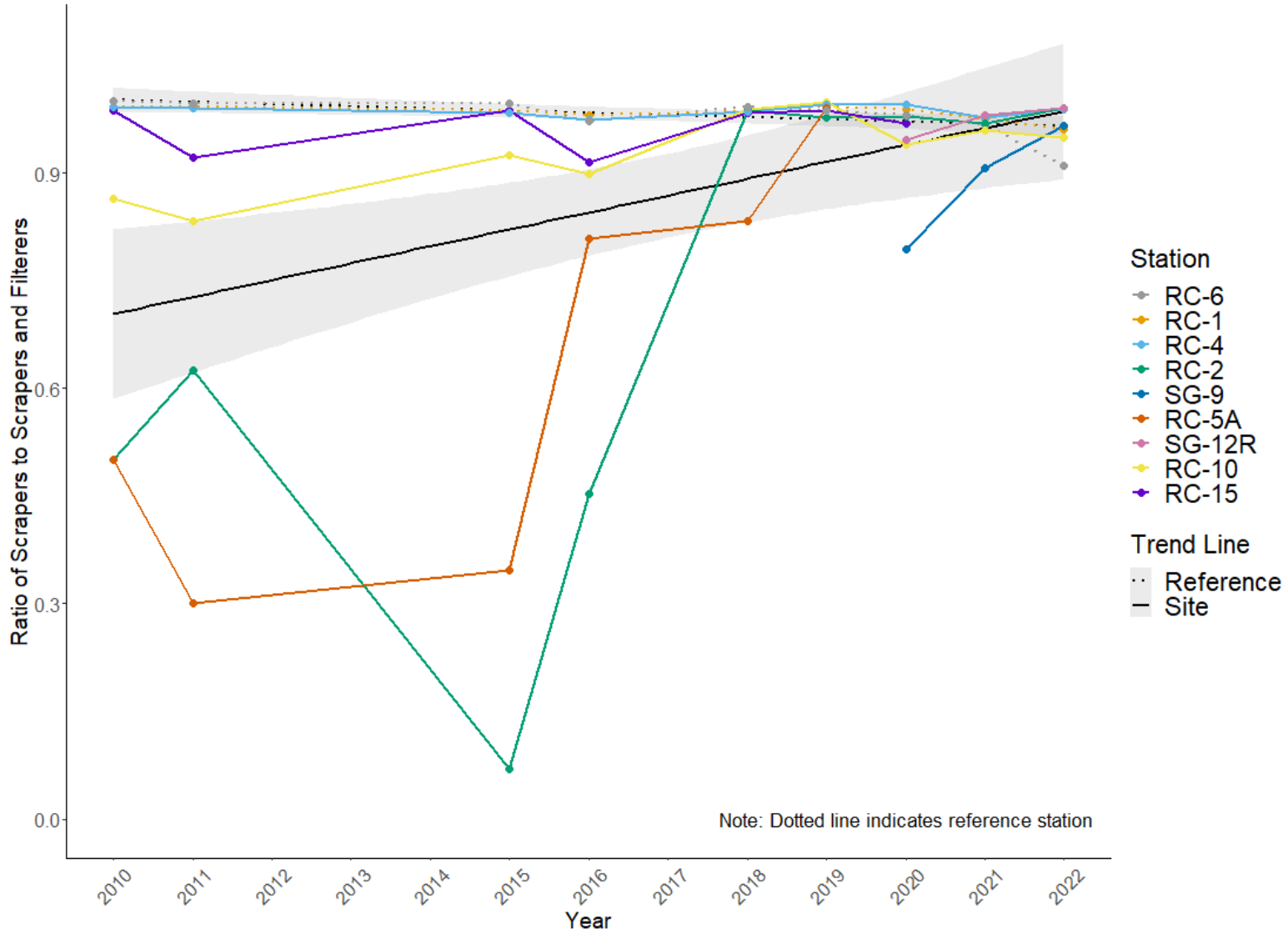

Figure E.7. Scrapers/scrapers+filtering collectors by Station, All Years

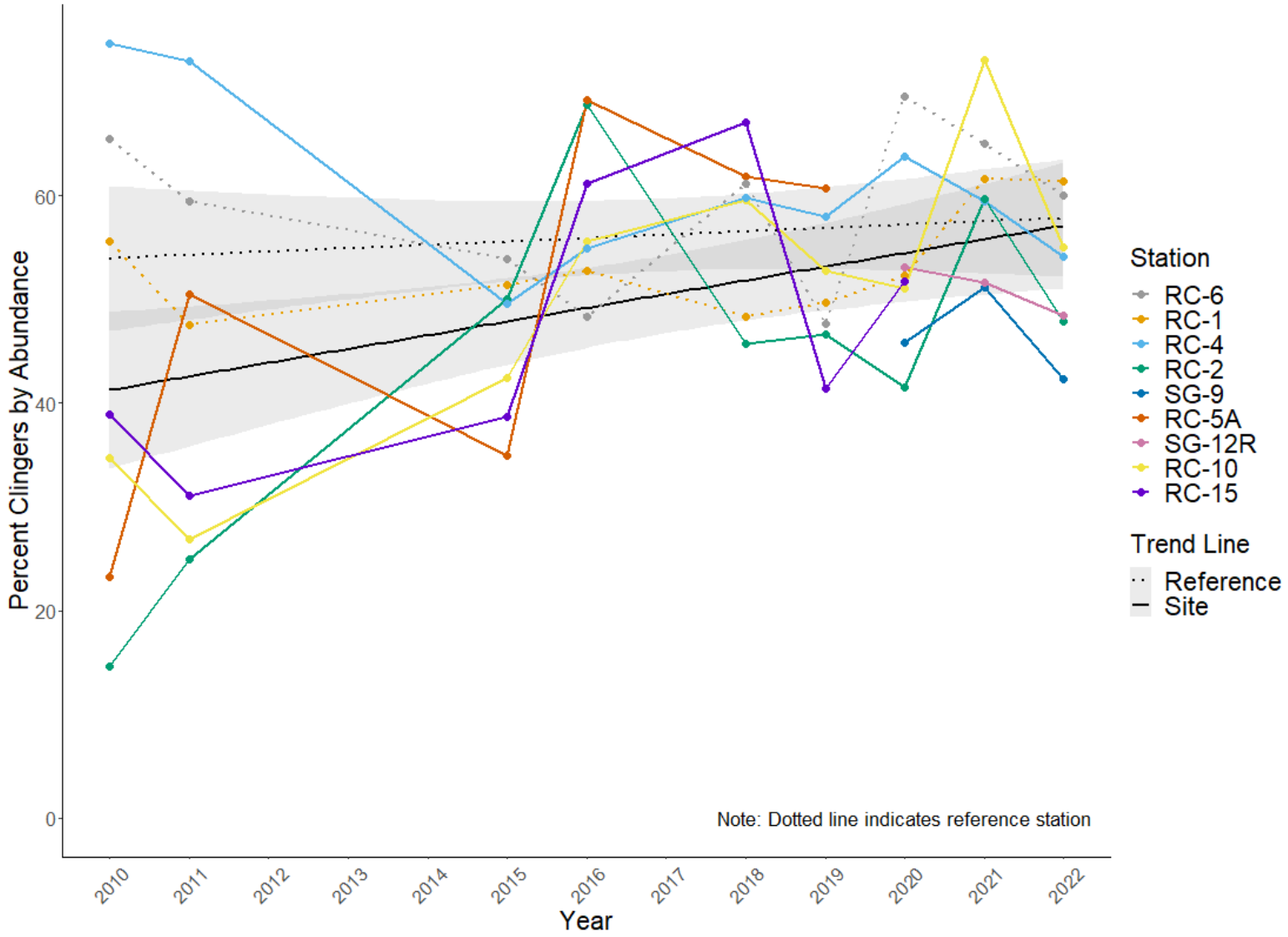

Figure E.8. Percent Clingers by Station, All Years

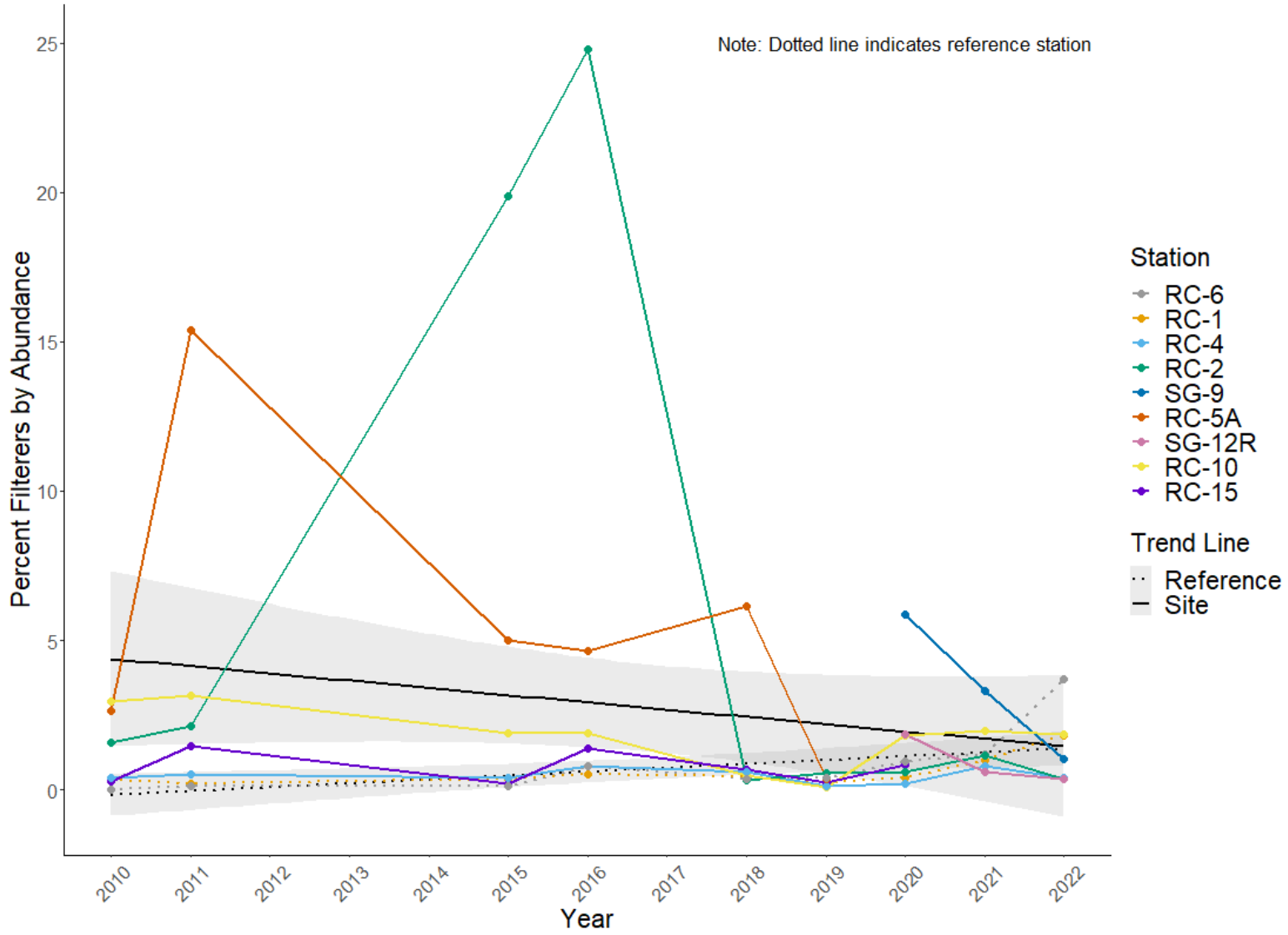

Figure E.9. Percent Filterers by Station, All Years

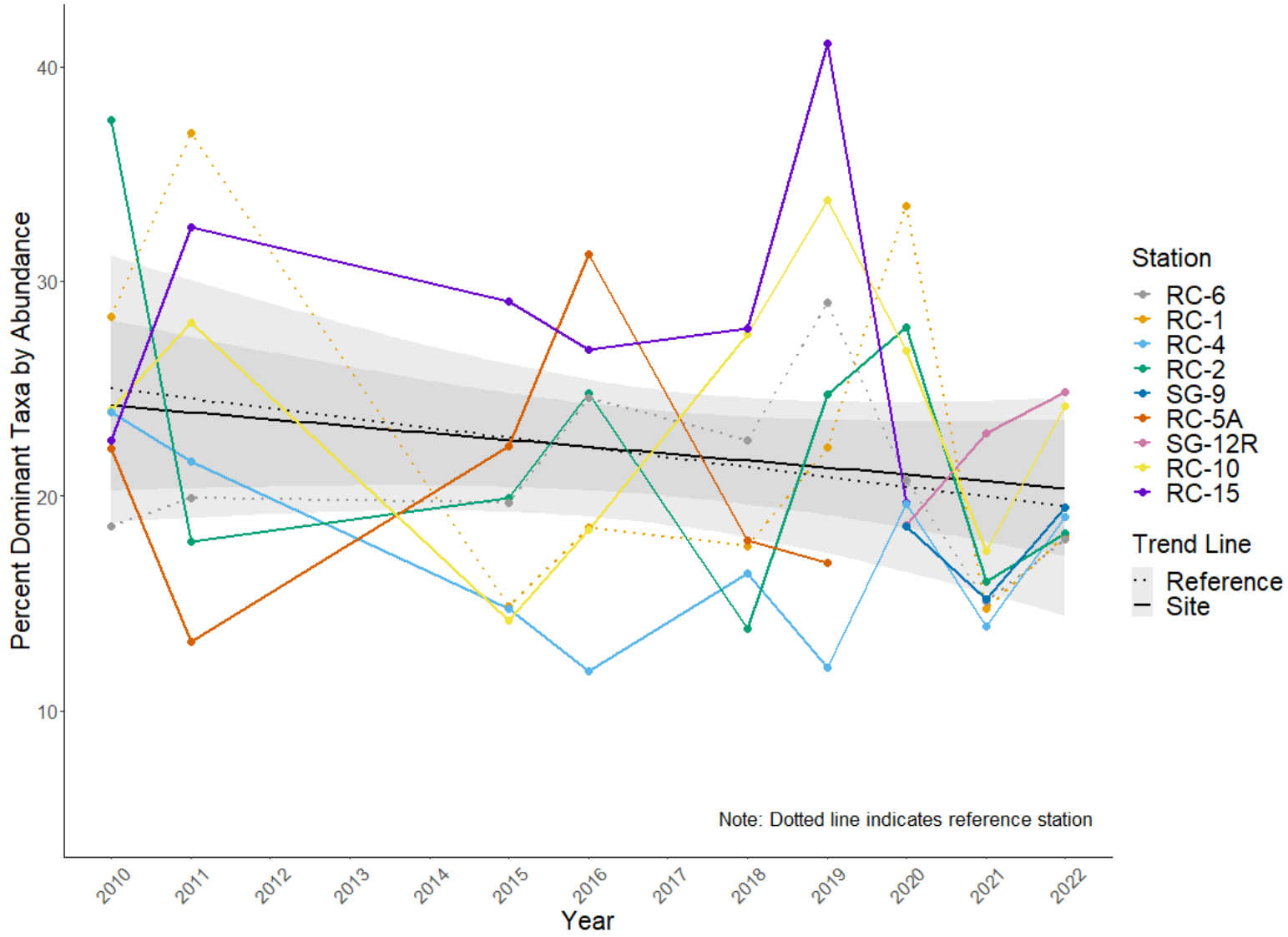

Figure E.10. Percent Contribution of dominant taxon by Station, All Years

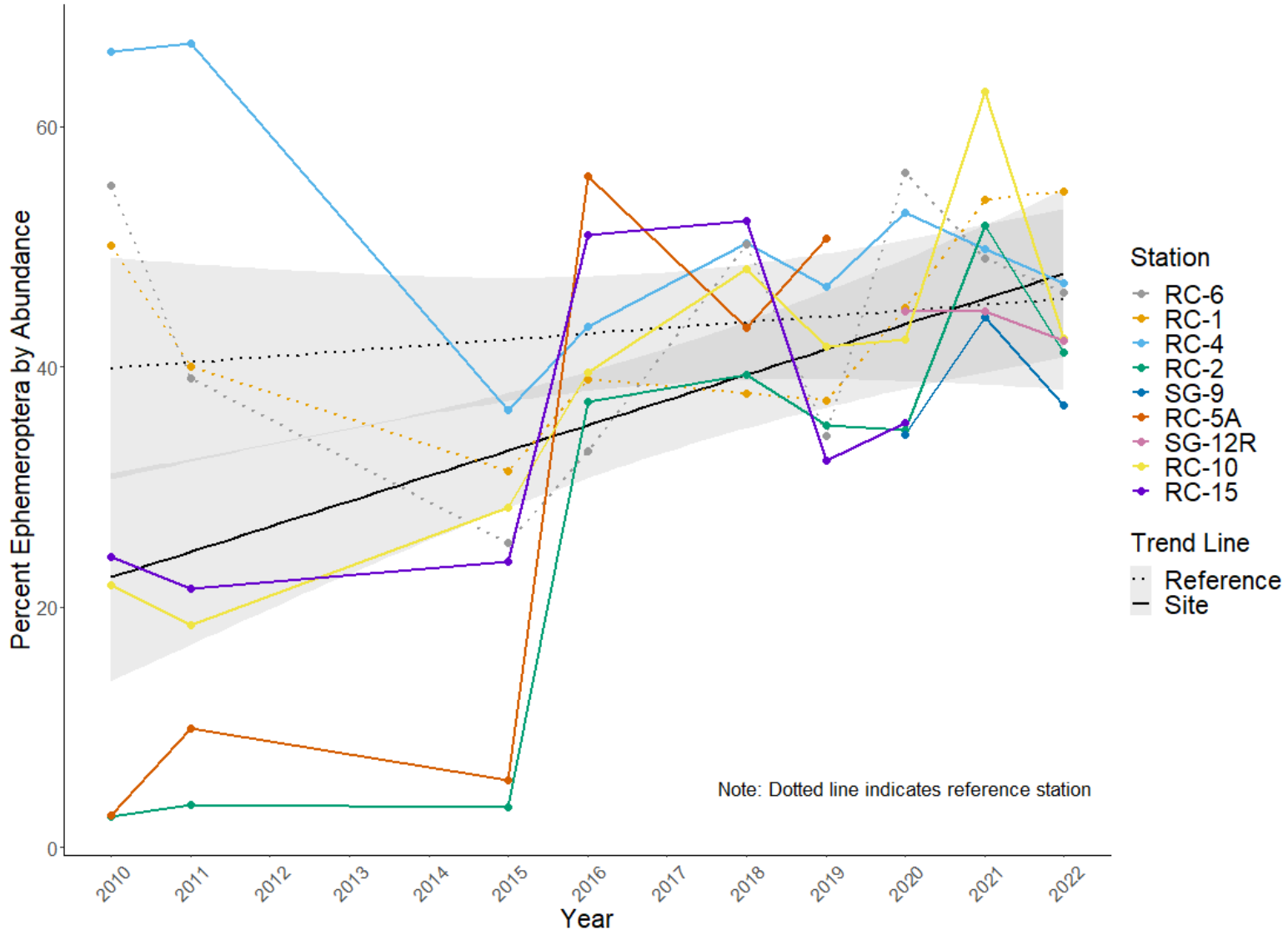

Figure E.11. Percent Ephemeroptera by Station, All Years

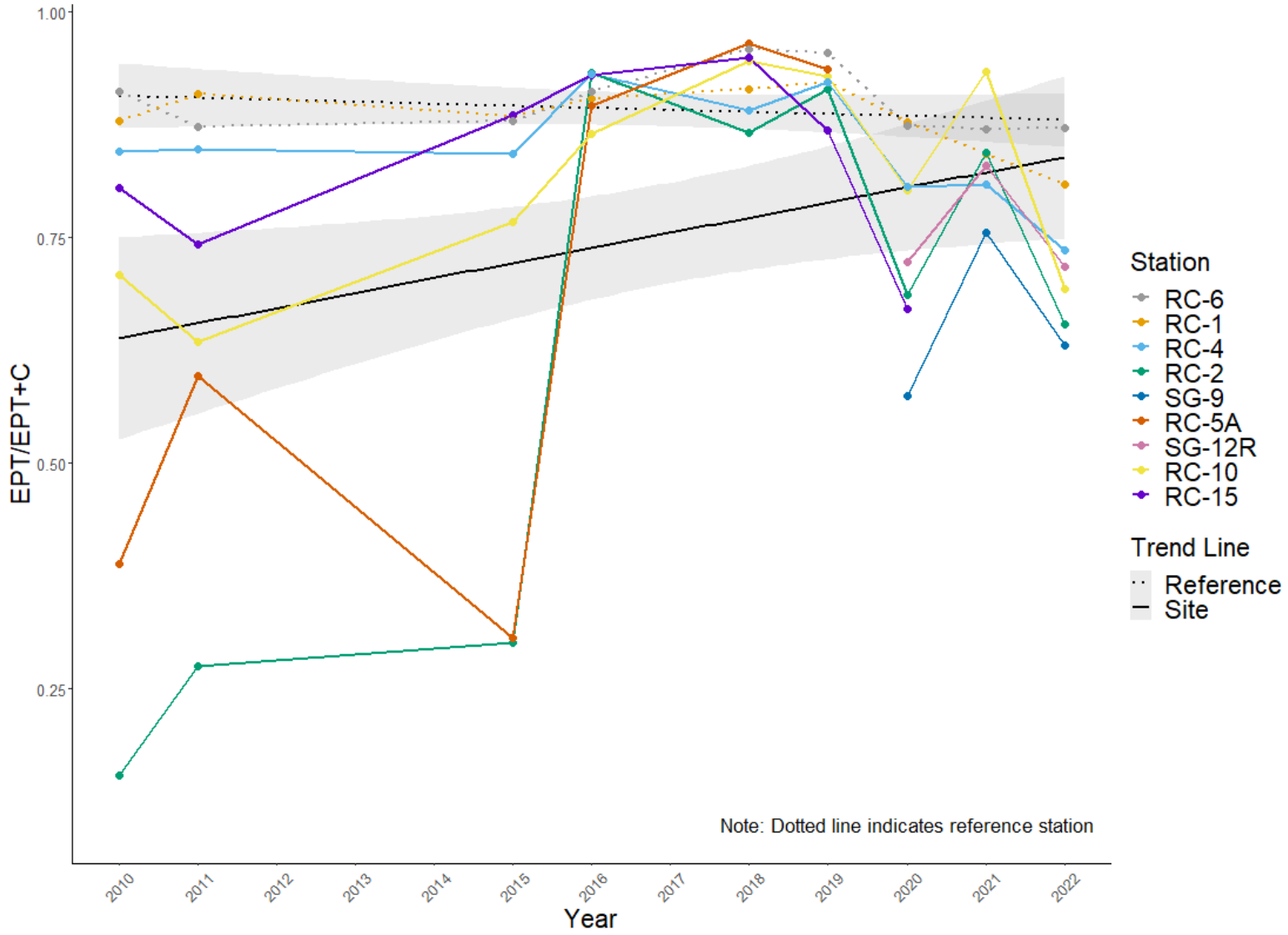

Figure E.12. EPT/EPT+C by Station, All Years

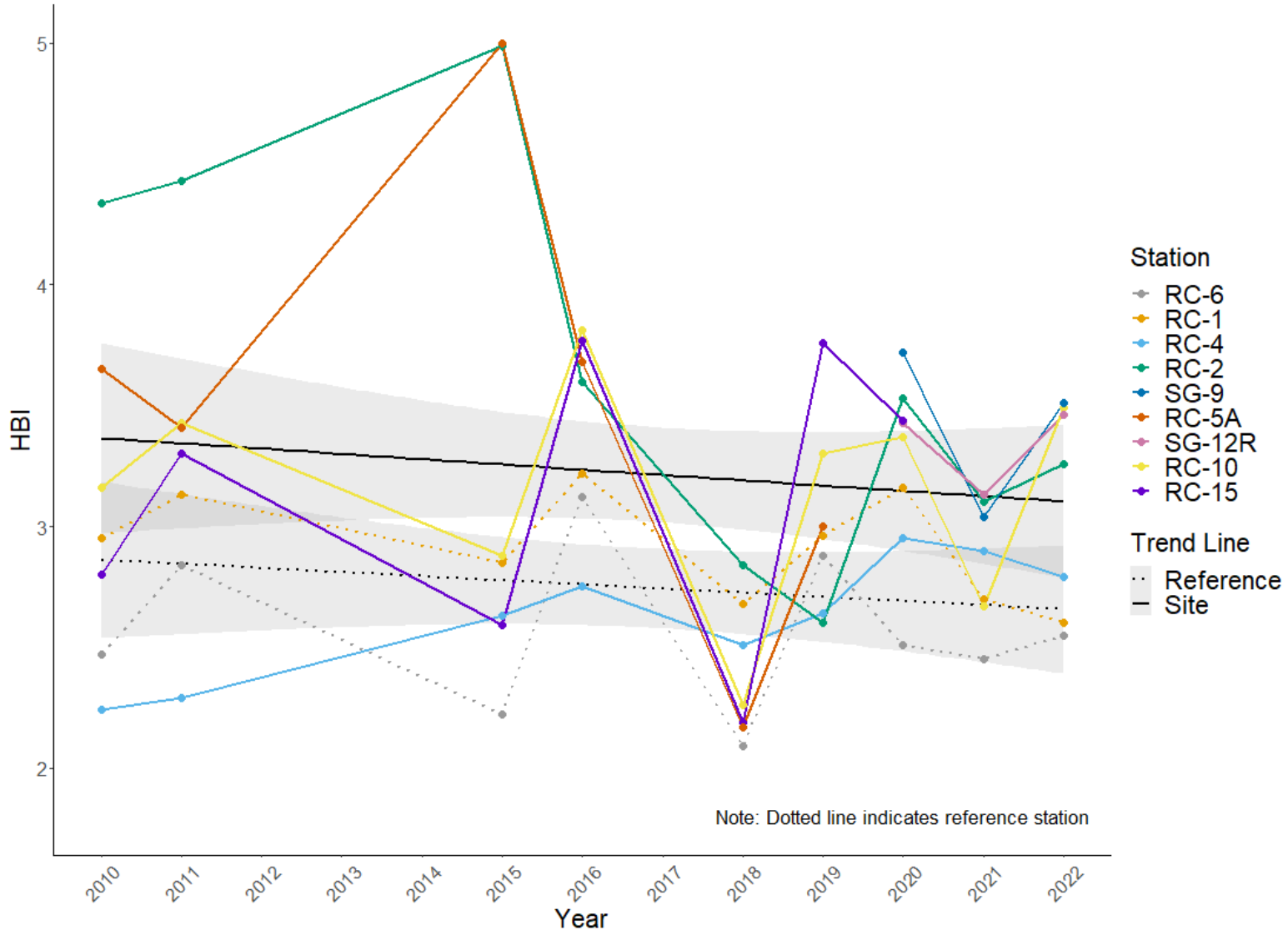

Figure E.13. HBI by Station, All Years

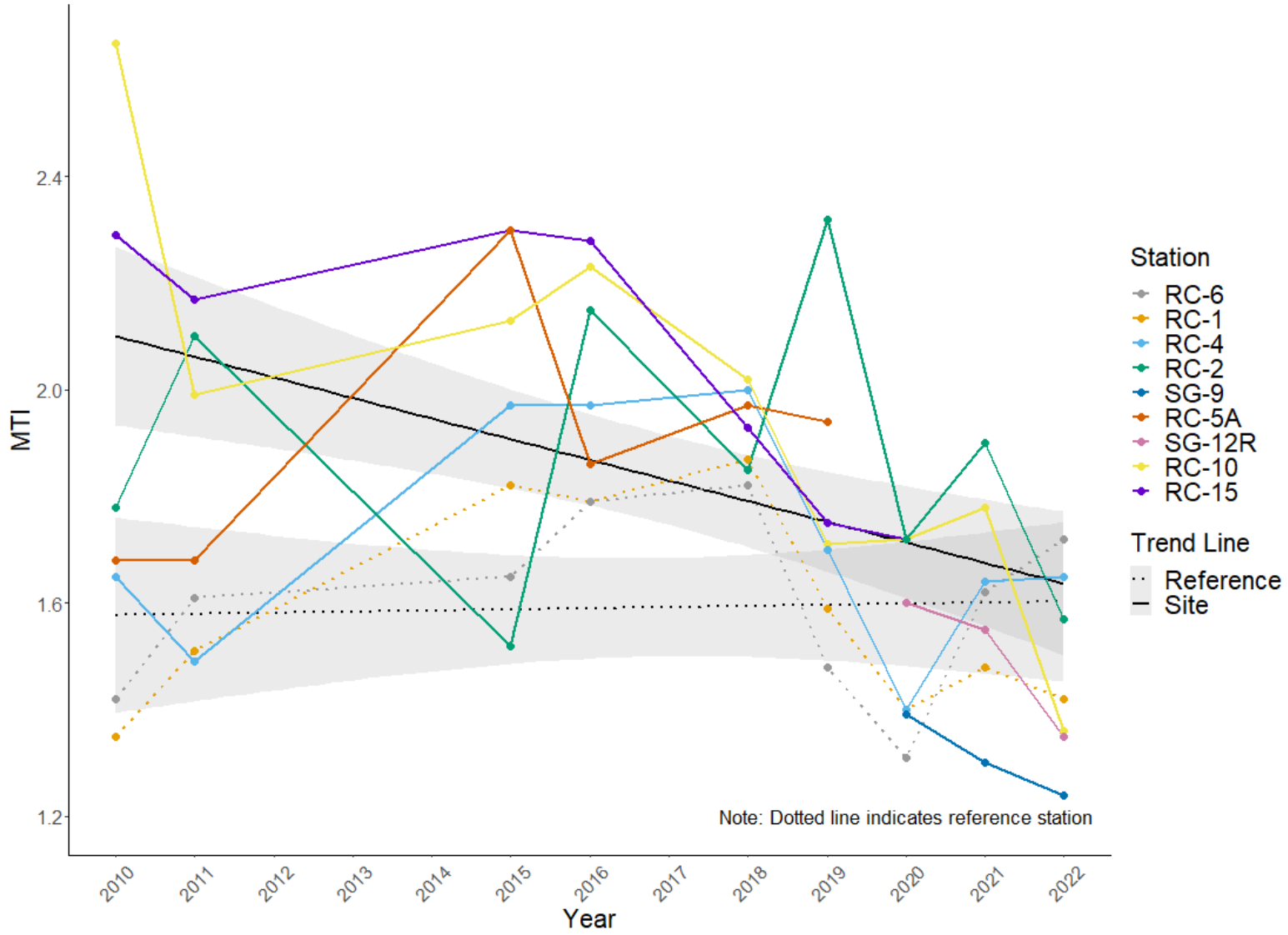

Figure E.14. MTI by Station, All Years

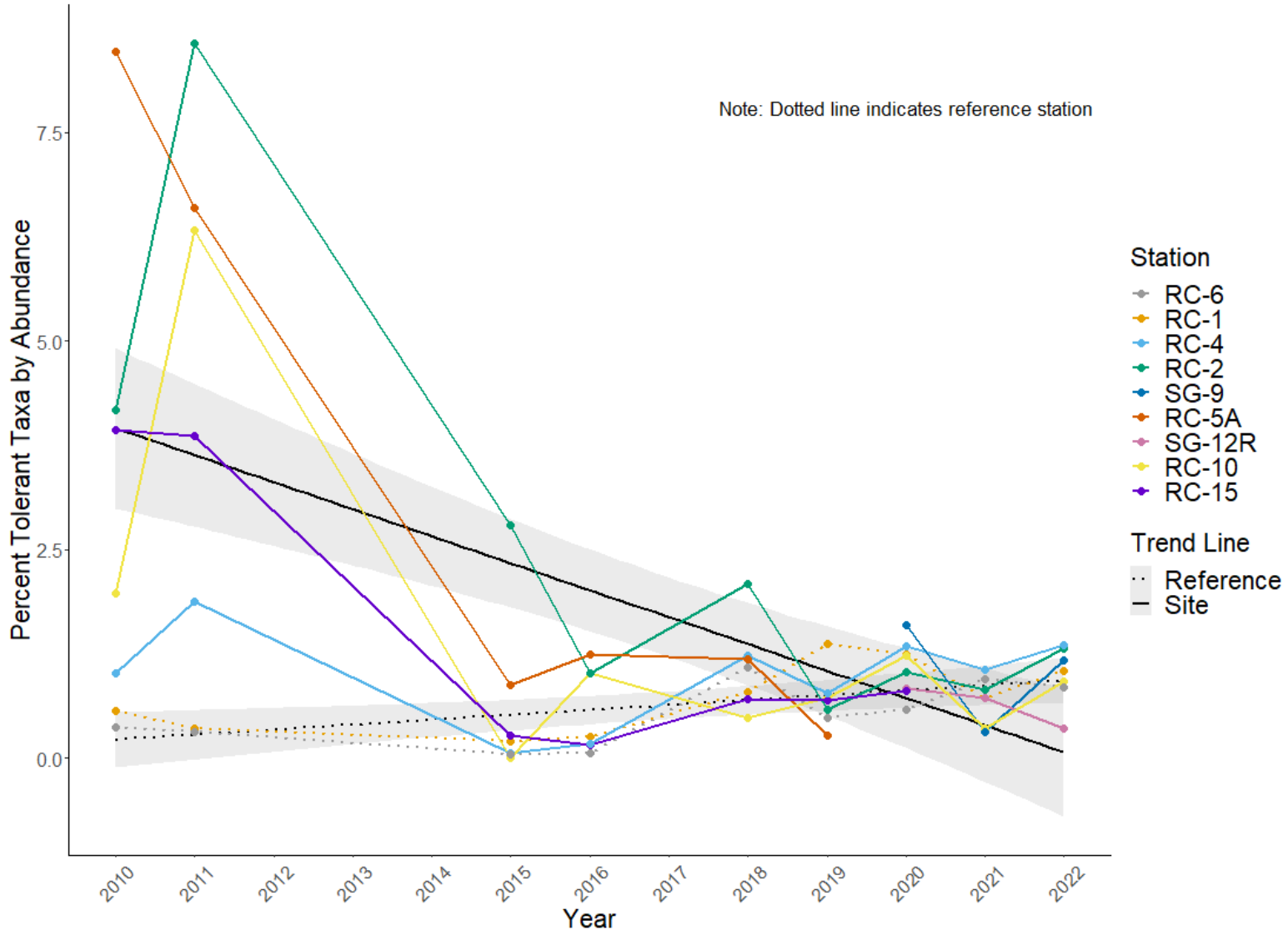

Figure E.15. Percent tolerant taxa by Station, All Years

Appendix F

Sources of Variation in the Benthic Macroinvertebrate Data

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1.0 INTRODUCTION

This appendix to Rio Tinto Holden Mine Remediation Project: Biomonitoring Report 2022 was prepared in response to a request by the natural resource trustee agencies for a more thorough evaluation of natural variability in Railroad Creek. Although natural variability has been discussed in the context of metric evaluation in the Railroad Creek biomonitoring data, natural variability has not been assessed directly. This appendix describes sources of natural variability based on a review of relevant case studies; discusses the potential influence of each source on the benthic macroinvertebrate community in Railroad Creek; and summarizes the observed interannual variability in the macroinvertebrate data at reference stations RC-6 and RC-1.

To determine the condition of a disturbed site, the majority of bioassessment programs use a reference-condition approach whereby a test site is evaluated against undisturbed sites (Reynoldson et al. 1997). To evaluate the benthic macroinvertebrate community in Railroad Creek, metrics are calculated from the benthic macroinvertebrate data at 5 Site stations (stations adjacent to or downstream of the Holden Mine Remediation Project site [Site]) and 2 reference stations (stations located upstream of the Site that have not been influenced by mining or remediation). Differences between Site and reference stations are evaluated, and trend plots showing metric values for each station over time are prepared.

Though the reference stations may be unimpacted by anthropogenic forces, they are susceptible to natural variability, meaning variability in benthic community structure resulting from spatial and temporal sources (Mazor et al. 2009). Therefore, when evaluating trends over time at Site stations and reference stations, natural variability must be considered. Most bioassessment studies proceed under the assumption that natural variability of metrics observed in reference stations is less than the change that would be caused by an anthropogenic disturbance (e.g., impacts of mine or remediation activities). This assumption is generally accurate when evaluating differences between stations from data collected during the same time period; however, literature suggests that the main source of variability when evaluating interannual differences at a given station are climatic events impacting stream discharge, as opposed to changes in habitat or anthropogenic impacts.

2.0 NATURAL SPATIAL AND TEMPORAL VARIABILITY

Natural variability generally stems from two sources: spatial variability and temporal variability. Spatial variability refers to differences in the benthic community structure attributable to their location. Small-scale spatial variability can occur between samples taken within one reach and often results from microhabitat complexity. Large-scale spatial variability refers to differences among reaches located at different sites within the same hydrologic unit or across several different watersheds. Spatial variability, both large- and small-scale, has been relatively well studied. It is generally understood that environmental parameters which vary

spatially can impact the benthic community structure (e.g., pH, riparian vegetation, stream order, substrate type, etc.) (Mazor et al. 2009).

Temporal variability refers to changes in benthic community structure over time both within years (e.g., seasonal variability) and among years (e.g., interannual variability). Several studies have documented the effects seasonal variability can have on benthic communities; this type of variability is generally driven by short-term climatic factors that occur over the course of a year (Linke et al. 1999; Bonada 2003; Beˆche et al. 2006). These climatic factors include rainfall/flood events and temperature. The effects of seasonal variability are particularly evident in regions with distinct seasonal climates, like the Mediterranean, which are characterized by warm, dry summers and cool, wet winters. In such climates, the benthic community structure is influenced by regular summer droughts, which can result in flow reductions, changes in productivity, decreases in dissolved oxygen, and increases in conductivity over the course of a season. Such changes may eliminate or significantly reduce taxa not adapted to the seasonal conditions. Additionally, predation may increase during low summer flows. Bioassessment programs can reduce the effects of seasonal variability by conducting annual sampling at the same time of year.

Long-term annual variability encompasses the effects of many different climatic events and trends over time, including prolonged droughts or floods, heat waves, or changes in rainfall or temperature driven by weather phenomena such as El Niño or, more recently, climate change.

Natural variability, particularly long-term variability, has not been well studied, but available literature suggests that the use of temporal trends in metrics and indices to inform and/or determine ecological health of a stream may be challenging (Hughes 1995, Mazor et al. 2009). Currently, only a handful of studies present more than a few years of benthological data, which is considered necessary to study and understand long-term variability (Mazor et al. 2009). These studies are summarized below.

In a study assessing 20 years of benthic macroinvertebrate and climate data from 4 undisturbed sites in 2 creeks in northern California, Mazor et al. (2009) found high variability among years for most metrics and determined that site-by-year interactions accounted for most of the variation in nearly all metrics and indices analyzed. Thus, due to interactions among interannual, seasonal, and spatial factors, site-specific approaches are likely required to isolate these sources of variation. Similarly, in a 1989 study that sampled benthic macroinvertebrates in a stream in northern California over a 7-year period, McElravy et al. (1989) found numbers of total taxa, mean number of taxa, mean macroinvertebrate density, mean Simpson's diversity, and mean densities of specific taxa varied greatly between years. This variability was in large part attributed to changes in precipitation and discharge between years and was most evident in the benthic samples collected in late May in the aftermath of peak discharge events as compared to late August when the other samples were collected (McElravy et al. 1989).

A study (MacDonald and Cote 2014) conducted in eastern Newfoundland between 2006 and 2011 to evaluate the effects of interannual variability on the benthic community structure found significant differences in the benthic macroinvertebrate community structure at references sites before and after Hurricane Igor, which occurred in 2010 and resulted in large scale discharge events. The study also found interannual variation to be significant in years unaffected by natural disturbance events. The results led McDonald and Cote to suggest that comparisons between potentially impacted sites and reference sites that do not use temporally aligned data may detect differences that are the result of temporal variation rather than the disturbance. Based on a review of the available literature, studies that have evaluated interannual variability in benthic community structure often conclude that the dominant sources of variability in community structure include time and the climatic changes that result in changes to stream discharge (Mazor et al. 2009, Rollinson 1989, MacDonald and Cote 2014, Roberts 2020, Wagner and Schmidt 2004).

Some metrics may be more susceptible to natural variability than others as demonstrated in a study conducted in the Bonita Peak Mining District in Colorado (Roberts 2020). A total of 12 locations (both reference and site) throughout 3 different watersheds within the mining district were sampled for benthic macroinvertebrates between 2016 and 2019. The study found particular metrics—including Shannon Diversity Index, Modified Hilsenhoff Biotic Index, Ephemeroptera-Plecoptera-Trichoptera (EPT) richness, Macroinvertebrate Multi-metric Index, and Metal Sensitive Family (MSF) richness—had lower interannual variability, while the relative abundance measures of EPT and MSF had the highest inter-annual variability. Based on these results, Roberts argues that sensitivity of metrics to interannual variability should be considered when interpreting future benthic trends in the mining district.

3.0 OTHER SOURCES OF VARIABILITY

Though changes in discharge can explain most natural variability, other sources must also be considered. These include the following:

- Human variability: Differences in sampling techniques among sampling crews may affect the abundance of organisms collected.
- Parasite outbreak: Outbreaks in parasites or disease and invasions of non-native species may result in short-term and long-term changes in the benthic community structure (Mazor et al. 2009). An example of a parasite outbreak was reported in a 1997 study which demonstrated outbreaks of the microsporidian pathogen *Cougourdella* decimated populations of a dominant caddisfly grazer in streams, shifting the invertebrate community to other grazer species, as well as to filter-feeders (Kohler and Wiley 1997).
- Density-dependent mechanisms: The benthic community structure can be influenced by the densities of particular taxa and intra-species competition for resources. Intra-species

competition for food, for example, may explain density-dependent mortality in some species of grazers and predators. However, few studies have successfully shown that such mechanisms explain between-year changes observed in natural stream populations (Rosillon 1989).

- Disturbance events: Fires (like the Wolverine fire that occurred in the Railroad Creek watershed in 2015) can have both short-term and long-term effects on sediment dynamics and nutrient cycling that can measurably influence community structure (Bixby et al. 2015, Harris et al. 2015). Increased nutrient and sediment delivery in burned catchments can lead to an increase in overall abundance, but the community structure will typically shift toward disturbance-tolerant taxa (Harris et al. 2015, Martens et al. 2019). Fire effects on macroinvertebrate community structure can be compounded by seasonal and interannual flow variability, potentially delaying recovery (Verkaik et al. 2015). Broadly speaking, macroinvertebrate community structure is dynamic and varies spatially and temporally in response to disturbance events like fire. The burned landscape in the Railroad Creek watershed is undergoing long-term recovery and associated watershed processes may take several more years to reach an equilibrium.

4.0 BENTHIC MACROINVERTEBRATE VARIABILITY IN RAILROAD CREEK

Located in the Chelan watershed (Water Resource Inventory Area [WRIA] 47), Railroad Creek is a mountain stream subject to a seasonal climate characterized by warm/dry summers and wet/cool winters. The variable climate conditions make the stream particularly susceptible to changes in flow and discharge, which can contribute to interannual variability in benthic community structure, as demonstrated in the studies described above. During the sampling period (2010-2022), climatic conditions have varied and included periods of low precipitation or drought, high precipitation or flooding, late temperature changes which have delayed average snow melt timelines, and disturbance events such as the 2015 Wolverine fire. Sampling has generally occurred between August and September across all monitoring years, thereby reducing the effects of seasonal variability.

Based on the literature review, a considerable source of natural interannual variability in the benthic community of Railroad Creek may be discharge. To better understand the potential impact of changes in discharge, weather data were evaluated and a WETS table analysis was prepared (NOAA Regional Climate Centers, Applied Climate Information System, NOAA 2022). Additionally, variability within the benthic macroinvertebrate community associated with interannual differences in natural conditions was analyzed by assessing measurements of variability at the 2 reference stations (RC-6 and RC-1) for the period of record (2010-2022).

4.1 Analysis of Precipitation Data and Stehekin River Discharge Data

Variation in discharge/flow is reported as a significant driver of natural interannual differences in the benthic macroinvertebrate community (Mazor et al. 2009, MacDonald and Cote 2014, McElravy et al. 1989, Rollinson 1989, Roberts 2020). Therefore, understanding the variation in discharge within Railroad Creek is informative when considering differences in the benthic macroinvertebrate community. Although discharge data are not available for Railroad Creek, precipitation data were evaluated as proxy for flow.

To evaluate precipitation data, a WETS table analysis was conducted based on climate data collected at the Holden Village weather station for the years in which sampling was conducted (2010, 2011, 2015, 2016, 2019, 2020, 2021, and 2022). A WETS analysis provides a month-by-month summary and probability analysis of temperature and precipitation. In the 3 months prior to sampling, precipitation was wetter than normal in 2022; drier than normal in 2011, 2018, and 2021; and normal in 2010, 2015, 2016, 2019, and 2020 compared to historical averages for Holden Village, Washington (NOAA 2022). Although this information does not allow for direct conclusions to be made about the benthic macroinvertebrate community, it highlights the climatic variation among years that likely influenced variation in the community structure.

As a proxy for Railroad Creek, mean monthly discharge was also evaluated for the Stehekin River, which is located in the same watershed as Railroad Creek (WRIA 47), between 2010 and 2022 (USGS 2022). Given that the Stehekin River and Railroad Creek are in the same watershed, are located in a similar mountain riverine, and are both oligotrophic, trends in the mean monthly discharge of Stehekin River are likely comparable to Railroad Creek. Qualitatively, there is substantial variability in mean monthly discharge among years (Figure F.1), particularly for the months of April through July due to snow melt and precipitation events, which can influence the benthic community structure as discussed above. For example, in the period assessed, the mean discharge for the month of May ranged from 2,704 cubic feet per second (cfs) to 6,031 cfs.

4.2 Analysis of Natural Variability in Metric Values Calculated for the Reference Stations

Natural variability within the benthic macroinvertebrate community associated with interannual differences in natural conditions was analyzed by assessing measurements of variability (e.g., standard deviation) at the 2 reference stations (RC-6 and RC-1) for the period of record (2010-2022).

Table F.1 presents the interannual standard deviation, coefficient of variation (CV), and range of the metrics of interest presented in the Biomonitoring Report for the reference stations (RC-6 and RC-1). The CV values presented in Table F.1 reflect how large the standard deviation is relative to the mean. Therefore, the larger the CV, the higher the standard deviation is relative

to the mean. There is no shared consensus on the significance of the CV value; rather it depends on the dataset. Mazor et al. (2009) defined low variability as those metrics with CV values < 50% (0.5), while metrics with high variability had CV values > 100% (1.0) with respect to long-term variability. If we apply these criteria, only one metric showed high variability (% filterers), while the other metrics showed low to moderate variability over the monitoring period. While some of this variability can likely be attributed to human variability (e.g., different sampling personnel) and localized spatial variability, much of it is likely due to interannual temporal variability caused by climatic differences that result in changes in flow/discharge regimes and rates.

Figures F.2 through F.17 present the RC-6 and RC-1 metric means and error visually, with the error bars representing the metric means plus or minus 1 standard deviation. Trend lines are included to highlight the change over the sampling period. Since RC-6 and RC-1 are reference stations and unaffected by mine or remediation activities, any trends in the data are expected to result from natural or other sources of variability (e.g., sampling efficiency).

5.0 SUMMARY AND CONCLUSIONS

This appendix describes sources of natural variability based on a review of relevant case studies and their potential influence on the benthic macroinvertebrate community in Railroad Creek, and it summarizes the observed interannual variability in the macroinvertebrate data from reference stations RC-6 and RC-1.

Based on a review of the available literature, a considerable source of natural interannual variability in the benthic community of Railroad Creek may be climatic changes over time that impact discharge. A WETS table analysis of climate data from the Holden Village weather station highlighted the variability in precipitation among sampling years, with 4 of the 9 sampling years having conditions different from normal. Additionally, discharge data from the Stehekin River (in the same watershed as Railroad Creek) provided context for the range of flows that occurred during the sampling period; the spring and summer months were highly variable in the mean monthly discharge.

The variation in the climatic and other environmental conditions are likely a large driver for the variation seen in the benthic macroinvertebrate community. Measurements of variability at the 2 reference stations (RC-6 and RC-1) for the period of record (2010-2022) indicate a moderate level of variation; only 1 metric showed high variability (% filterers), based on thresholds defined by Mazor et al. (2009).

This assessment of natural variability in Railroad Creek provides context for future evaluations of temporal trends in data from Site stations by characterizing variability associated with annual climatic, environmental, and other natural factors.

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TABLES

Table F.1. Metric Variation at RC-6 and RC-1 across Monitoring Years

Metric	Standard Deviation		Coefficient of Variation		Range	
	RC-6	RC-1	RC-6	RC-1	RC-6	RC-1
Productivity Metrics						
Total abundance	46.71	62.31	0.45	0.44	130.40	214.60
Richness Metrics						
Total taxa richness	7.06	11.38	0.09	0.14	25	36
EPT taxa richness	3.71	6.85	0.08	0.15	13	17
Plecoptera richness	1.50	2.29	0.10	0.14	4	7
Trichoptera richness	2.06	3.64	0.14	0.28	6	11
Clinger richness	3.64	5.75	0.10	0.16	12	18
Trophic/Habit Metrics						
% Shredders	5.91	6.77	0.55	0.62	17.56	18.22
Scrapers/Scrapers+Filterers	0.03	0.01	0.03	0.01	0.09	0.03
% Clingers	7.63	5.20	0.13	0.10	21.95	14.06
% Filterers	1.14	0.52	1.36	0.89	3.68	1.60
Composition Metrics						
% Dominant taxon	4.07	8.20	0.19	0.36	13.93	22.14
% Ephemeroptera	10.71	8.13	0.25	0.19	30.82	23.23
EPT/EPT+C	0.04	0.04	0.04	0.04	0.09	0.11
Tolerance Metrics						
HBI	0.33	0.23	0.13	0.08	1.03	0.62
MTI	0.17	0.20	0.11	0.12	0.51	0.52
% Tolerant taxa	0.37	0.43	0.71	0.59	1.05	1.17

FIGURES

Figure F.1. Mean Monthly Discharge for Stehekin River between 2010 and 2022

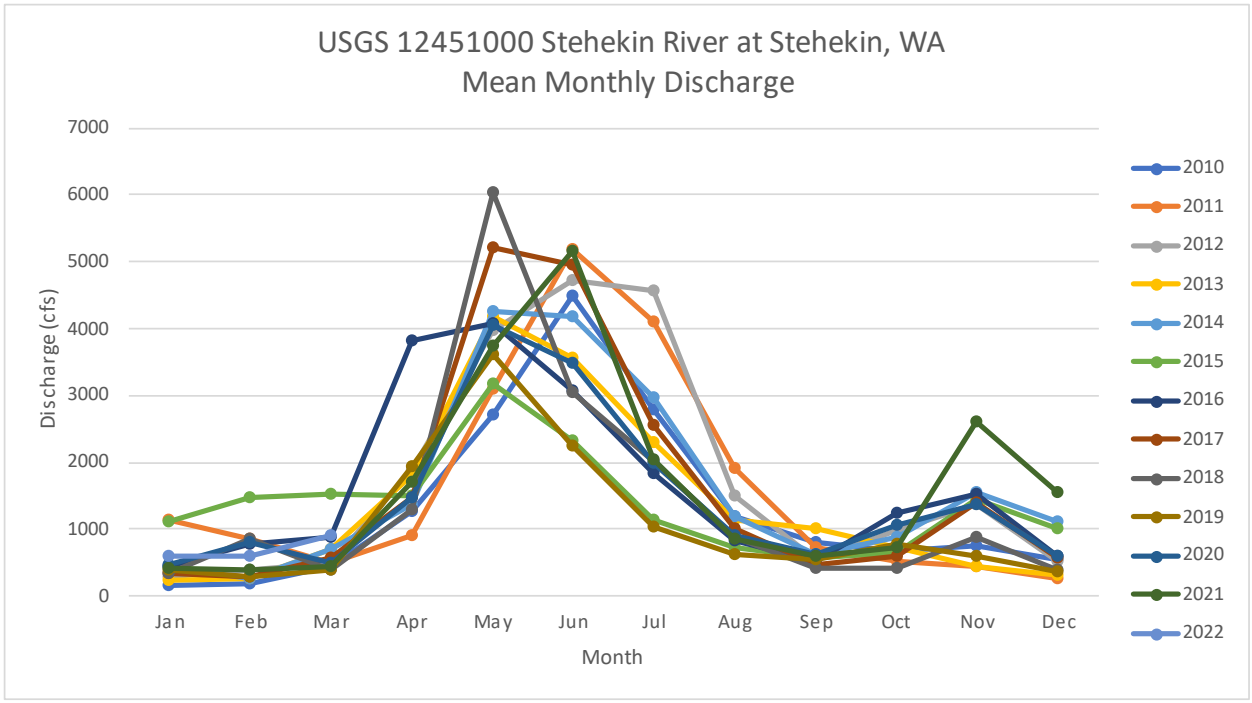


Figure F.2. Total Abundance per square foot at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

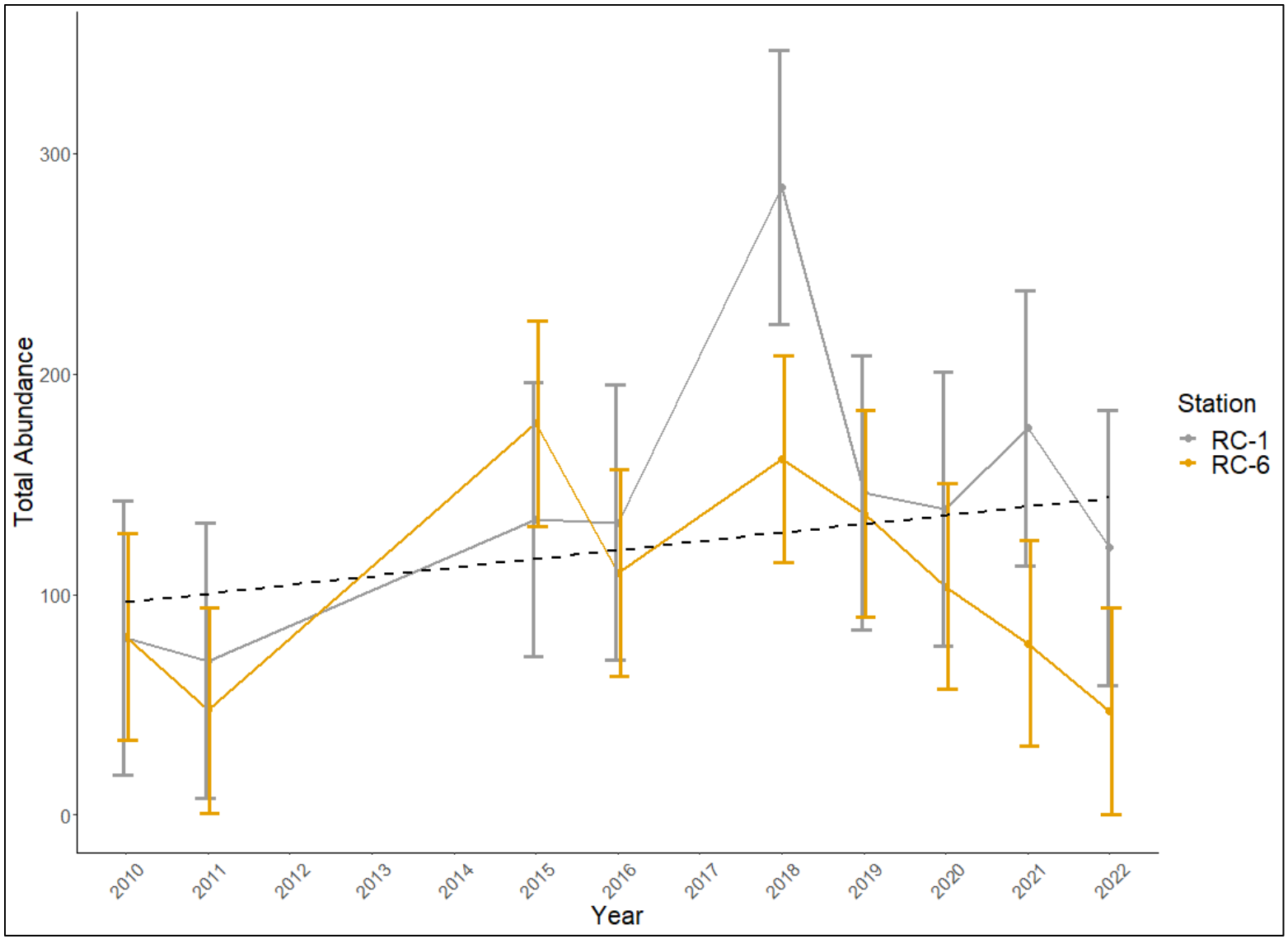


Figure F.3. Total Taxa Richness at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

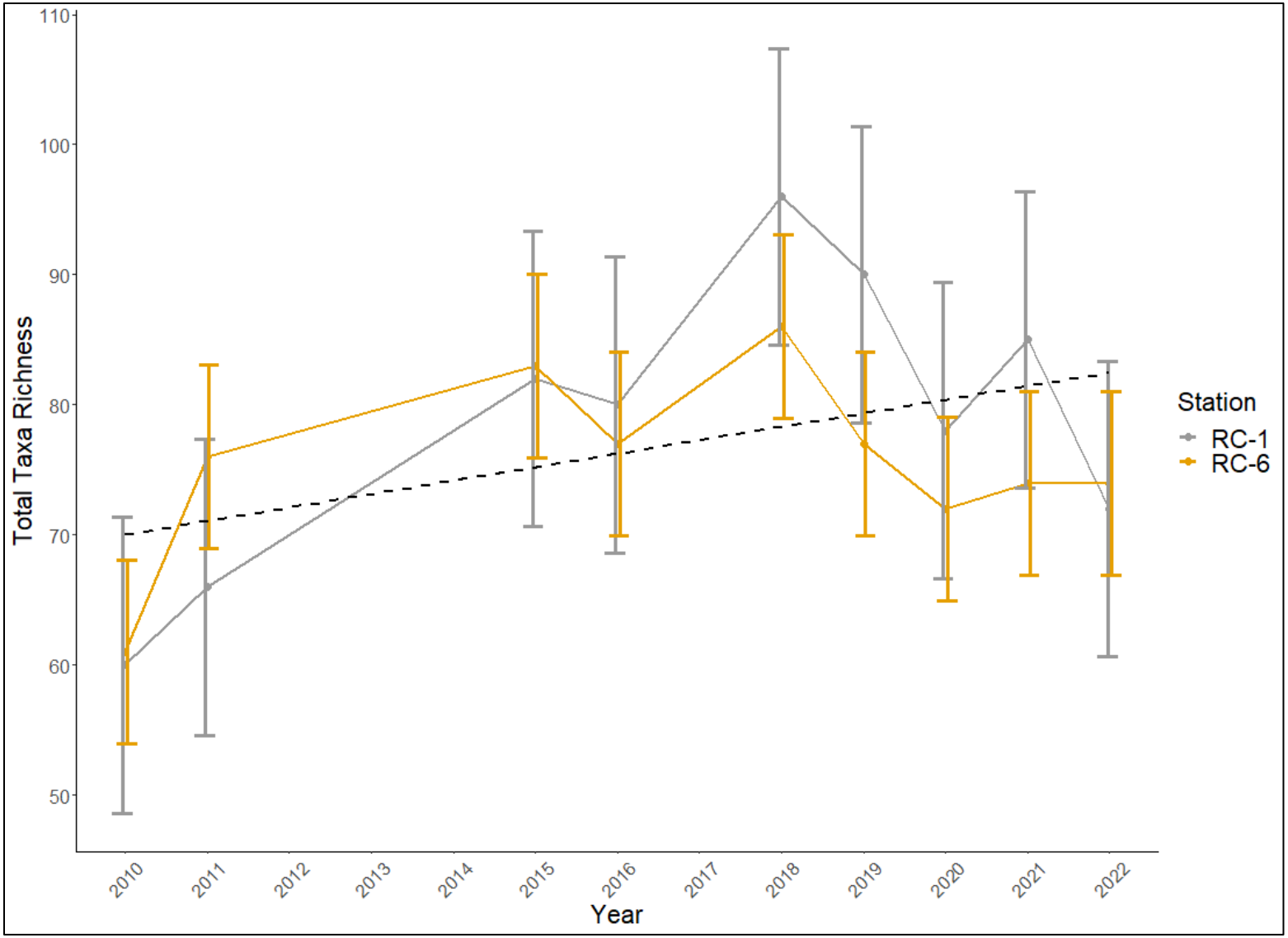


Figure F.4. EPT Taxa Richness at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

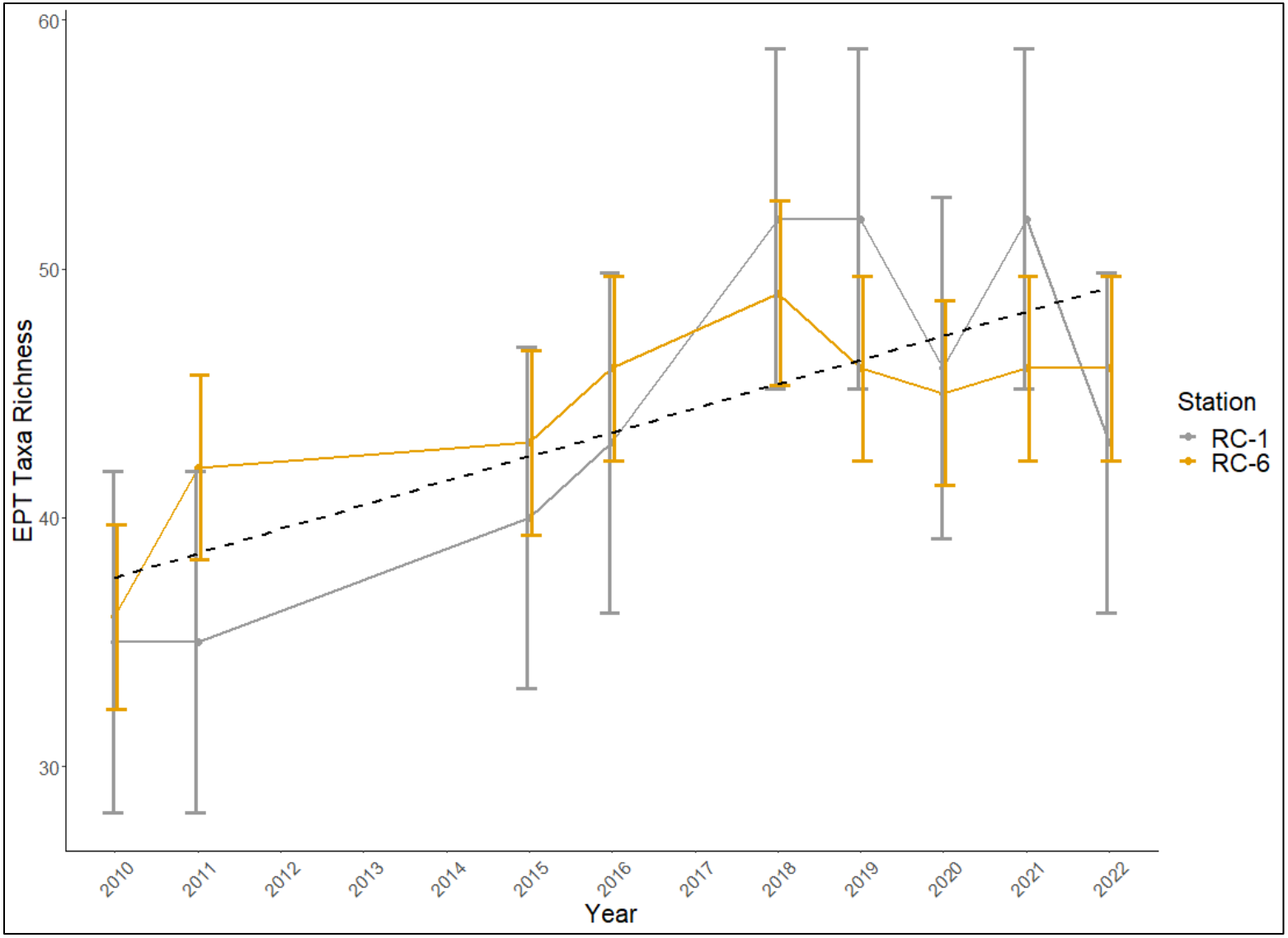


Figure F.5. Plecoptera Richness at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

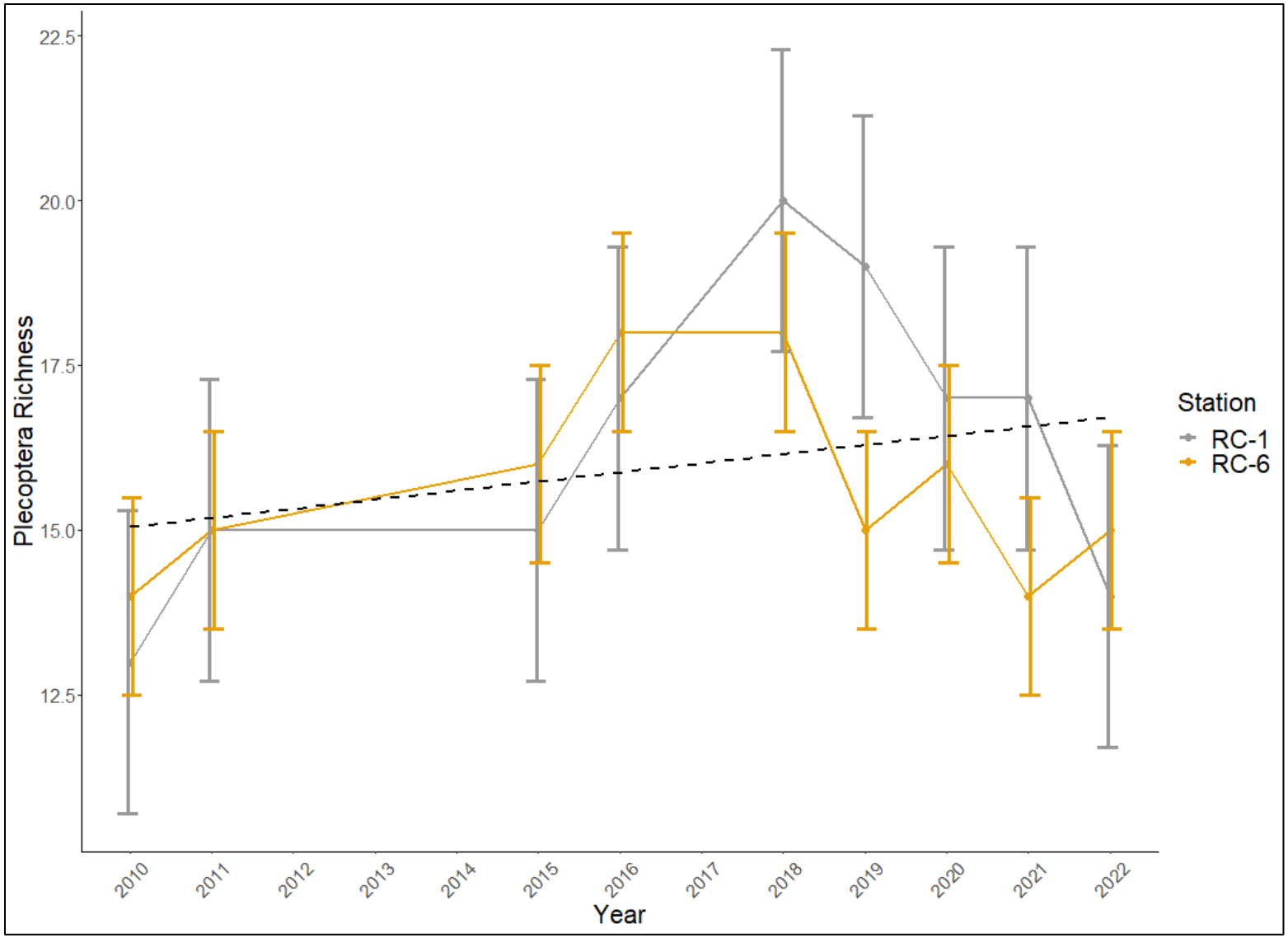


Figure F.6. Trichoptera Richness at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

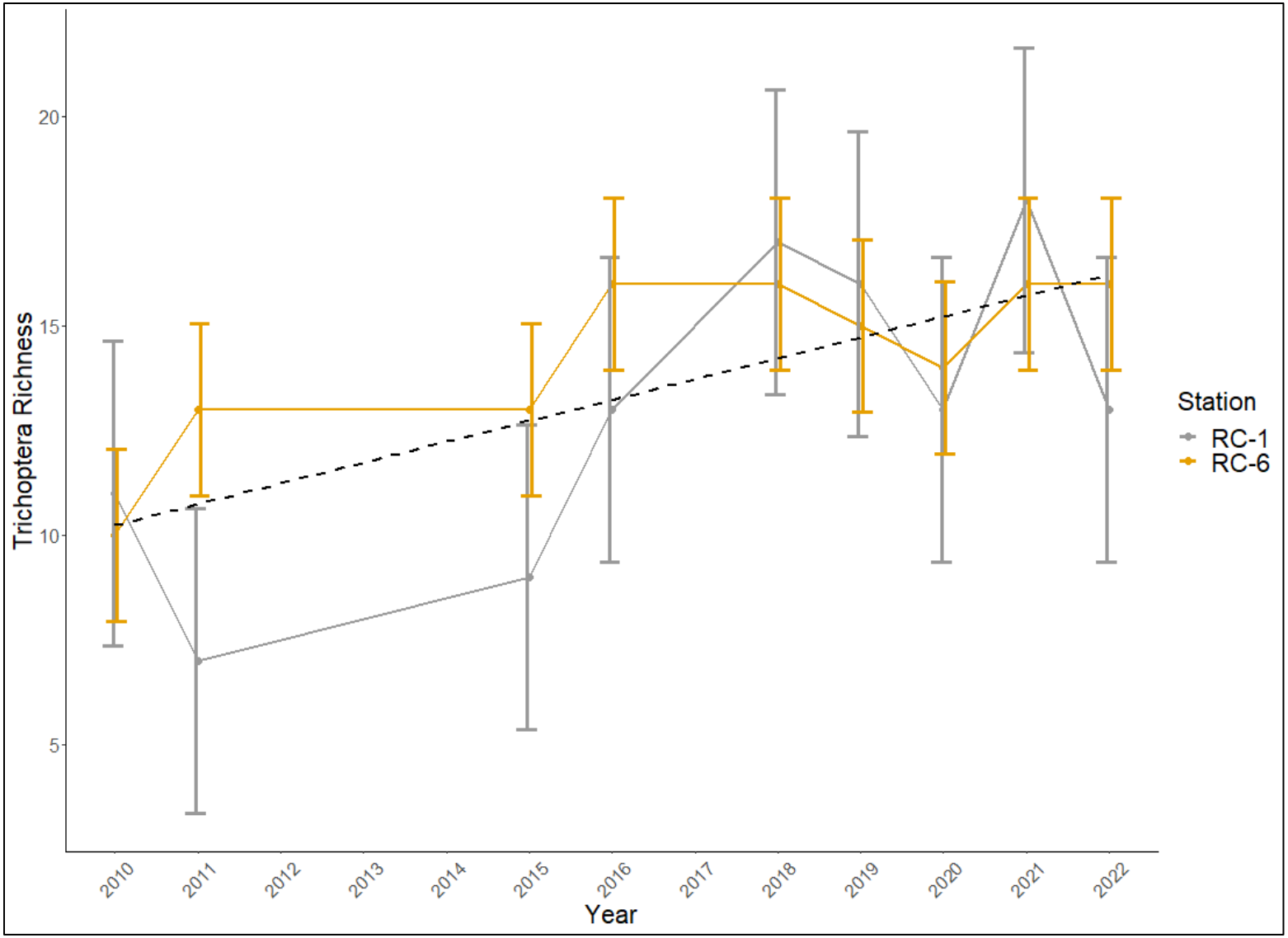


Figure F.7. Clinger Richness at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

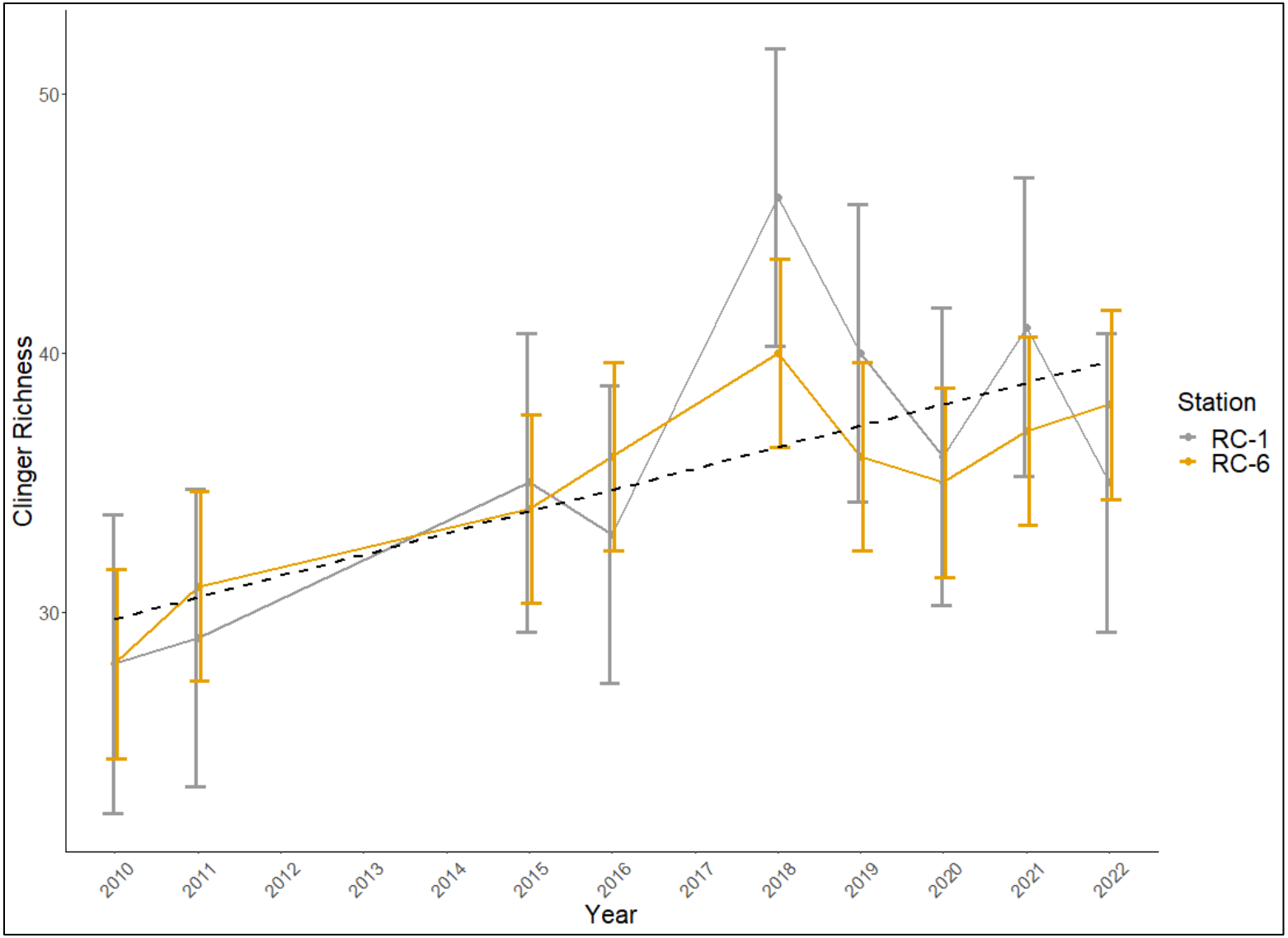


Figure F.8. Percent Shredders by Abundance at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

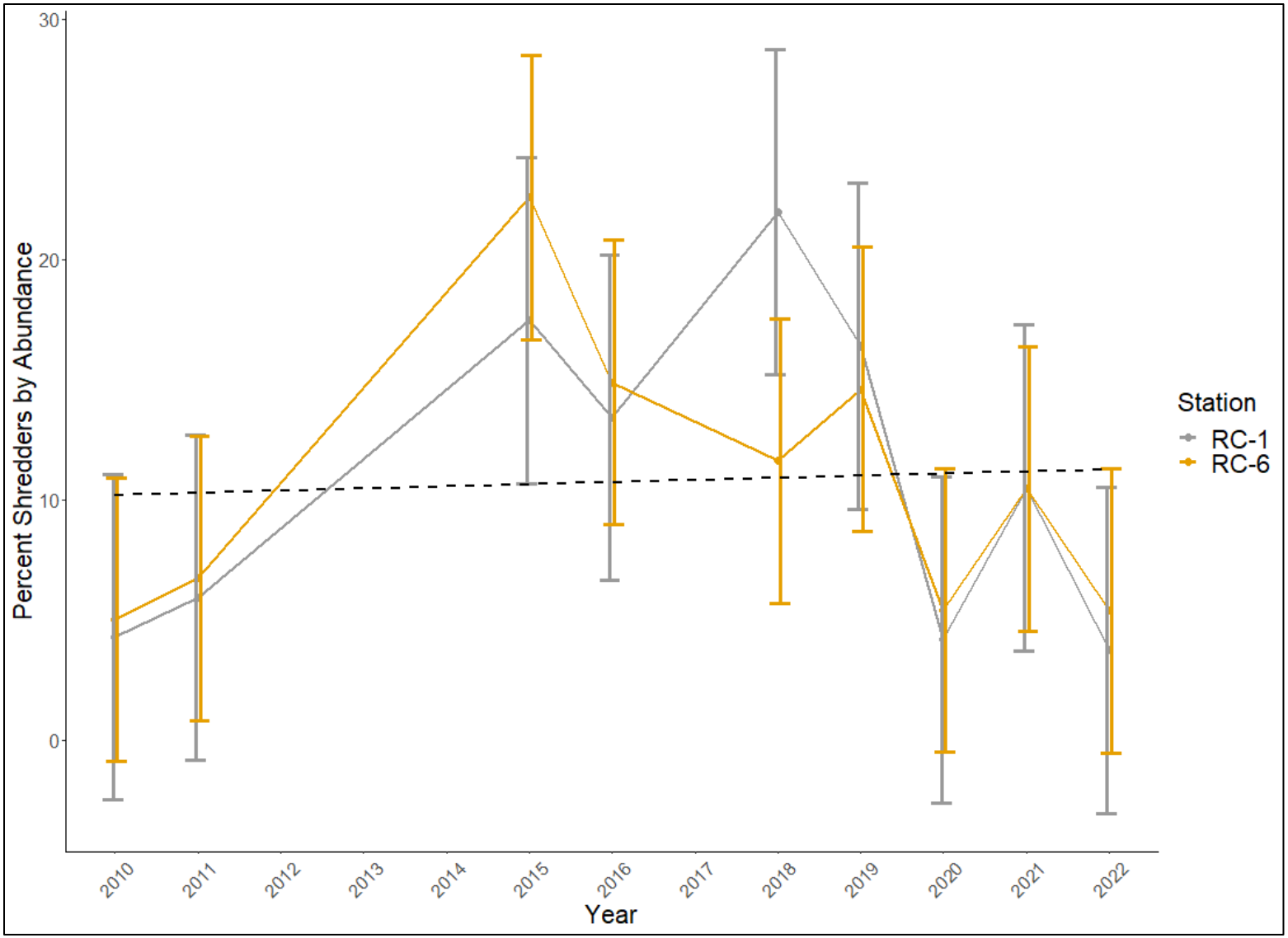


Figure F.9. Ratio of Scrapers to Scrapers and Filtering Collectors at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

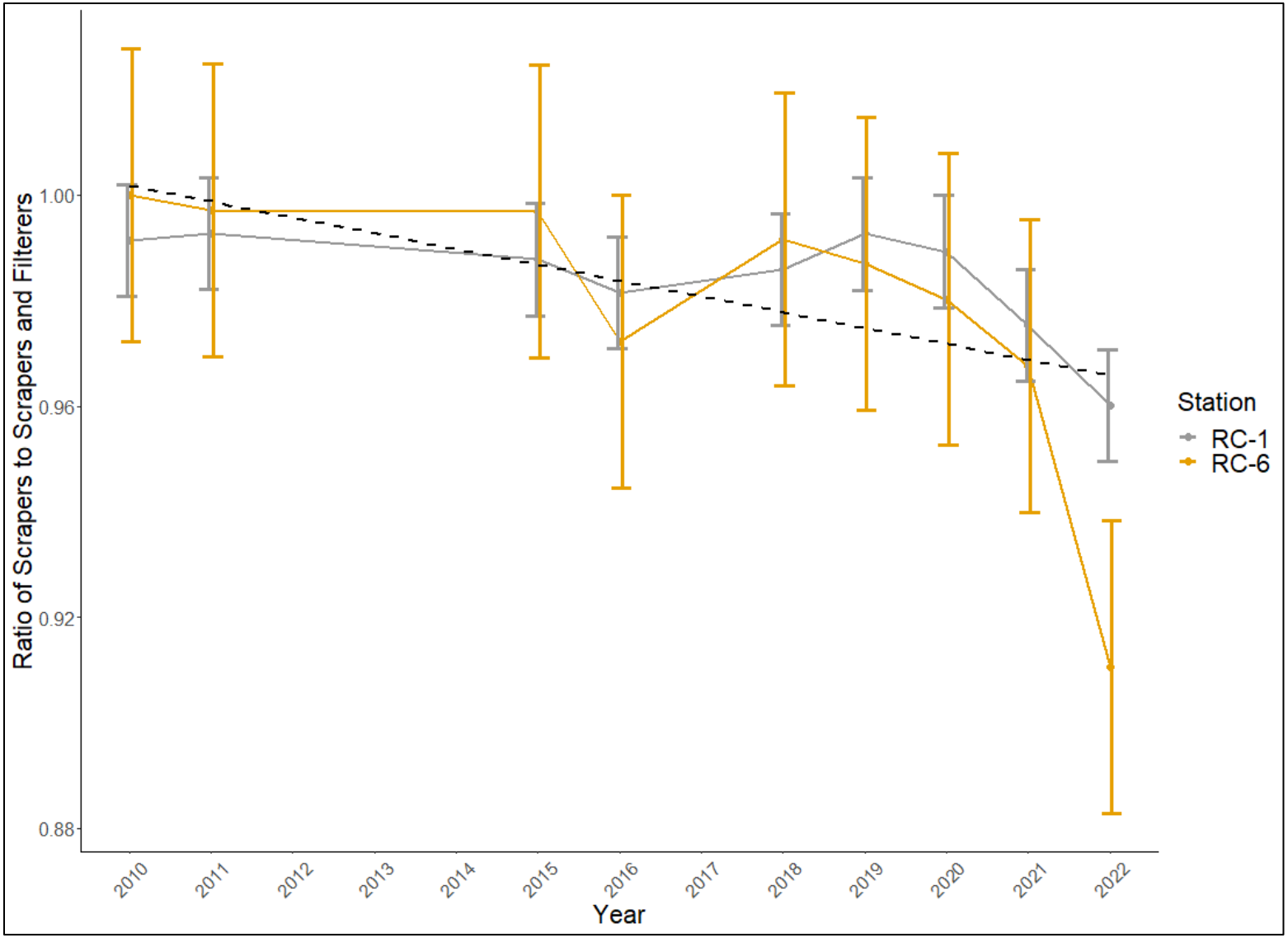


Figure F.10. Percent Clingers by Abundance at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

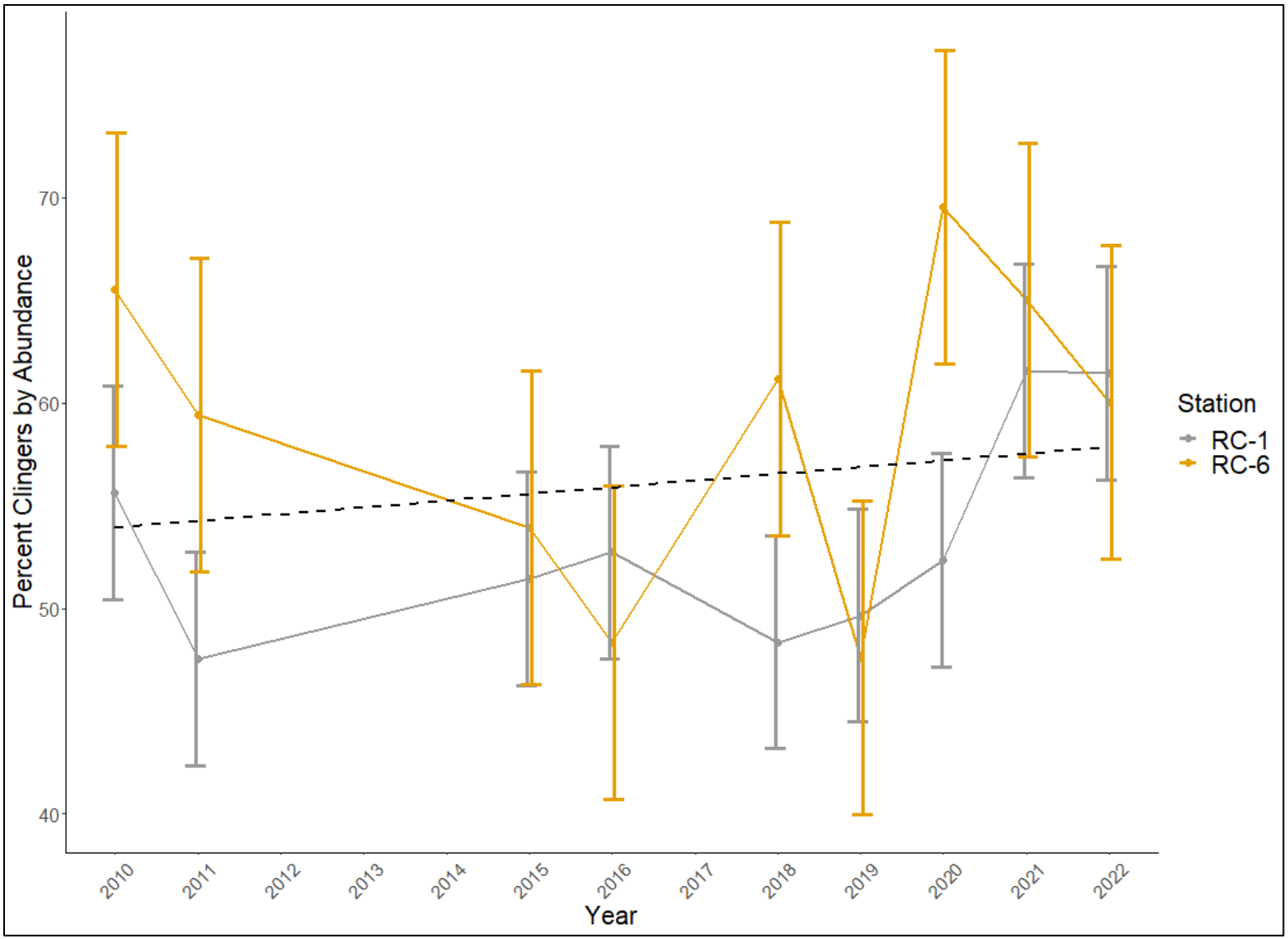


Figure F.11. Percent Filterers by Abundance at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

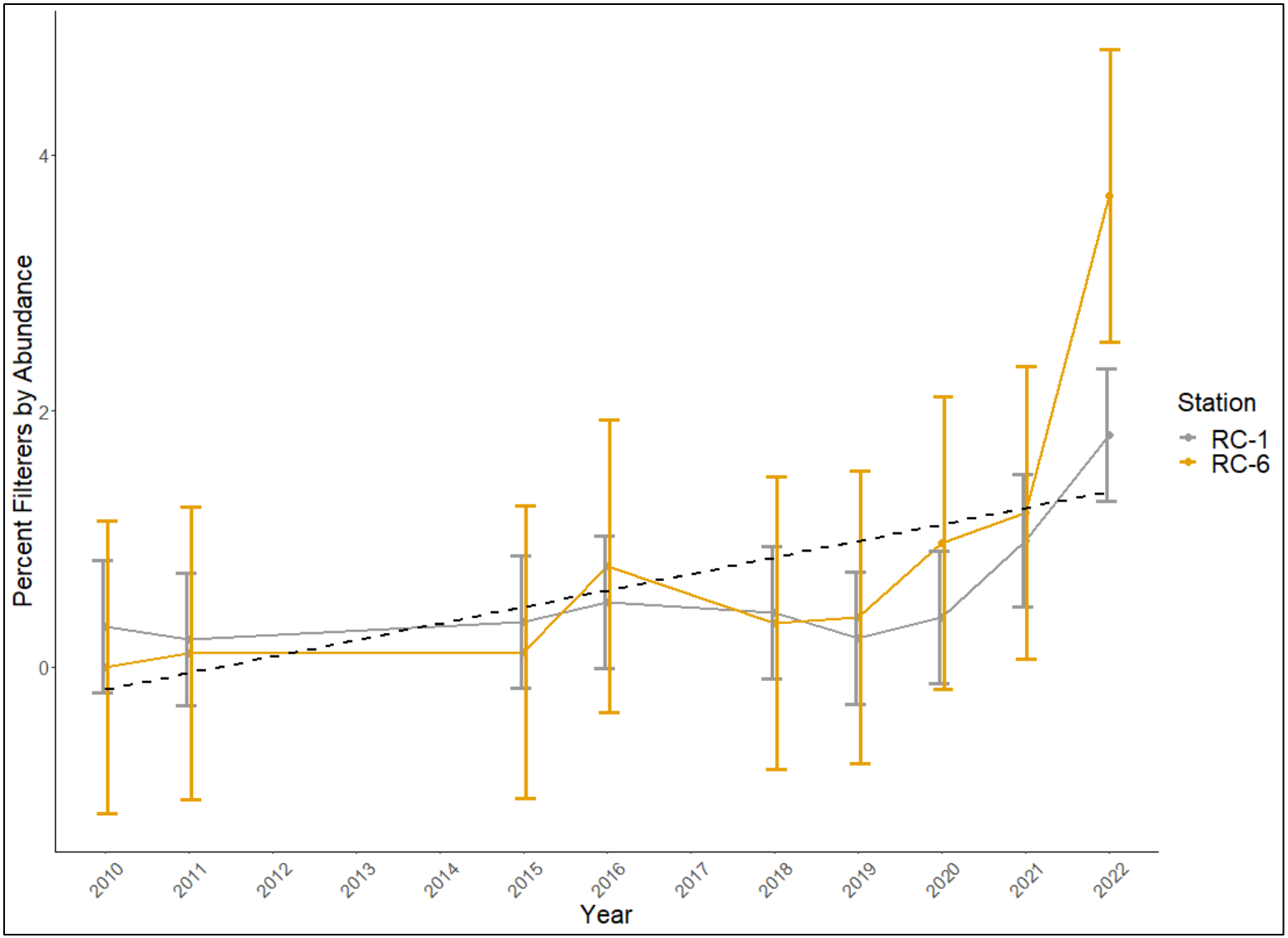


Figure F.12. Percent Contribution of Dominant Taxon at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

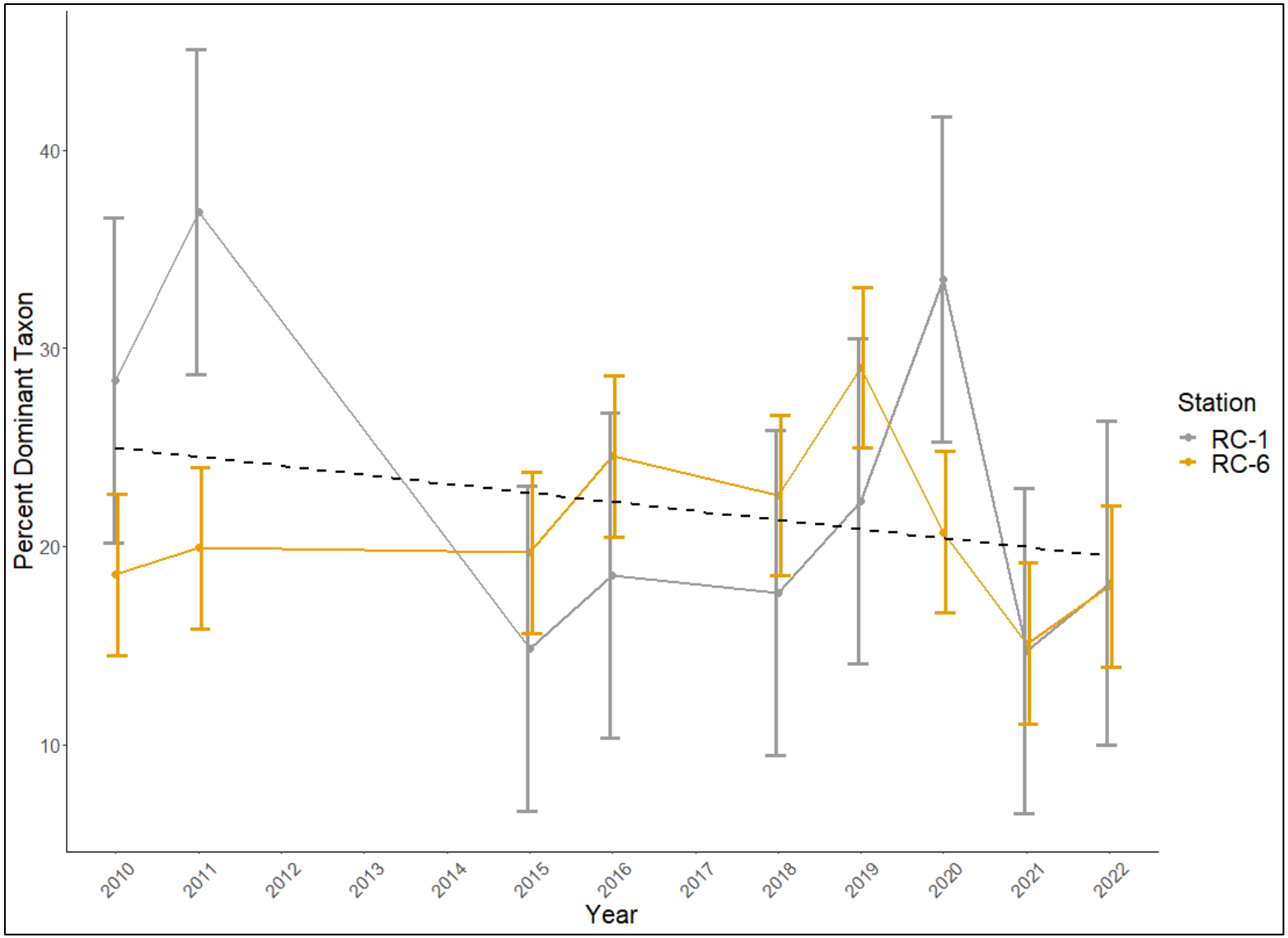


Figure F.13. Percent Ephemeroptera by Abundance at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

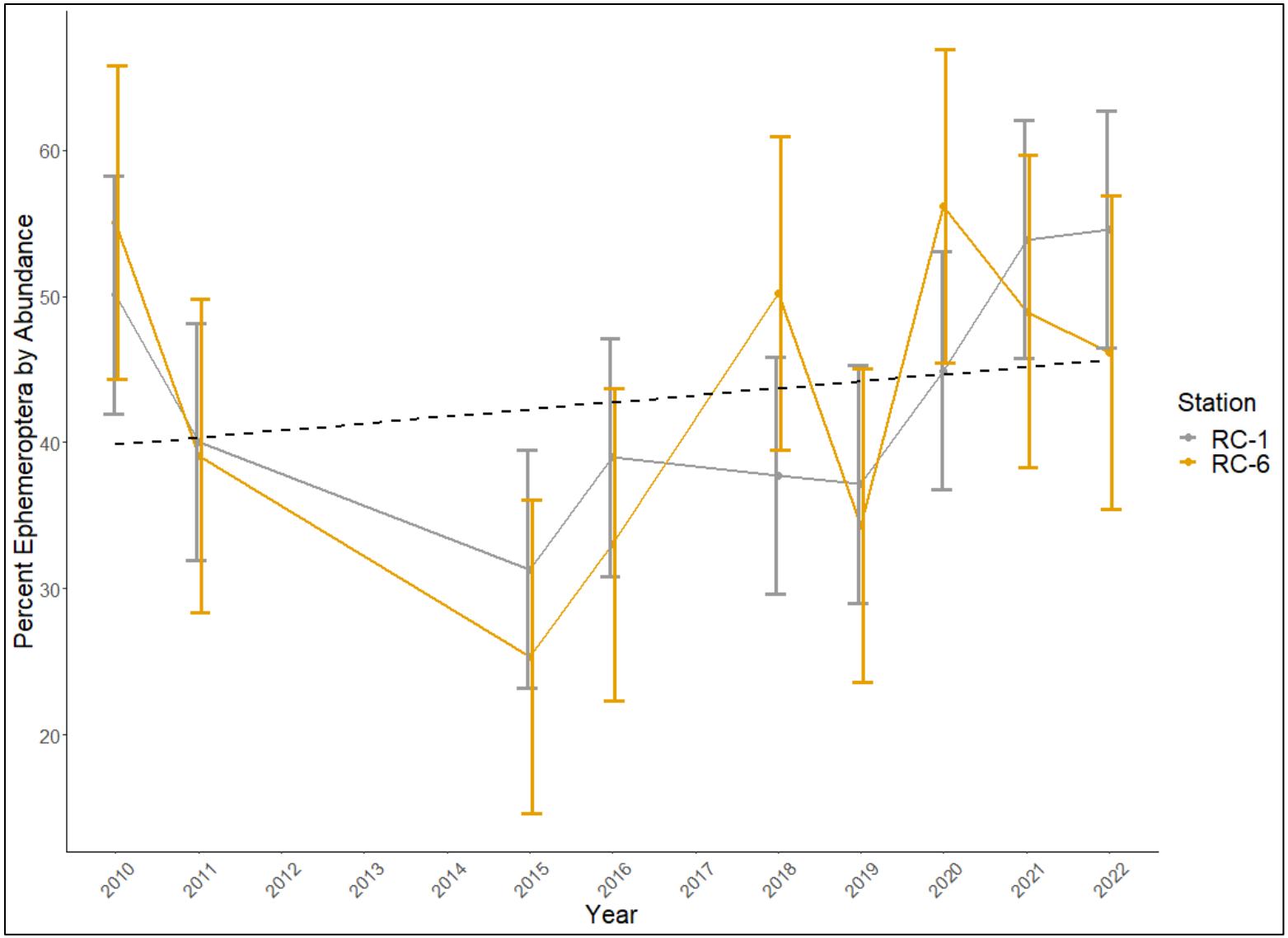


Figure F.14. EPT/EPT+C at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

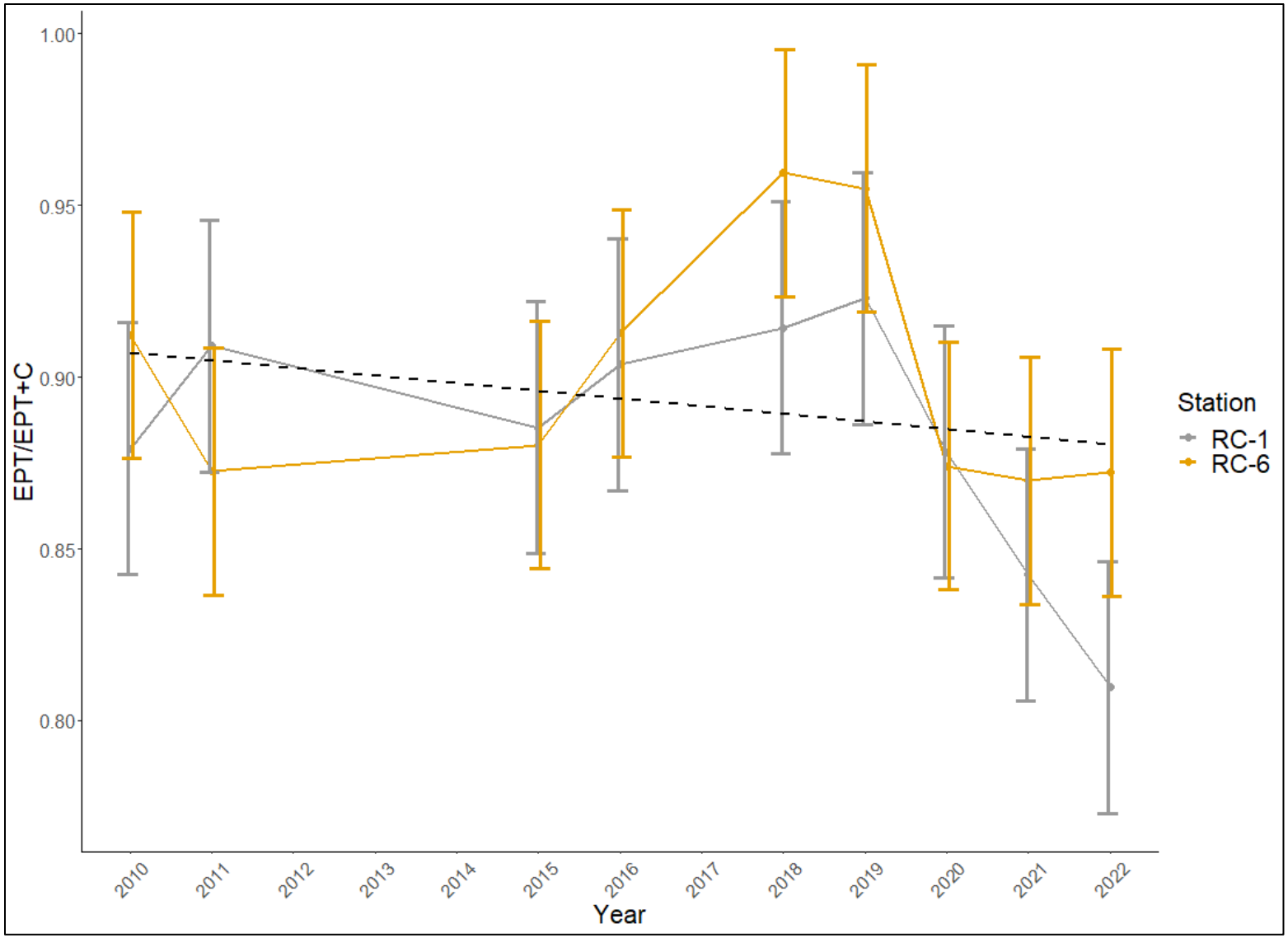


Figure F.15. Hilsenhoff Biotic Index (HBI) at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

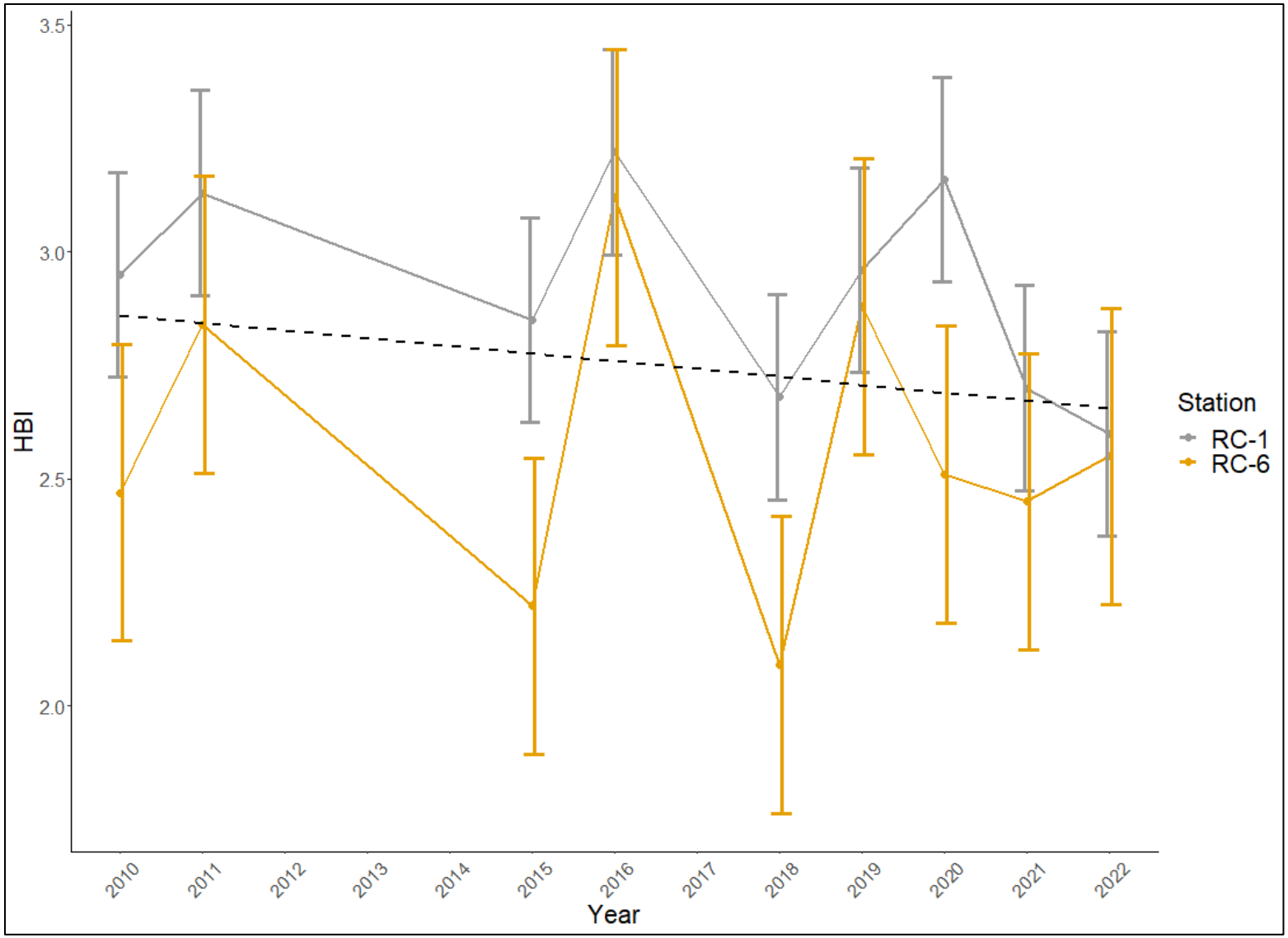


Figure F.16. Metals Tolerance Index (MTI) at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

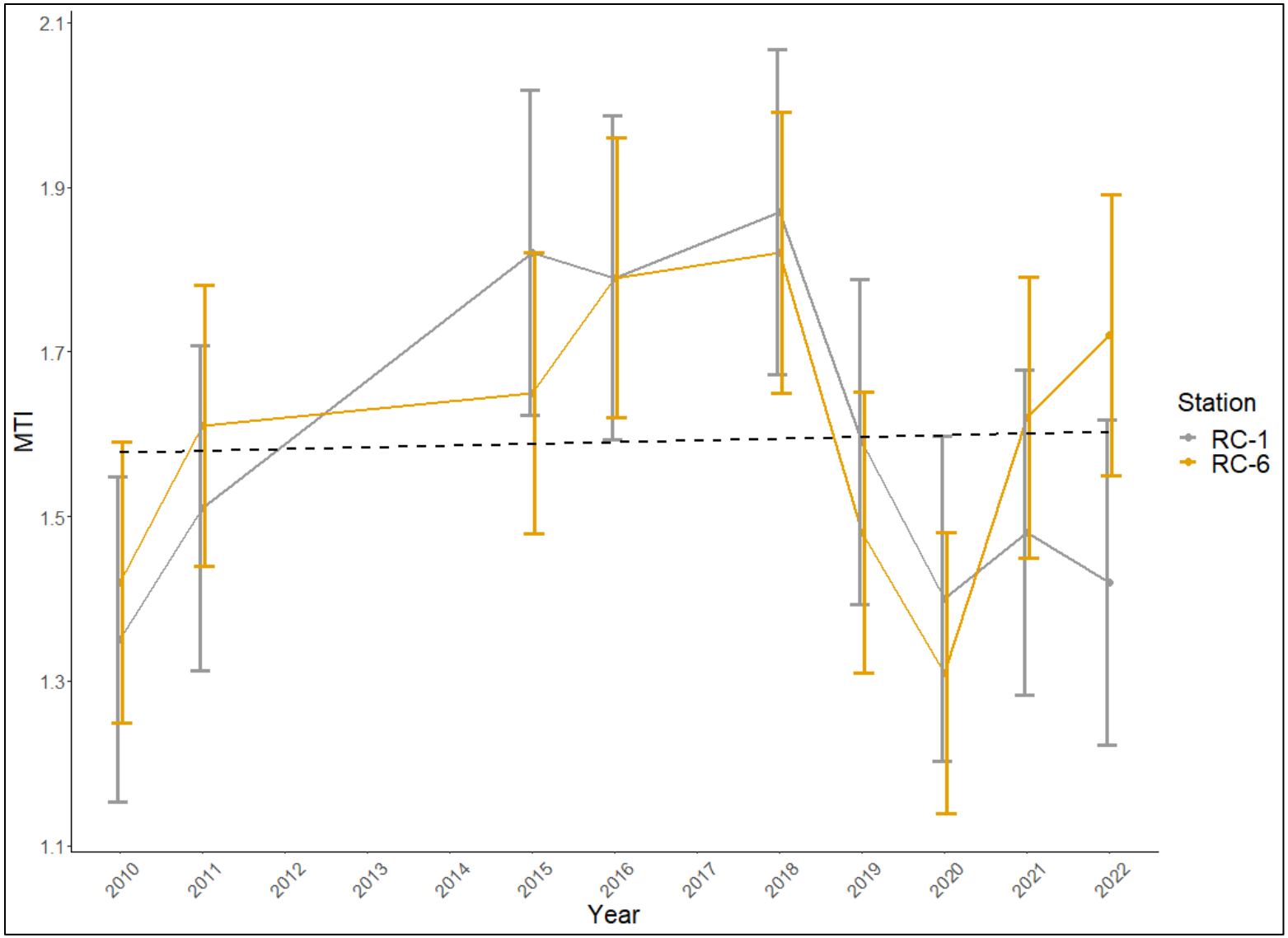
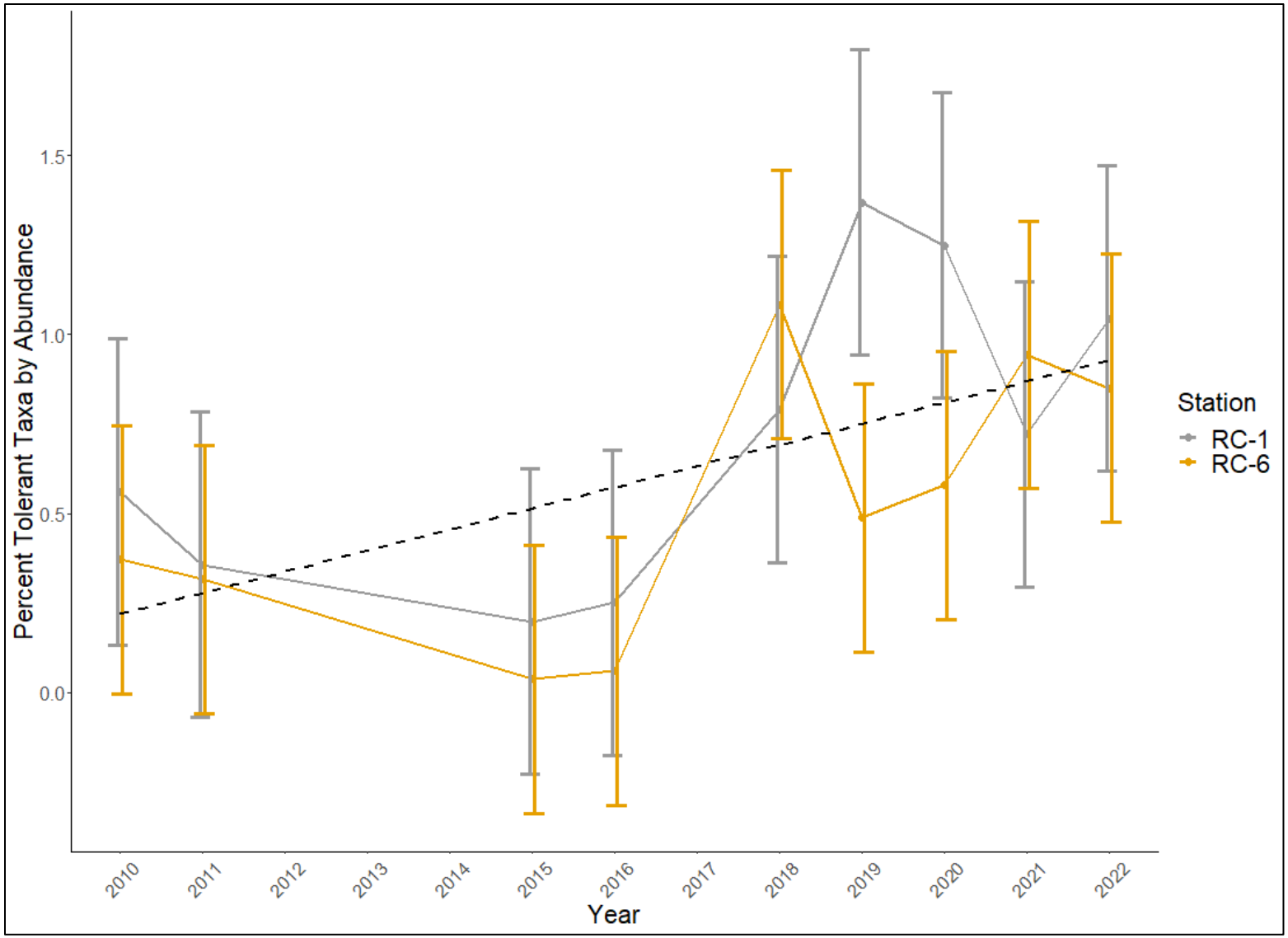


Figure F.17. Percent Tolerant Taxa by Abundance at Reference Stations, All Years

Note: Error bars are +/- one standard deviation. Trend line is for the combined reference station data.

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