

Technical Report No. 25-10

Baseline Aquatic Biomonitoring at Illinois Creek and Associated Prospects, 2024

By
Olivia N. Edwards



April 2025

Alaska Department of Fish and Game

Habitat Section



Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Habitat Section, as well as the Divisions of Sport Fish, and Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, Technical Reports and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

| | | | | | |
|---|--------------------|--|---|---|-------------------------|
| Weights and measures (metric) | | General | | Mathematics, statistics | |
| centimeter | cm | Alaska Administrative Code | AAC | <i>all standard mathematical signs, symbols and abbreviations</i> | |
| deciliter | dL | all commonly accepted abbreviations | e.g., Mr., Mrs., AM, PM, etc. | alternate hypothesis | H _A |
| gram | g | | | base of natural logarithm | <i>e</i> |
| hectare | ha | | | catch per unit effort | CPUE |
| kilogram | kg | all commonly accepted professional titles | e.g., Dr., Ph.D., R.N., etc. | coefficient of variation | CV |
| kilometer | km | | | common test statistics | (F, t, χ^2 , etc.) |
| liter | L | at | @ | confidence interval | CI |
| meter | m | compass directions: | | correlation coefficient (multiple) | R |
| milliliter | mL | east | E | correlation coefficient (simple) | r |
| millimeter | mm | north | N | covariance | cov |
| | | south | S | degree (angular) | ° |
| | | west | W | degrees of freedom | df |
| Weights and measures (English) | | copyright | © | expected value | <i>E</i> |
| cubic feet per second | ft ³ /s | corporate suffixes: | | greater than | > |
| foot | ft | Company | Co. | greater than or equal to | ≥ |
| gallon | gal | Corporation | Corp. | harvest per unit effort | HPUE |
| inch | in | Incorporated | Inc. | less than | < |
| mile | mi | Limited | Ltd. | less than or equal to | ≤ |
| nautical mile | nmi | District of Columbia | D.C. | logarithm (natural) | ln |
| ounce | oz | et alii (and others) | et al. | logarithm (base 10) | log |
| pound | lb | et cetera (and so forth) | etc. | logarithm (specify base) | log ₂ , etc. |
| quart | qt | exempli gratia (for example) | e.g. | minute (angular) | ' |
| yard | yd | Federal Information Code | FIC | not significant | NS |
| | | id est (that is) | i.e. | null hypothesis | H ₀ |
| Time and temperature | | latitude or longitude | lat or long | percent | % |
| day | d | monetary symbols (U.S.) | \$, ¢ | probability | P |
| degrees Celsius | °C | months (tables and figures): first three letters | Jan,...,Dec | probability of a type I error (rejection of the null hypothesis when true) | α |
| degrees Fahrenheit | °F | registered trademark | ® | probability of a type II error (acceptance of the null hypothesis when false) | β |
| degrees kelvin | K | trademark | ™ | second (angular) | " |
| hour | h | United States (adjective) | U.S. | standard deviation | SD |
| minute | min | United States of America (noun) | USA | standard error | SE |
| second | s | U.S.C. | United States Code | variance | |
| | | U.S. state | use two-letter abbreviations (e.g., AK, WA) | population | Var |
| Physics and chemistry | | | | sample | var |
| all atomic symbols | | | | | |
| alternating current | AC | | | | |
| ampere | A | | | | |
| calorie | cal | | | | |
| direct current | DC | | | | |
| hertz | Hz | | | | |
| horsepower | hp | | | | |
| hydrogen ion activity (negative log of) | pH | | | | |
| parts per million | ppm | | | | |
| parts per thousand | ppt, ‰ | | | | |
| volts | V | | | | |
| watts | W | | | | |

TECHNICAL REPORT NO. 25-10

**BASELINE AQUATIC BIOMONITORING AT ILLINOIS CREEK AND
ASSOCIATED PROSPECTS, 2024**

By

Olivia N. Edwards
Habitat Section, Fairbanks

Alaska Department of Fish and Game
Habitat Section
1300 College Rd, Fairbanks, Alaska, 99701

April 2025

Cover: Waterpump Creek, a tributary to California Creek, 2024. Photo by Olivia Edwards

Technical Reports are available through the Alaska State Library, Alaska Resources Library and Information Services (ARLIS), and on the Internet: http://www.adfg.alaska.gov/index.cfm?adfg=habitat_publications.main. This publication has undergone editorial and peer review.

Note: Product names used in the publication are included for completeness but do not constitute product endorsement. The Alaska Department of Fish and Game does not endorse or recommend any specific company or their products.

Olivia N. Edwards
Alaska Department of Fish and Game, Habitat Section
1300 College Rd., Fairbanks, AK 99701-1599, USA

This document should be cited as:

Edwards, O. N. 2025. Baseline Aquatic Biomonitoring at Illinois Creek and Associated Prospects, 2024. Alaska Department of Fish and Game, Technical Report No. 25-10, Fairbanks, Alaska.

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act (ADA) of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility please write:

ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK 99811-5526

U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington, VA 22203

Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street NW MS 5230, Washington DC 20240

The department's ADA Coordinator can be reached via phone at the following numbers:

(VOICE) 907-465-6077, (Statewide Telecommunication Device for the Deaf) 1-800-478-3648,

(Juneau TDD) 907-465-3646, or (FAX) 907-465-6078

For information on alternative formats and questions on this publication, please contact:

ADF&G Habitat Section, 1300 College Road, Fairbanks, AK 99701 (907) 459-7289

TABLE OF CONTENTS

| | |
|---------------------------------|-----|
| LIST OF TABLES | ii |
| LIST OF FIGURES | ii |
| ACKNOWLEDGEMENTS | iii |
| EXECUTIVE SUMMARY | 1 |
| INTRODUCTION | 2 |
| METHODS | 11 |
| SAMPLING OVERVIEW | 11 |
| WATER QUALITY | 12 |
| PERIPHYTON | 12 |
| BENTHIC MACROINVERTEBRATES..... | 13 |
| FISH PRESENCE | 14 |
| ENVIRONMENTAL DNA..... | 14 |
| RESULTS AND DISCUSSION | 15 |
| WATER QUALITY | 15 |
| PERIPHYTON | 15 |
| BENTHIC MACROINVERTEBRATES..... | 17 |
| FISH PRESENCE | 20 |
| ENVIRONMENTAL DNA..... | 24 |
| CONCLUSION..... | 24 |
| LITERATURE CITED | 27 |
| APPENDICES | 28 |

LIST OF TABLES

| | |
|--|---|
| Table 1.–Illinois Creek sampling locations (WGS 84), 2024..... | 7 |
|--|---|

LIST OF FIGURES

| | |
|--|----|
| Figure 1.–June 2024 sample sites surrounding the historic Illinois Creek Mine and target deposits. | 6 |
| Figure 2.–Sample sites on Lower Illinois Creek (left) and Lower California Creek 1 (right). | 8 |
| Figure 3.–Sample sites on Waterpump Creek (left) and Upper Twin Creek (right)..... | 8 |
| Figure 4.–Sample sites on Colorado Creek (left) and California Creek Tributary 2 (right)..... | 9 |
| Figure 5.–Sample sites on Lower Minnesota Creek (left) and Minnesota Creek Tributary 1 (right). | 10 |
| Figure 6.–Sample sites on Eddy Creek Tributary (left) and Honker Trail Creek (right)..... | 10 |
| Figure 7.–Sample sites on Lower Dome Creek (left) and Dome Creek Tributary (right)..... | 11 |
| Figure 8.–Mean chlorophyll-a concentrations (± 1 SD), 2020–2024 at Illinois Creek and 2024 at all other sites. | 16 |
| Figure 9.– Chlorophyll-a concentration boxplots by site, 2024..... | 16 |
| Figure 10.–Mean BMI density (± 1 SD) at Illinois Creek for all years and 2024 at other sites. .. | 18 |
| Figure 11.–Mean percent EPT, Diptera, and other taxa in BMI samples from Upper Illinois Creek, 2020–2024. | 18 |
| Figure 12.–Mean percent EPT, Diptera, and other taxa in BMI samples from all sites except Upper Illinois Creek, 2024..... | 19 |
| Figure 13.– Taxa richness in BMI samples from Illinois Creek for all years and 2024 at all other sites. | 19 |
| Figure 14.–Resident fish species (slimy sculpin and Alaska blackfish) catch per unit effort (CPUE) at all sites, 2024..... | 21 |
| Figure 15.–Coho salmon catch per unit effort (CPUE) at all sites where coho salmon were captured, 2024..... | 22 |
| Figure 16.–Length frequency for coho salmon captured in minnow traps at all sites in 2024..... | 22 |
| Figure 17.–Dolly Varden catch per unit effort (CPUE) at all sites where Dolly Varden were captured, 2024..... | 23 |
| Figure 18.–Length frequency for Dolly Varden captured in minnow traps at all sites, 2024. | 23 |

ACKNOWLEDGEMENTS

The authors thank Western Alaska Minerals for their financial and logistical support for the 2024 aquatic biomonitoring work. We specifically acknowledge the assistance provided by Jack DiMarchi and Wade Hopkins.

Olivia Edwards and Maria Wessel (ADF&G Habitat) performed field sampling. Olivia Edwards and Lauren Yancy (ADF&G Habitat) processed chlorophyll samples. Nora Foster (NRF Taxonomic Services) was responsible for the sorting and identification of macroinvertebrates. Maria Wessel, Chelsea Clawson, Audra Brase, and Al Ott (all ADF&G Habitat) and Jack DiMarchi (Western Alaska Minerals) provided constructive reviews for this report.

EXECUTIVE SUMMARY

This report summarizes results of 2024 biomonitoring work conducted in streams in the vicinity of the historic Illinois Creek mine and associated exploratory prospects. Biomonitoring included surveys of water quality, periphyton, benthic macroinvertebrates (BMI), and fish; these data have been collected annually from 2020–2024. Sampling was expanded in 2024 with the addition of periphyton and BMI sampling at 7 additional sites and environmental DNA (eDNA) sampling at 5 sites. The sample site on Minnesota Creek was moved downstream and the California Creek 2 site was moved upstream to improve site distribution across drainages. A Control Site on a tributary to Eddy Creek was added outside of the projected area of potential mining impact. A total of 21 sites were sampled in 2024.

Measurements of periphyton standing crop, BMI, and fish distribution varied among the sample sites in 2024. The mean chlorophyll-a concentration was lowest in Lower Dome Creek at 2.44 mg/m² (SD = 0.95) and highest in Lower California Creek 1 at 24.02 mg/m² (SD = 20.04). BMI densities across all sites ranged from a low of 2,765/m² in Lower Dome Creek to a high of 17,735/m² in Waterpump Creek. Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa were present in some capacity at all sites in 2024. The percentage of EPT taxa present exceeded the percentage of Diptera in the samples from half of the sites, including Lower Minnesota Creek, Lower Dome Creek, Eddy Creek, and the Control Site. BMI taxa richness was similar among all sites ranging from 17 at Upper Illinois Creek to 23 at the Control Site. Fish were captured at all sites in 2024 except Minnesota Creek Tributary 2. Coho salmon were captured at 9 sites with catch per unit effort ranging from 0.57–86 fish per day. Other species captured included Dolly Varden, Alaska blackfish, and slimy sculpin.

INTRODUCTION

The historic Illinois Creek gold and silver mine and associated prospects are located in the southern Kaiyuh Mountains approximately 90 km southwest of Galena, Alaska. An open pit mine was operated in the area by USMX Incorporated from 1996 to 1998 and Viceroy Resources Corporation from 1998 to 2000. American Reclamation Group leased the mine from the State of Alaska until 2002, and fees from their operation were used for reclamation. The operation has since been acquired by Western Alaska Copper and Gold (WAC&G) and there is no active mining at this time. There are five main exploration targets held by WAC&G in the Illinois Creek Mining District (Figure 1). The historic Illinois Creek Mine gold and silver deposit is southwest of camp. The Waterpump Creek and Last Hurrah silver, zinc, and lead targets are adjacent to the Illinois Creek deposit. Northwest of these is the Honker gold vein. To the northeast are the Round Top copper and silver targets and the TG North silver, zinc, and lead target. Tentative plans for future development include two proposed roads which would cross drainages that support resident and anadromous fish.

The ADF&G Habitat Section collected fish presence data and relative abundance in streams near the mine between 1995 and 1998 (Winters 1996–1998b). During this period, sampling focused on Illinois Creek due to its proximity to the mine pit using minnow traps for juvenile salmon, and visual surveys on foot for adult salmon. Whole body element and histological analyses were performed on juvenile coho salmon from Illinois Creek in 1995. Limited minnow trapping was done in California Creek in 1995. Annual biomonitoring sampling resumed in 2020 and expanded to include additional sampling protocols and sites.

Streams in the area vary considerably in physical characteristics but tend to rapidly transition from steep upland streams to lower gradient meandering streams. The dominant rock type in the area is schist, which erodes easily, and stream substrate transitions from small boulders to sand and silt within a few kilometers.

Fish communities vary depending on stream characteristics. The high gradient headwater streams are primarily inhabited by resident Dolly Varden, and mixed communities of Alaska blackfish, slimy sculpin, Arctic grayling, and juvenile salmon occupy the lower reaches. Abundant large beaver dam complexes in these drainages can alter fish distribution by creating fish passage

barriers that can fragment habitat and exclude species previously present in upper stream reaches. Conversely, when dam complexes are destroyed via high water events or structural failure, fish can recolonize previously fragmented areas.

The goal of annual biomonitoring is to quantify baseline and document natural variability in biological conditions in Illinois Creek and nearby watersheds. This report summarizes in-situ water quality, periphyton, BMI, and fish data collected in 2024.

LOCATION AND DESCRIPTION OF MONITORING SITES

In 2024, biomonitoring activities were performed at 21 sites around the Illinois Creek Mining District (Figure 1; Table 1). Of these, 20 sites may be impacted by mining activity or road construction, and one is outside of the area of potential impact as a control site. The control site is on a tributary to Eddy Creek. The Lower California Creek 2 site was moved from its previous location to a point upstream of the confluence with Twin Creek in order to more evenly space the California Creek sites through the drainage. The Upper Minnesota Creek site was removed from sampling protocol and a site lower in the drainage was added below the confluence with Minnesota Creek Tributary 3.

- **Illinois Creek**
 - **Lower Illinois Creek** is a low-gradient stream characterized by deep runs and pools with a silty mud bed and abundant decayed organic matter. Deciduous shrubs and grasses line the banks (Figure 2).
 - **Upper Illinois Creek** is approximately 1.5 river km upstream of the lower Illinois Creek site. This site is characterized by pool and riffle habitat with silt, cobble, and small boulder substrate. Wet grassy meadows and deciduous shrubs line the stream banks (Figure 2). A warm groundwater spring enters approximately 200 m upstream of the sampling reach.
- **California Creek and Tributaries**
 - **Lower California Creek 1** is the downstream-most site in the California drainage. This site is approximately 12–20 m wide and meanders through low lying grassy wetlands with mature spruce trees along parts of the riverbanks. The creek is low gradient with deep pools and large woody debris built up at river bends. Silt and gravel are the predominant substrate and wadable riffle sections are sparse (Figure 3).

- **Lower California Creek 2** is approximately 13 river km upstream of the lower California Creek 1 site and has similar characteristics, but the substrate is comprised of more gravel and sand, and less silt (Figure 3).
- **Waterpump Creek** is a small tributary to California Creek with headwaters just north of the camp and airstrip. The site is characterized by moderate gradient, cobble and gravel substrate, cut banks, and woody debris in the stream. Spruce, alder, and willow vegetation line the stream banks (Figure 4).
- **Upper Twin Creek** is below a series of active beaver complexes with a portion of the sampling reach located in a recently breached beaver dam where the channel has been re-established and revegetation is beginning. The creek is characterized by riffle, run, and pool habitats with small cobble, gravel, and sandy substrate. There is dense willow and alder growth along the banks (Figure 4).
- **Colorado Creek** is characterized by moderate gradient riffle and run habitat with sand and gravel substrate. The adjacent banks are dominated by deciduous shrubs. There are abundant off-channel beaver complexes that do not impede the main channel flow (Figure 5).
- **California Creek upstream Colorado Creek** is approximately 3.5 river km upstream of the mouth of Colorado Creek. It is characterized by shallow, swift reaches with occasional deeper pools and cobble substrate. The site is surrounded by black spruce bog with mature willows along the banks (Figure 5).
- **California Creek Headwaters** is the most upstream site on California Creek. There is a large beaver complex downstream of the sample site, but at the site the stream is wide with shallow riffle and pool habitats with cobble and gravel substrate. The riparian vegetation consists of white spruce and mature willows (Figure 6).
- **California Creek Tributary 1** is a small stream, approximately 2 m wide and has a medium gradient with cobble and small boulder substrate. Cutbanks are abundant and riparian vegetation consists of alder and willows (Figure 6).
- **California Creek Tributary 2** is characterized by high gradient cascading step pools with vertical drops up to 1.5 m. There is dense alder and willow canopy intertwining across the stream with boulder and some cobble substrate (Figure 7).
- **Minnesota Creek**
 - **Lower Minnesota Creek** is a new sample site in 2024 just downstream of the confluence with Minnesota Creek Tributary 3. The creek is approximately 4 m wide and is characterized by shallow riffles, runs, and pools with cobble substrate. Riparian vegetation includes willows and grasses (Figure 7).

- **Minnesota Creek Tributary 1** is a narrow and braided stream with intermittent sections of subsurface flow. Step pools formed by large boulders are sparsely present. Some sections of the stream are only 1 m wide, and the riparian vegetation is dense, intertwining across the stream (Figure 8).
- **Minnesota Creek Tributary 2** is approximately 150 m east of Minnesota Tributary 1 and converges 100 m below the sample sites. The creek has red precipitate accumulation on the gravel substrate, with deciduous shrubs along the bank (Figure 8).
- **Minnesota Creek Tributary 3** is approximately 1.5 m wide with cut banks, gravel substrate, and silty pools. There is intermittent dense overhanging vegetation along the banks (Figure 9).
- **Eddy Creek**
 - **Eddy Creek** is a tributary of the Khotol River. The sample site has been relocated downstream over the last few years because beaver complexes are likely creating a barrier to juvenile coho salmon. The current site is characterized by moderate gradient with swift riffles and interspersed deeper pools and runs with gravel and cobble substrate. There is thick grassy and deciduous vegetation along the banks (Figure 9).
 - **Eddy Creek Tributary (Control Site)** is a new sample location in 2024 established as a reference site since it is outside the area of potential mining impact. The creek is approximately 3 m wide and is characterized by shallow riffles, runs, and small pools with cobble substrate. Riparian vegetation includes willow, grass, and spruce trees (Figure 10).
- **Honker Trail Creek** is a tributary of the West Fork Mud River. It is a high gradient first order stream with abundant step pools and rapids. Boulder and cobble are the dominant substrate, and dense alder and willows shade the stream (Figure 10).
- **Dome Creek**
 - **Lower Dome Creek** is characterized by shallow riffles, runs, and deep pools with gravel and cobble substrate. There is abundant beaver activity above and below this site. The sample reach contains a breached beaver dam with some regrowth of vegetation in the previously submerged flood plain (Figure 11).
 - **Upper Dome Creek** is a fast-flowing shallow stream with interspersed pools. Adjacent beaver complexes overflow into the creek and dams create a series of potential fish barriers from the lower to the upper Dome Creek sites. Riparian vegetation varies along the sample reach ranging from tall grasses and sedges to large birch trees (Figure 11).
 - **Dome Creek Tributary** is a small stream with cut banks and fine gravel substrate. Alder and willow shade significant portions of the stream (Figure 12).

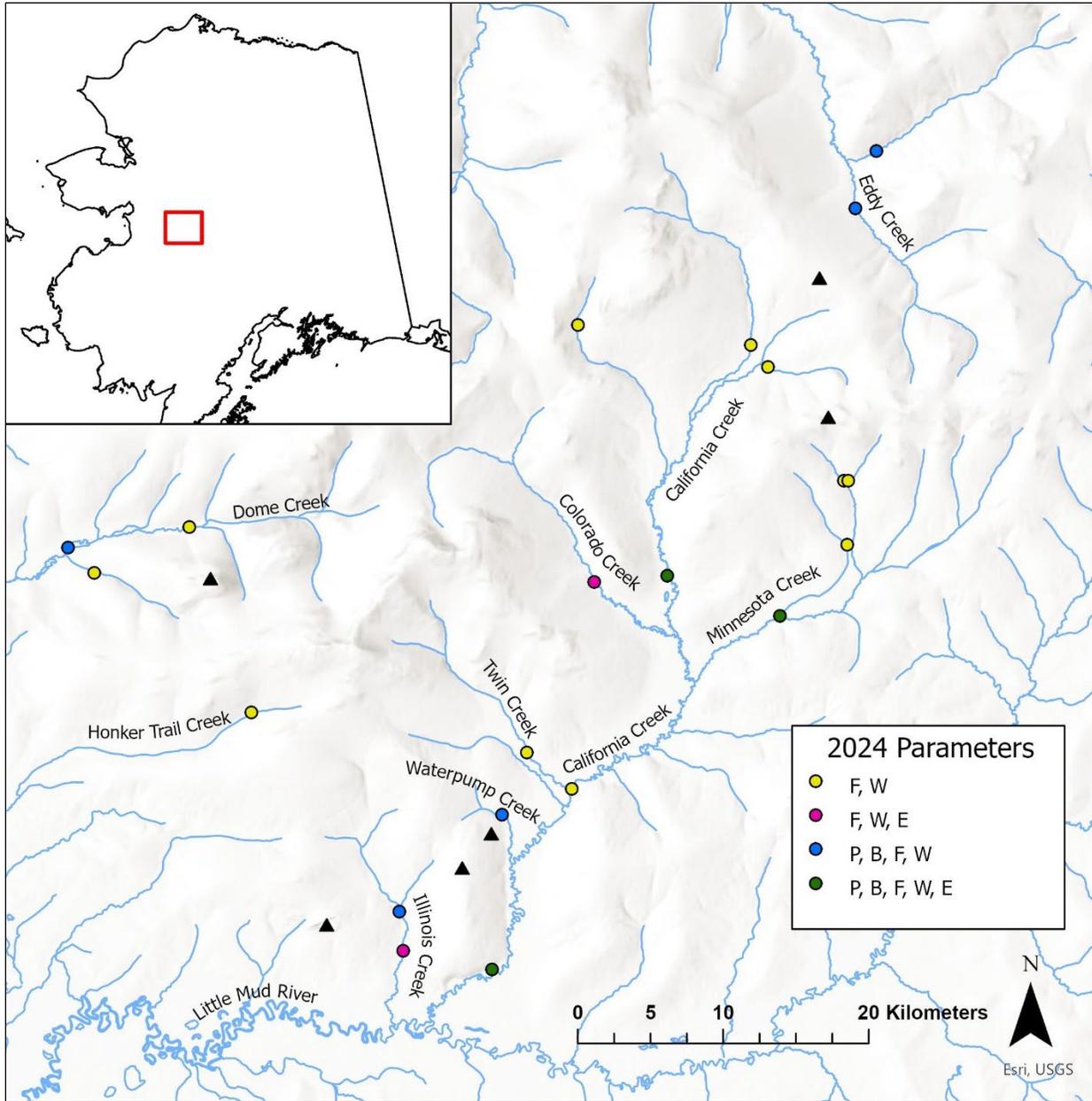


Figure 1.—June 2024 sample sites surrounding the historic Illinois Creek Mine and target deposits. Sampling parameters are abbreviated as follows: P=periphyton, B=benthic macroinvertebrates, F=fish, W=water quality, and E=eDNA. Black triangles depict general deposit locations.

Table 1.–Illinois Creek sampling locations (WGS 84), 2024.

| Site | Latitude | Longitude | BMI | Periphyton | Fish | eDNA |
|-----------------|----------|-----------|-----|------------|------|------|
| Lower Illinois | 64.0280 | -157.8667 | | | X | X |
| Upper Illinois | 64.0387 | -157.8691 | X | X | X | |
| Lower CA 1 | 64.0230 | -157.8117 | X | X | X | X |
| Lower CA 2 | 64.0718 | -157.7624 | | | X | |
| Waterpump* | 64.0649 | -157.8057 | X | X | X | |
| Upper Twin* | 64.0816 | -157.7903 | | | X | |
| Colorado | 64.1276 | -157.7487 | | | X | X |
| CA u/s Colorado | 64.1292 | -157.7033 | X | X | X | X |
| CA Headwaters | 64.1918 | -157.6515 | | | X | |
| CA Trib 1 | 64.1854 | -157.6413 | | | X | |
| CA Trib 2 | 64.1967 | -157.7584 | | | X | |
| Lower MN | 64.1184 | -157.6339 | X | X | X | X |
| MN Trib 1 | 64.1552 | -157.5928 | | | X | |
| MN Trib 2 | 64.1552 | -157.5928 | | | X | |
| MN Trib 3 | 64.1376 | -157.5924 | | | X | |
| Eddy | 64.2281 | -157.5873 | X | X | X | |
| Control Site | 64.2435 | -157.5744 | X | X | X | |
| Honker Trail* | 64.0924 | -157.9603 | | | X | |
| Lower Dome | 64.1369 | -158.0737 | X | X | X | |
| Upper Dome | 64.1424 | -157.9989 | | | X | |
| Dome Trib | 64.1301 | -158.0574 | | | X | |

*Unnamed streams with locally recognized names



Figure 2.—Sample sites on Lower Illinois Creek (left) and Upper Illinois Creek (right).



Figure 3.—Sample sites on Lower California Creek 1 (left) and Lower California Creek 2 (right).



Figure 4.—Sample sites on Waterpump Creek (left) and Upper Twin Creek (right).



Figure 5.—Sample sites on Colorado Creek (left) and California Creek upstream of Colorado Creek (right).



Figure 6.—Sample sites on California Creek headwaters (left) and California Creek Tributary 1 (right).



Figure 7.—Sample sites on California Creek Tributary 2 (left) and Lower Minnesota Creek (right).



Figure 8.—Sample sites on Minnesota Creek Tributary 1 (left) and Minnesota Creek Tributary 2 (right).



Figure 9.—Sample sites on Minnesota Creek Tributary 3 (left) and Eddy Creek (right).



Figure 10.—Sample sites on Eddy Creek Tributary (left) and Honker Trail Creek (right).



Figure 11.—Sample sites on Lower Dome Creek (left) and Upper Dome Creek (right).



Figure 12.—Sample site on Dome Creek tributary.

METHODS

SAMPLING OVERVIEW

The objective of the Illinois Creek biomonitoring program is to document in-situ productivity of the aquatic communities at each sample site. In 2024 there was one sample event in the Illinois Creek area which took place from June 18–26. Water levels were normal and ideal for sampling protocols, with intermittent rain and thunderstorms throughout the trip. Replicate samples of the aquatic community were collected, including periphyton, BMI, and fish. Previously, periphyton and BMI samples were only collected at Upper Illinois Creek but in 2024 these samples were collected at an additional 7 sites (Table 1). In-situ water quality was recorded at each site and eDNA samples were taken at 5 sites. Whole body fish element analysis in Illinois Creek was

suspended in 2024 as 4 years of consecutive data was deemed sufficient. Previous results can be found in last year's technical report (Yancy and Edwards 2024).

WATER QUALITY

A handheld multiparameter YSI was used to measure water temperature (°C), dissolved oxygen (mg/L), specific conductance (µS/cm), conductivity (µS/cm), and pH. The probe was placed in flowing water, and measurements were allowed to equilibrate for approximately 10–15 minutes before being recorded.

PERIPHYTON

Field Methods

Periphyton is composed of chlorophyll producing organisms, such as algae, attached to submerged surfaces in a waterbody. Algal density and community structure are influenced by water and sediment quality through physical chemical and biological factors that change throughout the year (Barbour et al. 1999). The concentration of chlorophyll-a pigments in periphyton samples provides an estimate of active algal biomass and is often used in monitoring studies to detect changes in aquatic communities. Periphyton samples were collected at 8 locations around the Illinois Creek historic mine area (Table 1; Figure 2).

Periphyton sample collection and lab analyses follow the rapid bioassessment techniques of Barbour et al. 1999. Ten flat rocks, each larger than 25 cm² were collected from submerged areas at each site. A 5 cm x 5 cm square of high-density flexible foam was placed on the rock. All the material around the foam was scrubbed off with a toothbrush and rinsed back into the stream. The foam square was then removed from the rock, and that section of the rock was brushed and rinsed onto a 0.45 µm glass fiber filter receptacle attached to a hand vacuum pump. Material from the toothbrush was also rinsed onto the filter. The water was extracted from the periphyton covered filter using a hand vacuum pump. Just before all the water was pumped through the filter, one to two drops of magnesium carbonate (MgCO₃) were added to the water to prevent acidification and additional conversion of chlorophyll-a to phaeophytin.

Filters from each rock were folded in half, with the sample material on the inside, and placed in individual dry paper coffee filters. All ten coffee filters were placed in a zip-lock bag containing desiccant to absorb remaining moisture. The bags were then wrapped in aluminum foil to prevent

light from reaching the samples, placed in a cooler with ice packs, then transferred to a freezer at the Illinois Creek camp. Samples were kept frozen until they were analyzed at the ADF&G laboratory in Fairbanks.

Laboratory Methods

In the lab, periphyton samples were removed from the freezer, the glass fiber filters were cut into small pieces and placed in individual 15 ml centrifuge tubes with 10 ml of 90% spectrophotometric grade acetone. The centrifuge tubes were secured in a vial rack covered with aluminum foil to reduce light exposure and stored in a dark refrigerator overnight. On the following day (18-24 hours after preparation), sample tubes were placed in a centrifuge and spun at 1,600 rpm for 20 minutes. Samples were then decanted individually into cuvettes and absorption values at 750 nm, 664 nm, 647 nm, and 630 nm were recorded on a split beam spectrophotometer. Each sample was treated with 80 μ L of 0.1N hydrochloric acid for 90 seconds to convert the chlorophyll to phaeophytin and then absorbance was measured at 750 nm and 665 nm.

Trichromatic equations were used to estimate chlorophyll a, -b, and -c concentrations. Phaeophytin was calculated to determine if a chlorophyll-a conversion had occurred, and to correct chlorophyll-a concentrations for the presence of phaeophytin. Additional details regarding periphyton sampling and analysis methods can be found in ADF&G Technical Report No. 17-09 (Bradley 2017).

BENTHIC MACROINVERTEBRATES

Field Methods

At each benthic macroinvertebrate (BMI) sample site, five replicates were collected using a Hess sampler (Table 1). The Hess stream bottom sampler has a 0.086 m² sample area and material is captured in a 200 mL cod end—both constructed with 300 μ m mesh net. Rocks within the sample area were scoured by hand, and gravel, sand, and silt were disturbed to approximately 10 cm depth to dislodge macroinvertebrates occupying the benthos into the net. The cod end contents were then removed and placed in individual pre-labeled Nalgene bottles with denatured ethyl alcohol to preserve the macroinvertebrates.

A Surber sampler was used in 2020, which adds a component of drift collection to the benthic sampling. While Surber and Hess samples are not directly comparable due to the added drift

component with the Surber sampler, the Surber results are still included in comparisons because both methods sample macroinvertebrates from the benthos, and the units are the same.

Laboratory Methods

Samples were sorted and invertebrates identified by a private aquatic invertebrate lab in Fairbanks to the lowest practicable taxonomic level. BMI of the orders Ephemeroptera, Plecoptera, Trichoptera were identified to genus. Dipterans were identified to genus, except the nonbiting midges of the family Chironomidae. Copepoda, Collembola, and Coleoptera were identified to genus. Cladocera and Hydroida were identified to order. Oligochaeta, Ostracoda, Platyhelminthes, Nematoda, and Nematomorpha were identified to class level. Because invertebrates belonging to the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) (EPT) are more sensitive to water quality, the total number of individual specimens of EPT was calculated and compared to groups of other invertebrates, which are less sensitive. The BMI density was calculated for each sample by dividing the number of BMI by 0.086 m², the Hess sampling area. Mean density was estimated for each site by calculating the mean density among the five samples. Taxa richness is reported as the number of taxonomic groups identified to the lowest practical level. Terrestrial organisms were excluded from all calculations.

FISH PRESENCE

Ten minnow traps baited with cured salmon roe in perforated plastic bags were set at each sample site for approximately 24 hours. When traps were collected, the species and fork length (FL; mm) of every captured salmonid were recorded. Total length (TL; mm) was recorded for other species with round caudal fins, such as slimy sculpin and Alaska blackfish. Results are reported as catch per unit effort (CPUE) which is the total number of fish caught at a site divided by the number of hours the trap was set (number of fish caught/24 hrs). Length-frequency histograms are presented for juvenile coho salmon.

ENVIRONMENTAL DNA

Environmental DNA (eDNA) samples were collected in 2024 using a Smith-Root citizen science sampler. Methods were performed as described in Harings et al. 2024. Replicate eDNA samples were collected from Lower Illinois Creek, Lower California Creek 1, Colorado Creek, California Creek upstream of Colorado Creek, and Lower Minnesota Creek. One blank was collected using

water from a sealed water bottle each day eDNA sampling was performed. We chose this method to help determine Chinook salmon presence following juvenile salmon identification challenges in Illinois Creek in 2023 (Yancy and Edwards 2024). Chinook salmon were documented in the Illinois and California creek drainages in the 1990's but have not been positively identified since sampling resumed in 2020 (Morsell 1991; Winters 1996). This method may also help to determine whether species other than those captured in minnow traps may be present.

RESULTS AND DISCUSSION

WATER QUALITY

Honker Trail Creek had the lowest water temperature and highest dissolved oxygen at 2.9°C and 13.43 mg/mL, respectively. Water temperature was highest in Lower California Creek 1 at 9.9°C. Dissolved oxygen was lowest in Upper Illinois Creek at 10.71 mg/L. The pH ranged from 7.42 in Minnesota Creek Tributary 2 to 8.67 in California Creek Tributary 2. In-situ water quality data from all years are presented in Appendix 1.

PERIPHYTON

In 2024, mean chlorophyll-a concentration in Upper Illinois Creek was 13.05 mg/m² (SD = 7.63), which is higher than 2020 and 2021 but lower than 2022 and 2023 (Figure 13). High values recorded in 2022 and 2023 are similar to Upper Ruby Creek near the Arctic-Bornite prospects in the southern end of the Brooks Range (Clawson 2023). Additional periphyton sites were added in 2024 (Figure 14). Of these, Lower California Creek 1 had the highest mean chlorophyll-a concentration at 24.02 mg/m² (SD = 20.04), but also the most variability among individual samples. Lower Dome Creek had the lowest mean chlorophyll-a concentration at 2.44 mg/m² (SD = 0.95) with very little variability among samples. Periphyton data from 2024 are presented in Appendix 2.

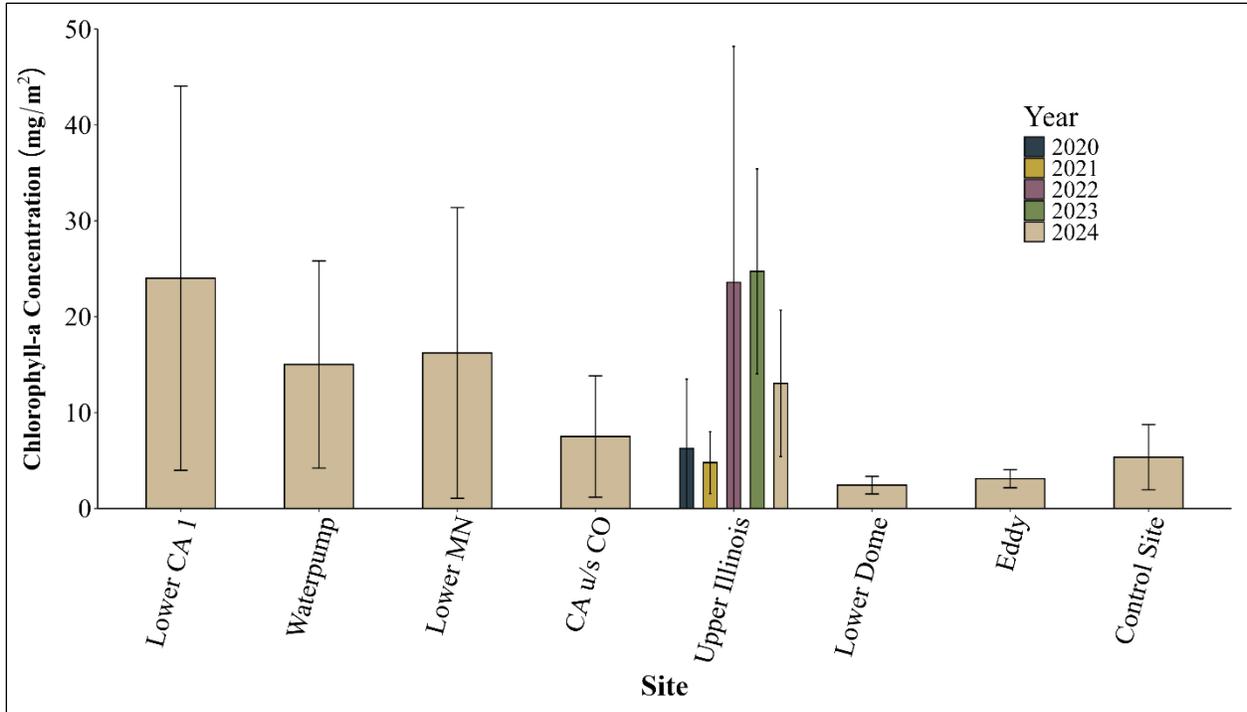


Figure 13.–Mean chlorophyll-a concentrations (± 1 SD), 2020–2024 at Illinois Creek and 2024 at all other sites.

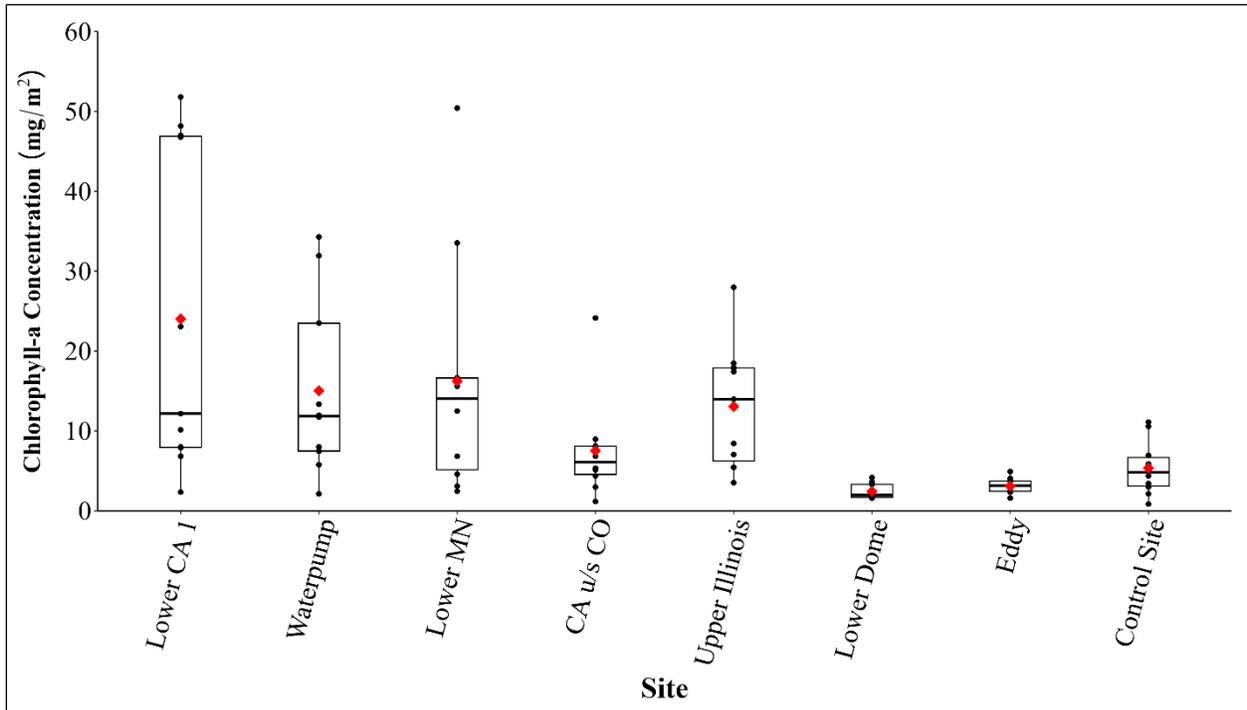


Figure 14.– Chlorophyll-a concentration boxplots by site, 2024. Raw data are depicted by black dots and mean values are depicted in red.

BENTHIC MACROINVERTEBRATES

Mean BMI density in Upper Illinois Creek in 2024 was 15,591/m² (SD = 8,943). This is less than one half the density recorded in 2023, but similar to the densities in 2020–2022 (Figure 15). Lower California Creek 1, Waterpump Creek, and California Creek upstream of Colorado Creek had similar mean BMI densities to Upper Illinois Creek in 2024, ranging from 12,251–17,735/m². The remaining sites ranged from 2,765/m² in Lower Dome Creek to 6,936/m² in Eddy Creek (Figure 15).

The BMI taxa composition in Upper Illinois Creek was similar in 2024 to the previous 3 years but different than the composition in 2020 potentially due to the switch from Surber to Hess samplers after 2020 (Figure 16). Although Illinois Creek, California Creek 1, Waterpump Creek, and California Creek had relatively high BMI densities in 2024, Diptera made up the majority of these samples (Figure 16; Figure 17). EPT taxa made up the majority of the samples from the four remaining sites (Figure 17). Diptera made up 86% of the samples from Lower California Creek 1 while EPT taxa made up just 4%. Conversely, Diptera made up 14% of the samples from Lower Minnesota Creek while EPT taxa made up 81% (Figure 17).

Taxa richness in 2024 exhibited a relatively small range among sites, from 17 in Upper Illinois Creek to 23 at the Control Site. A wider range was apparent in Upper Illinois Creek among years, from 17 in 2024 to 30 in 2020 (Figure 18). BMI data from 2024 are presented in Appendix 3.

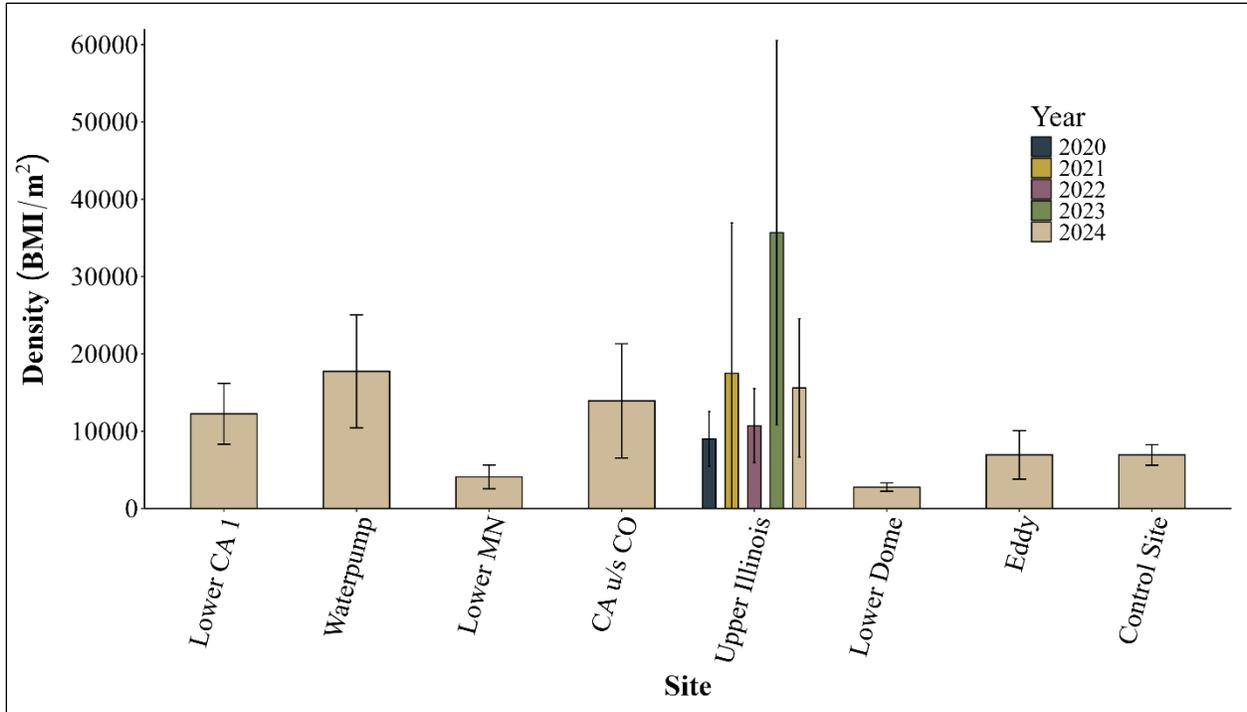


Figure 15.—Mean BMI density (± 1 SD), 2020–2024 at Illinois Creek and 2024 at all other sites.

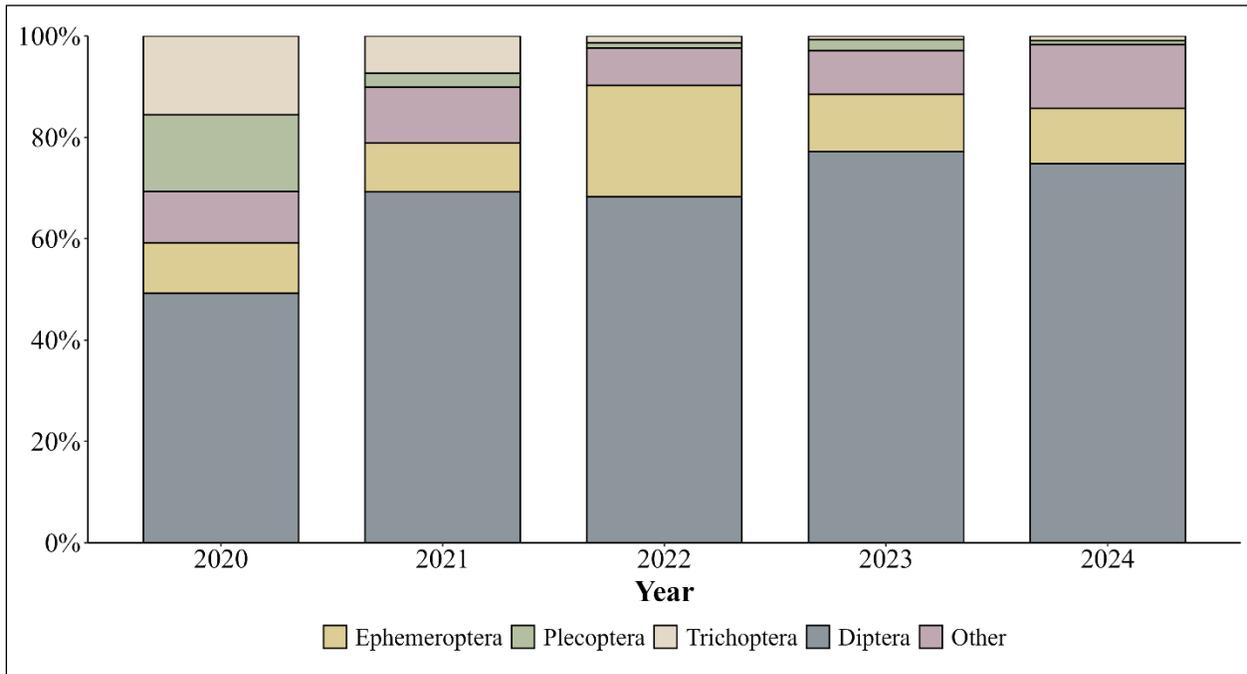


Figure 16.—Mean percent EPT, Diptera, and other taxa in BMI samples from Upper Illinois Creek, 2020–2024.

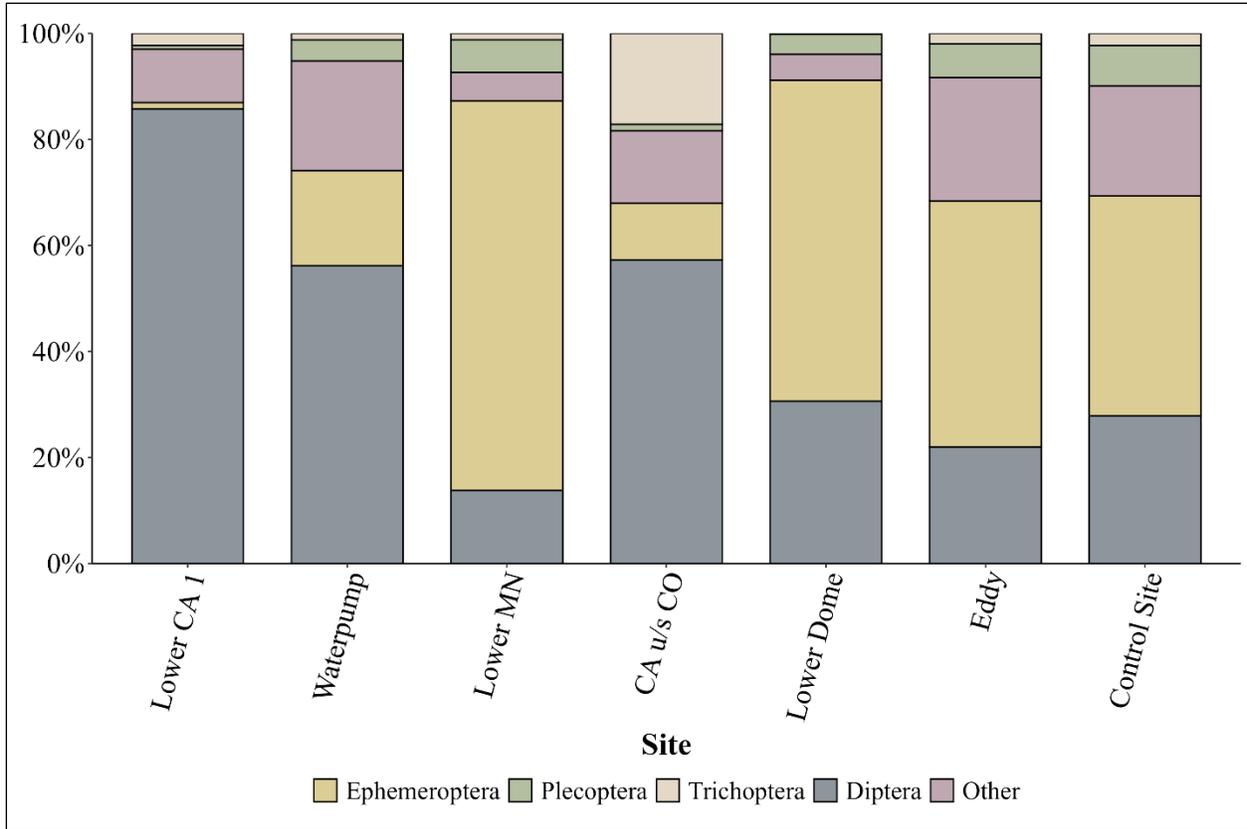


Figure 17.—Mean percent EPT, Diptera, and other taxa in BMI samples from all sites except Upper Illinois Creek, 2024.

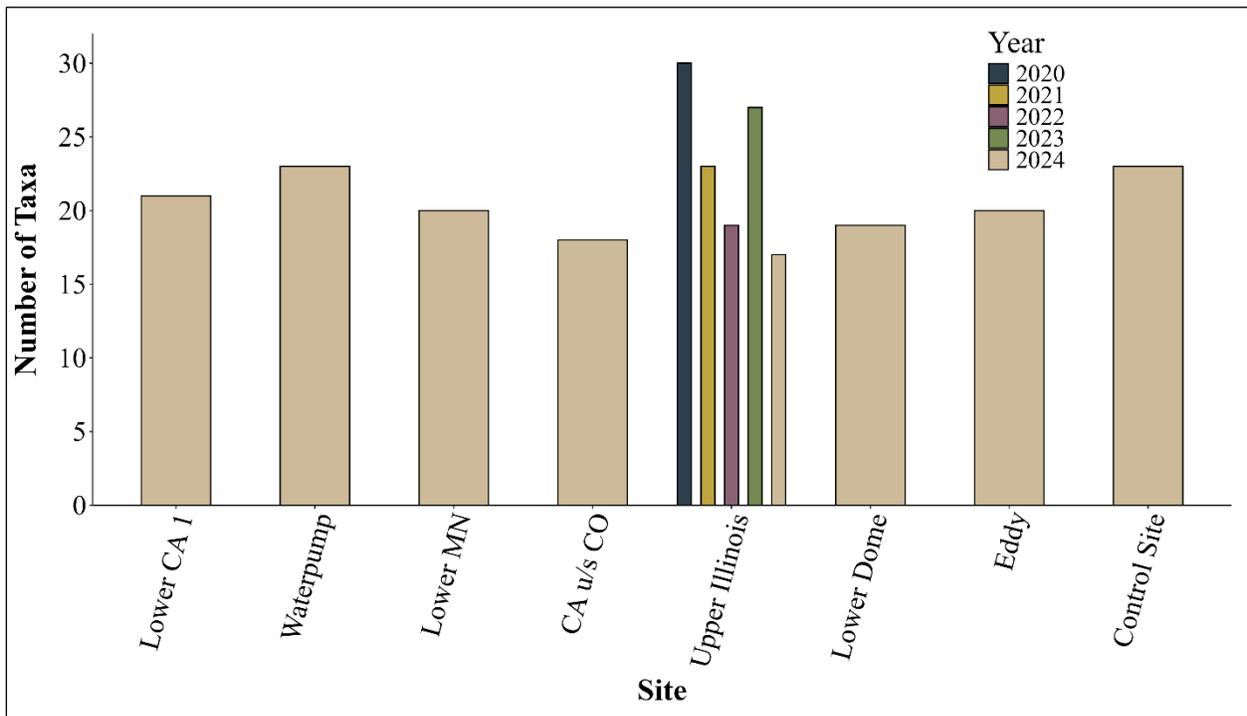


Figure 18.—Taxa richness in BMI samples from Illinois Creek in 2020–2024 and in 2024 from all other sites.

FISH PRESENCE

Fish were captured in minnow traps at all sites except for Minnesota Creek Tributary 2 in 2024. Catch per unit effort (CPUE) for sites where the resident fish species slimy sculpin and Alaska blackfish were captured ranged from 2.29 at Upper Twin Creek to 15.84 at Upper Illinois Creek (Figure 19). No slimy sculpin or Alaska blackfish were captured at a total of 8 sites in 2024 (Figure 19). Slimy sculpin were captured at 12 sites in 2024 and have been captured at a total of 17 sites among all years of data. Alaska blackfish were captured at 7 sites in 2024 and have been captured at a total of 11 sites among all years of data. One Arctic grayling was captured in Lower California Creek 2 in 2020, but none have been captured since.

Coho salmon were captured at a total of 9 sites in 2024. CPUE for coho salmon ranged from 0.57 at Eddy Creek to 86 at California Creek upstream of Colorado Creek (Figure 20). In 2024, coho salmon were captured in Lower Dome Creek and Eddy Creek for the first time since 2020. The mean fork length of all coho salmon captured in 2024 was 67.9 mm (SD = 13.6). Fork lengths ranged from 44–108 mm and the length frequency plot shows an asymmetrical distribution with a right skew (Figure 21). Since sample events have changed from mid-July in 2020 and 2021 to late June beginning in 2022, generally fewer coho salmon have been captured.

Among all years of data, Dolly Varden have been captured at least once at all sites except for Lower and Upper Illinois Creek. It has not been determined if these populations of Dolly Varden are resident or anadromous. Dolly Varden were captured at a total of 15 sites in 2024. CPUE for Dolly Varden ranged from 1.13 at Upper Dome Creek to 18.78 at Waterpump Creek (Figure 22). The mean fork length of all Dolly Varden captured in 2024 was 106.6 mm (SD = 26.1). Fork lengths ranged from 49–152 mm and the length frequency plot shows a generally uniform distribution (Figure 23). Fish presence data from all years are presented in Appendix 4.

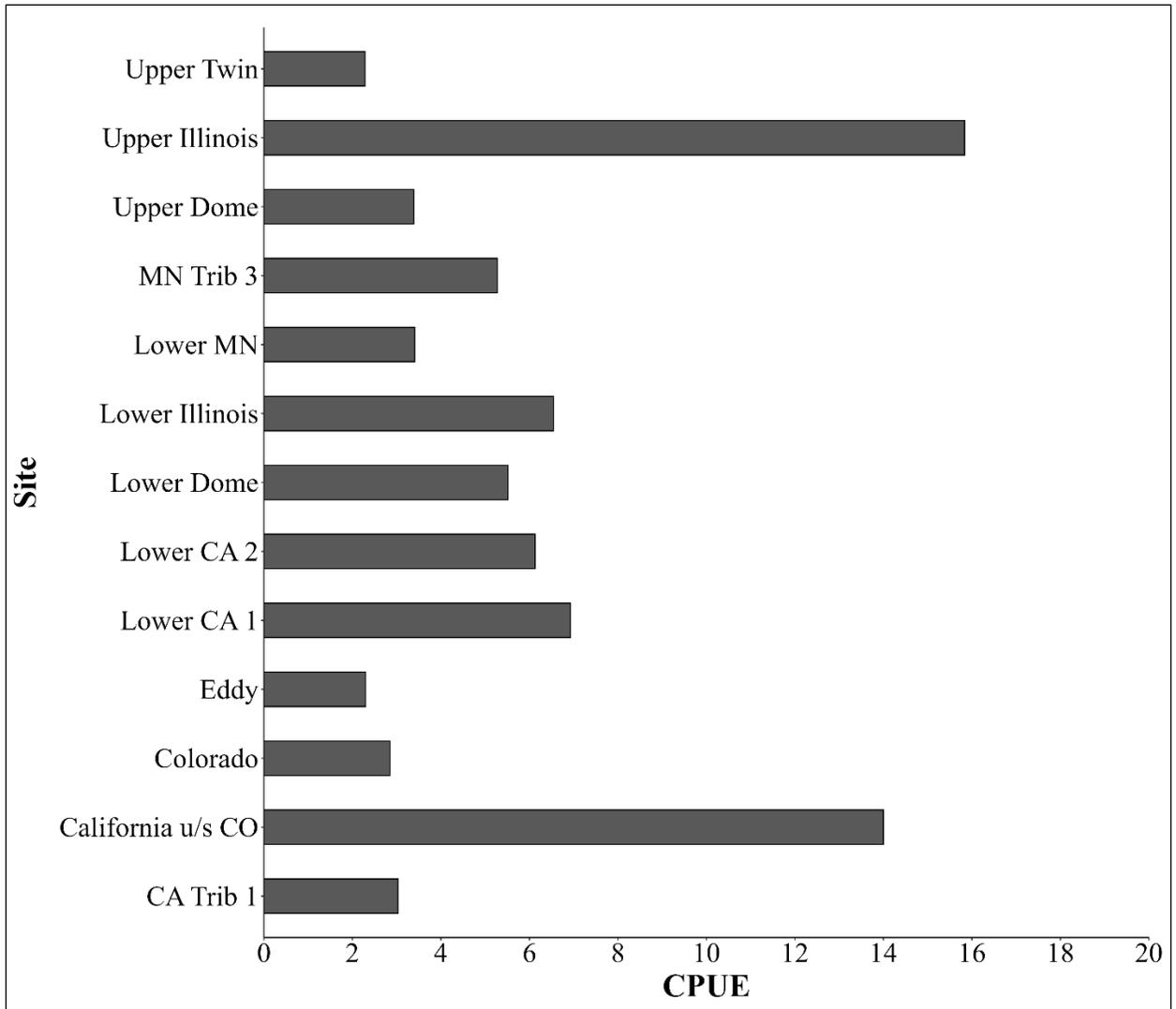


Figure 19.—Resident fish species (slimy sculpin and Alaska blackfish) catch per unit effort (CPUE) at all sites where these species were captured, 2024.

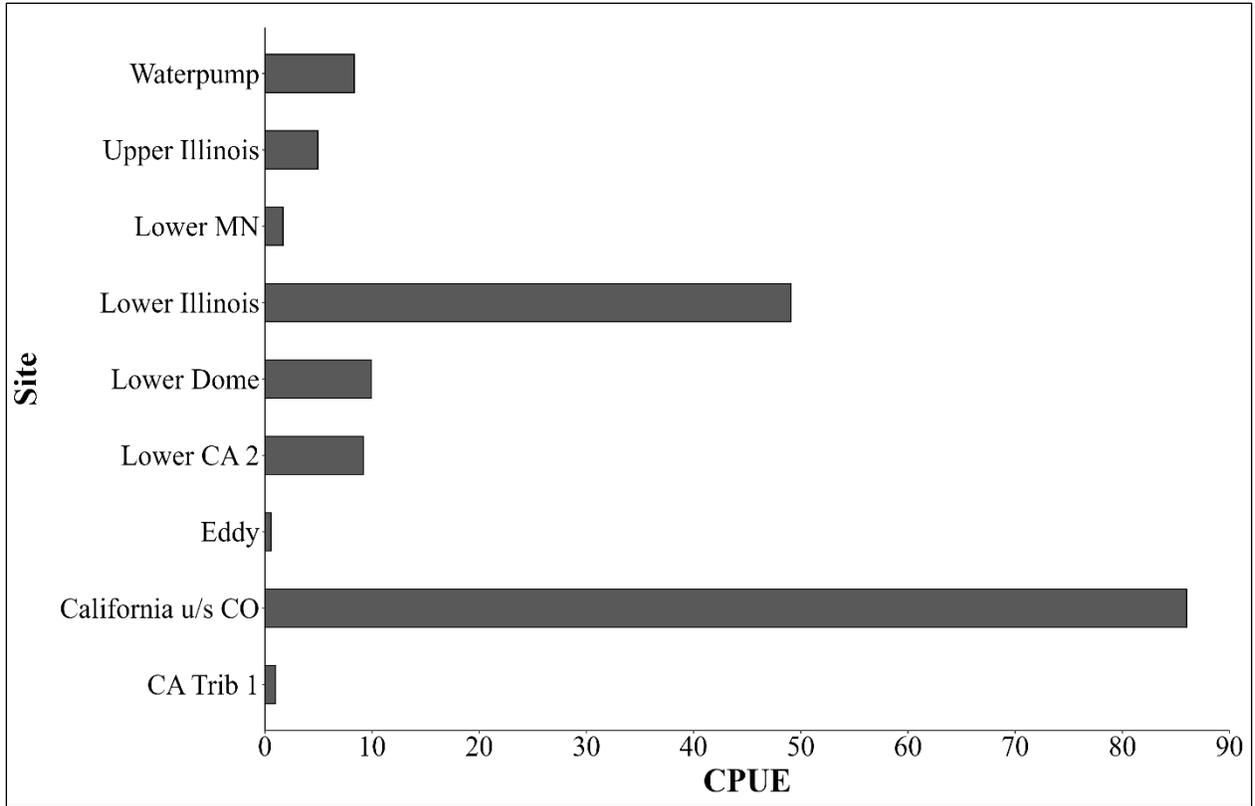


Figure 20.—Coho salmon catch per unit effort (CPUE) at all sites where coho salmon were captured, 2024.

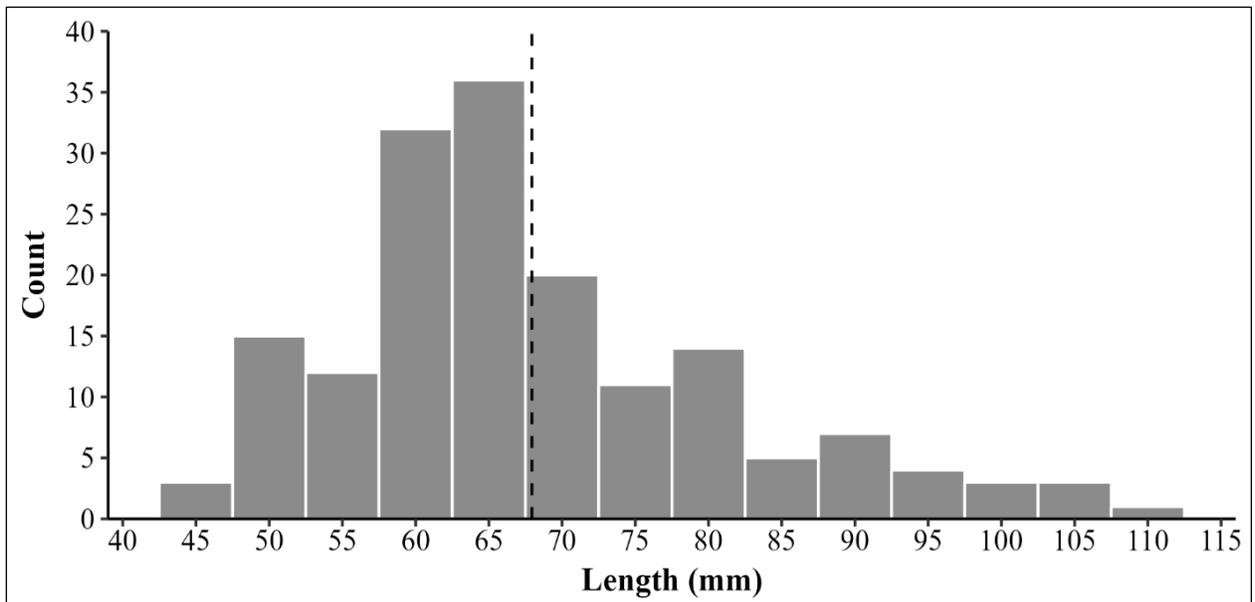


Figure 21.—Length frequency for coho salmon captured in minnow traps at all sites in 2024. The vertical dashed line represents the sample mean length.

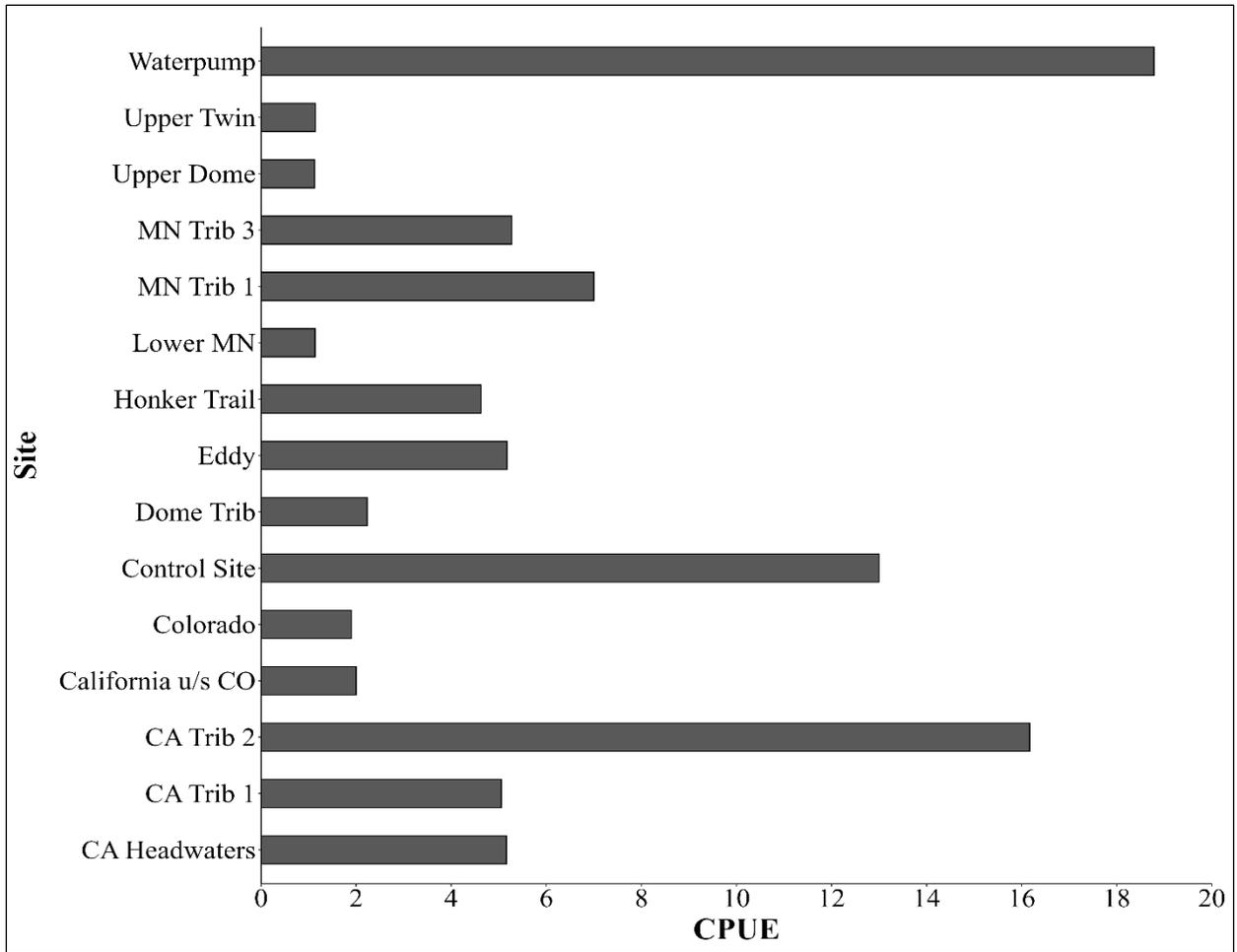


Figure 22.—Dolly Varden catch per unit effort (CPUE) at all sites where Dolly Varden were captured, 2024.

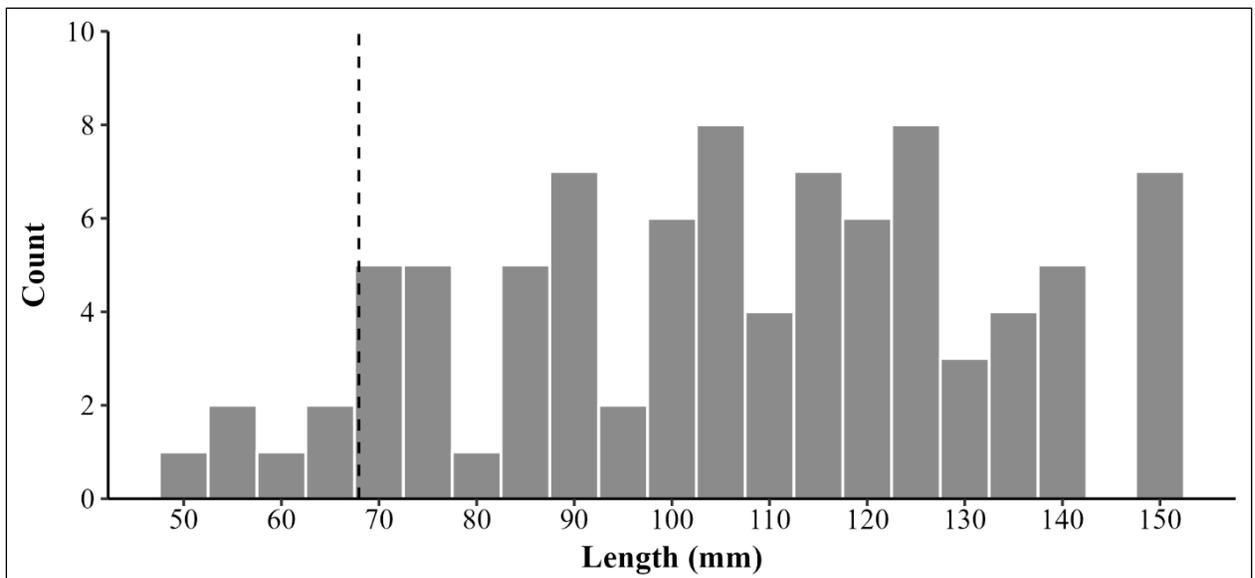


Figure 23.—Length frequency for Dolly Varden captured in minnow traps at all sites, 2024. The vertical dashed line represents the sample mean length.

ENVIRONMENTAL DNA

The eDNA results did not identify Chinook salmon presence at any sites in 2024. Species were identified with eDNA sampling that have not been confirmed with minnow traps at all 5 sites sampled. At Lower Illinois Creek Arctic grayling DNA was detected. Alaska blackfish DNA was detected at Lower Minnesota Creek and Colorado Creek. Chum salmon DNA was detected at Lower California Creek 1 and round whitefish DNA was detected at California Creek upstream of Colorado Creek. It is probable that these detections are accurate given that these species have been captured at other locations in the general area and habitat conditions are suitable. Prickly sculpin DNA was detected in California Creek upstream of Colorado Creek. This species has a known range from south coastal Alaska to California. This DNA signature could be due to a laboratory error either through contamination or misidentification due to genomic similarity to slimy sculpin, or a lack of research on their range. Sculpin captured during future sampling will be carefully inspected to determine species identification.

CONCLUSION

This report summarizes the current biological conditions in watersheds near the historic Illinois Creek Mine and surrounding prospects. This was the first year that periphyton and BMI samples were collected from sites other than Upper Illinois Creek. Fish sampling was continued at all previous sites, but lethal sampling for fish element concentrations was suspended.

There was variability in mean chlorophyll-a concentrations among all sites and among samples within a site in 2024, as well as among years at Upper Illinois Creek. Lower California Creek 1 had the highest mean chlorophyll-a concentration but also the greatest variability among individual samples. Four out of 8 sites had mean concentration below 10 mg/m² with less variability among individual samples. Means around 10 mg/m² or less are similar to many streams sampled near the Arctic-Bornite prospects in the southern end of the Brooks Range (Clawson 2022; Clawson 2023). The mean chlorophyll-a concentration at Upper Illinois Creek remained two to three times higher than those in 2020 and 2021 but approximately half the mean in 2022 and 2023. The differences among individual sample results within sites illustrate the importance of examining data structure rather than just comparing means to understand differences in primary productivity both among and within sites.

Variability was also apparent in BMI samples, particularly for density and composition analyses. At sites with generally lower densities, EPT taxa composed the majority of the samples. Conversely, at sites with generally higher densities, Diptera composed the majority of the samples. Upper Illinois Creek had generally high density in 2024, but this was not the case in all years and the previously discussed correlation between density and taxa composition is not apparent among years at this site. Taxa richness was similar among all sites in 2024.

Fish sampling results were not explicitly compared among years in this report, but some variation has been apparent (Yancy and Edwards 2024). This does not necessarily mean that abundance or community composition has changed as these fish inhabit open systems that allow free movement between stream reaches. Additionally, the sampling period changed from mid-July to late June in 2022. This may explain the general decrease in juvenile coho salmon catches across years, but it could also be a result of a decline in coho salmon escapement estimates documented across the Yukon River drainage (Donnellan and Munro 2023). The three most commonly captured species among all sites are slimy sculpin, Dolly Varden, and coho salmon. Fish have been consistently captured at all sites except Minnesota Creek Tributary 2 which has persistent red staining on the stream substrate.

Environmental DNA samples were collected at a subset of sites for the first time in 2024. Chinook salmon DNA was not detected at any sites, but DNA signatures from resident species not confirmed via minnow trapping were detected at all 5 sites sampled. These results should be interpreted with caution as this is a relatively new sampling method with many unknown factors including DNA degradation rates in water. Laboratory contamination can also occur. It should also be noted that eDNA cannot offer specific distribution data as DNA can be transported from upstream areas. Additionally, lack of eDNA detection does not necessarily mean the species is not present as DNA eventually degrades and fish move among stream reaches.

Overall, the apparent variability in biomonitoring results among years and sites illustrates the importance of conducting sampling over multiple years and across the full area of potential impact to capture the magnitude of natural variability at these sites prior to development. We recommend continuing the annual biomonitoring program as conducted in 2024. Periphyton and BMI data collection should be continued at the 7 new sites added this year to capture natural inter-annual

variability. Continued fish sampling would be beneficial to inform future permitting decisions. Other recommendations to consider include conducting aerial surveys in August and/or September to determine if there are coho, chum and/or Chinook salmon or anadromous Dolly Varden spawning in the vicinity of the Illinois Creek mine and associated prospects.

LITERATURE CITED

- Barbour, M. T., J. Gerritsen, B. D. Snyder, and J. B. Stribling. 1999. Rapid bioassessment protocols for use in streams and wadeable rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.
- Bradley, P. T. 2017. Methods for aquatic life monitoring at the Red Dog Mine site. Alaska Department of Fish and Game, Technical Report No. 17-09, Fairbanks, Alaska.
- Clawson, C. M. 2022. Aquatic Biomonitoring at the Arctic-Bornite Prospect, 2021. Alaska Department of Fish and Game Technical Report No. 22-06, Fairbanks, Alaska.
- Clawson, C. M. 2023. Aquatic Biomonitoring at the Arctic-Bornite Prospect, 2022. Alaska Department of Fish and Game Technical Report No. 23-04, Fairbanks, Alaska.
- Donnellan, S. J., and A. R. Munro, editors. 2023. Run forecasts and harvest projections for 2023 Alaska salmon fisheries and review of the 2022 season. Alaska Department of Fish and Game, Special Publication No. 23-10, Anchorage, Alaska.
- Harings, M.A.B., J. Hill, K. Reece, B.R.K. Cron, J.A. Lopez, and E. Schoen. 2024. A simple protocol for sampling environmental DNA from flowing waters at remote field sites. protocols.io. <https://dx.doi.org/10.17504/protocols.io.q26g7mrykgwz/v1>.
- Morsell, J. W. 1991. Aquatic resource assessment study Illinois Creek gold project. Northern Ecological Services, Anchorage, Alaska.
- Winters, J. F. 1996. Illinois Creek Mine Fish Monitoring Study: Emphasis on Juvenile Chinook Salmon. Alaska Department of Fish and Game, Technical Report No. 96-7, Fairbanks, Alaska.
- Winters, J. F. 1997. Illinois Creek Mine Fish Monitoring Study: Emphasis on Juvenile Chinook Salmon – Year 2 (1996). Alaska Department of Fish and Game, Internal Memo, Fairbanks, Alaska.
- Winters, J. F. 1998a. Illinois Creek Mine Fish Monitoring Study: Emphasis on Juvenile Chinook Salmon – Year 3 (1997). Alaska Department of Fish and Game, Internal Memo, Fairbanks, Alaska.
- Winters, J. F. 1998b. Illinois Creek Mine Fish Monitoring Study: Emphasis on Juvenile Chinook Salmon – Year 4 (1998). Alaska Department of Fish and Game, Internal Memo, Fairbanks, Alaska.
- Yancy, L. E., and O. N. Edwards. 2024. Baseline Aquatic Biomonitoring at Illinois Creek Mine and Associated Prospects, 2023. Alaska Department of Fish and Game, Technical Report No 24-09, Fairbanks, Alaska.

APPENDICES

APPENDIX 1. IN SITU WATER QUALITY DATA, 2020–2024.

| Year | Date | Site | Water Temp (°C) | Dissolved Oxygen (mg/mL) | pH | Specific Conductivity (µs/cm) | Turbidity (NTU) |
|------|-----------|------------------------|-----------------|--------------------------|------|-------------------------------|-----------------|
| 2024 | 6/21/2024 | CA Creek u/s of CO Crk | 8.9 | 12.36 | 8.01 | 85.7 | |
| 2023 | 6/26/2023 | CA Creek u/s of CO Crk | 6.3 | 14.19 | 7.87 | 87.2 | 0.55 |
| 2022 | 6/18/2022 | CA Creek u/s of CO Crk | 7.3 | | | | |
| 2024 | 6/21/2024 | CA Crk Headwaters | 5.5 | 12.63 | 7.81 | 85.8 | |
| 2023 | 6/24/2023 | CA Crk Headwaters | 6.1 | 13.04 | 8.11 | 86.1 | 0.45 |
| 2022 | 6/15/2022 | CA Crk Headwaters | 4 | | | | |
| 2024 | 6/22/2024 | CA Crk Tributary 1 | 5.8 | 12.76 | 7.73 | 41.8 | |
| 2023 | 6/24/2023 | CA Crk Tributary 1 | 6.7 | 13 | 7.45 | 41 | 0.71 |
| 2022 | 6/15/2022 | CA Crk Tributary 1 | 5.4 | | | | |
| 2024 | 6/22/2024 | CA Crk Tributary 2 | 4.2 | 12.73 | 8.67 | 134.9 | |
| 2023 | 6/24/2023 | CA Crk Tributary 2 | 5 | 13.05 | 7.88 | 129.6 | 0.01 |
| 2022 | 6/15/2022 | CA Crk Tributary 2 | 3.8 | | | | |
| 2024 | 6/20/2024 | Colorado Creek | 7.7 | 11.9 | 7.55 | 59.2 | |
| 2023 | 6/26/2023 | Colorado Creek | 5.6 | 13.46 | 7.59 | 63.1 | 0.31 |
| 2022 | 6/17/2022 | Colorado Creek | 7.3 | | | | |
| 2024 | 6/24/2024 | Control Site | 5.1 | 12.77 | 8.32 | 135.6 | |
| 2024 | 6/20/2024 | Dome Crk Tributary | 4.5 | 13.33 | 7.96 | 111.2 | |
| 2023 | 6/23/2023 | Dome Crk Tributary | 4.2 | 15.7 | 7.64 | 104.1 | 1.32 |
| 2022 | 6/19/2022 | Dome Crk Tributary | 4.3 | | | | |
| 2024 | 6/23/2024 | Eddy Creek | 5.1 | 12.9 | 7.9 | 79.1 | |
| 2023 | 6/24/2023 | Eddy Creek | 5.7 | 13.4 | 7.61 | 77.9 | 0.74 |
| 2022 | 6/15/2022 | Eddy Creek | 3.6 | | | | |
| 2024 | 6/20/2024 | Honker Trail Creek | 2.9 | 13.43 | 7.76 | 71.6 | |
| 2023 | 6/23/2023 | Honker Trail Creek | 3.7 | 13.62 | 7.75 | 70 | 1.82 |
| 2022 | 6/20/2022 | Honker Trail Creek | 4 | | | | |
| 2020 | 7/10/2020 | Illinois Springs | 9.3 | | | | |
| 2024 | 6/19/2024 | Lower CA Creek 1 | 9.9 | 12.43 | 7.91 | 74.3 | |
| 2023 | 6/22/2023 | Lower CA Creek 1 | 9.6 | 12.8 | 7.77 | 75.7 | 2.27 |
| 2022 | 6/15/2022 | Lower CA Creek 1 | 9.5 | | | | |
| 2024 | 6/19/2024 | Lower CA Creek 2 | 9.4 | 12.44 | 8.18 | 75.1 | |
| 2023 | 6/22/2023 | Lower CA Creek 2 | 9.9 | 12.8 | 8.42 | 73.6 | 1.34 |
| 2022 | 6/16/2022 | Lower CA Creek 2 | 9.5 | | | | |
| 2024 | 6/20/2024 | Lower Dome Creek | 5.4 | 12.57 | 7.62 | 74.2 | |
| 2023 | 6/23/2023 | Lower Dome Creek | 6 | 12.72 | 7.54 | 71.2 | 1.01 |
| 2022 | 6/19/2022 | Lower Dome Creek | 6.9 | | | | |
| 2024 | 6/25/2024 | Lower Illinois Creek | 9.6 | 10.99 | 8.13 | 153.8 | |
| 2023 | 6/26/2023 | Lower Illinois Creek | 9.9 | 11.49 | 7.99 | 135.9 | 0.59 |
| 2022 | 6/15/2022 | Lower Illinois Creek | 10.1 | | | | |
| 2020 | 7/9/2020 | Lower Illinois Creek | 9.5 | | | | |
| 2024 | 6/24/2024 | Lower MN Creek | 7.9 | 11.43 | 7.61 | 105.6 | |
| 2022 | 6/16/2022 | MN Crk Headwaters | 8.1 | | | | |
| 2024 | 6/24/2024 | MN Crk Tributary 1 | 9.2 | 10.72 | 7.78 | 81.3 | |
| 2023 | 6/25/2023 | MN Crk Tributary 1 | 5.7 | 11.77 | 7.91 | 82.8 | 0.14 |
| 2022 | 6/16/2022 | MN Crk Tributary 1 | 7.1 | | | | |
| 2024 | 6/24/2024 | MN Crk Tributary 2 | 7.4 | 11.72 | 7.42 | 84.7 | |
| 2023 | 6/25/2023 | MN Crk Tributary 2 | 4.5 | 13.72 | 7.59 | 84.9 | 1.72 |
| 2022 | 6/16/2022 | MN Crk Tributary 2 | 5.4 | | | | |
| 2024 | 6/25/2024 | MN Crk Tributary 3 | 6.3 | 11.88 | 7.65 | 60.8 | |
| 2023 | 6/25/2023 | MN Crk Tributary 3 | 5.7 | 12.37 | 7.71 | 53.2 | 0.24 |
| 2022 | 6/16/2022 | MN Crk Tributary 3 | 6.9 | | | | |
| 2024 | 6/20/2024 | Upper Dome Creek | 5.4 | 12.63 | 7.64 | 76.5 | |
| 2023 | 6/23/2023 | Upper Dome Creek | 4.5 | 13.46 | 7.42 | 74.9 | 0.53 |
| 2022 | 6/19/2022 | Upper Dome Creek | 5.5 | | | | |
| 2024 | 6/25/2024 | Upper Illinois Creek | 9.2 | 10.71 | 7.7 | 134.9 | |
| 2023 | 6/26/2023 | Upper Illinois Creek | 7.3 | 11.06 | 7.72 | 118.5 | 0.55 |
| 2022 | 6/15/2022 | Upper Illinois Creek | 7.2 | | | | |
| 2020 | 7/9/2020 | Upper Illinois Creek | 7.1 | | | | |
| 2023 | 6/25/2023 | Upper MN Creek | 7.2 | 11.65 | 8.19 | 140 | 1.21 |
| 2024 | 6/24/2024 | Upper Twin Creek | 4.3 | 13 | 7.67 | 55.2 | |
| 2023 | 6/27/2023 | Upper Twin Creek | 4.4 | 13.84 | 7.67 | 54.8 | 0.8 |
| 2022 | 6/21/2022 | Upper Twin Creek | 4.7 | | | | |
| 2024 | 6/24/2024 | Waterpump Creek | 5 | 12.71 | 8.18 | 154.4 | |
| 2023 | 6/27/2023 | Waterpump Creek | 5 | 13.39 | 8.57 | 152.8 | 0.54 |
| 2022 | 6/21/2022 | Waterpump Creek | 6 | | | | |

APPENDIX 2: PHAEOPHYTIN-CORRECTED CHLOROPHYLL-A CONCENTRATIONS AT ALL SITES, 2024.

| Year | Site | Chlorophyll-a (phaeo corrected; mg/m2) | 664/665 Ratio | Chlorophyll-b (mg/m2) | Chlorophyll-c (mg/m2) |
|------|-----------------------------|--|---------------|-----------------------|-----------------------|
| 2024 | California Creek u/s CO Crk | 24.1368 | 1.668639053 | 0 | 2.26512 |
| 2024 | California Creek u/s CO Crk | 2.9904 | 1.636363636 | 0.46368 | 0.19984 |
| 2024 | California Creek u/s CO Crk | 8.01 | 1.630252101 | 0.46012 | 1.06712 |
| 2024 | California Creek u/s CO Crk | 5.34 | 1.684931507 | 0 | 0.431 |
| 2024 | California Creek u/s CO Crk | 8.1168 | 1.666666667 | 0 | 0.6436 |
| 2024 | California Creek u/s CO Crk | 4.3788 | 1.640625 | 0.57648 | 0.52772 |
| 2024 | California Creek u/s CO Crk | 6.8352 | 1.659793814 | 0 | 0.89124 |
| 2024 | California Creek u/s CO Crk | 1.1748 | 1.578947368 | 0.04164 | 0.11448 |
| 2024 | California Creek u/s CO Crk | 5.1264 | 1.685714286 | 0 | 0.42712 |
| 2024 | California Creek u/s CO Crk | 8.9712 | 1.641221374 | 0.24572 | 0.93372 |
| 2024 | Control Site | 6.942 | 1.698924731 | 0 | 0.74552 |
| 2024 | Control Site | 10.5732 | 1.692307692 | 0 | 0.94952 |
| 2024 | Control Site | 3.4176 | 1.680851064 | 0 | 0.30508 |
| 2024 | Control Site | 0.8544 | 1.666666667 | 0.10124 | 0.144 |
| 2024 | Control Site | 2.136 | 1.714285714 | 0.01808 | 0.33264 |
| 2024 | Control Site | 5.874 | 1.705128205 | 0 | 0.72612 |
| 2024 | Control Site | 4.3788 | 1.683333333 | 0 | 0.5642 |
| 2024 | Control Site | 5.2332 | 1.662162162 | 0 | 0.55948 |
| 2024 | Control Site | 2.9904 | 1.682926829 | 0 | 0.26692 |
| 2024 | Control Site | 11.1072 | 1.675324675 | 0 | 1.27912 |
| 2024 | Eddy Creek | 2.4564 | 1.657142857 | 0 | 0.30312 |
| 2024 | Eddy Creek | 3.204 | 1.666666667 | 0 | 0.29452 |
| 2024 | Eddy Creek | 3.204 | 1.666666667 | 0 | 0.29452 |
| 2024 | Eddy Creek | 2.4564 | 1.657142857 | 0 | 0.33352 |
| 2024 | Eddy Creek | 4.9128 | 1.647887324 | 0 | 0.56228 |
| 2024 | Eddy Creek | 1.602 | 1.6 | 0 | 0.18304 |
| 2024 | Eddy Creek | 4.0584 | 1.62295082 | 0 | 0.4118 |
| 2024 | Eddy Creek | 3.0972 | 1.659090909 | 0 | 0.50404 |
| 2024 | Eddy Creek | 2.3496 | 1.647058824 | 0 | 0.2488 |
| 2024 | Eddy Creek | 3.738 | 1.636363636 | 0 | 0.29928 |
| 2024 | Eddy Creek | 2.4564 | 1.657142857 | 0 | 0.30312 |
| 2024 | Eddy Creek | 3.204 | 1.666666667 | 0 | 0.29452 |
| 2024 | Eddy Creek | 3.204 | 1.666666667 | 0 | 0.29452 |
| 2024 | Eddy Creek | 2.4564 | 1.657142857 | 0 | 0.33352 |
| 2024 | Eddy Creek | 4.9128 | 1.647887324 | 0 | 0.56228 |
| 2024 | Eddy Creek | 1.602 | 1.6 | 0 | 0.18304 |
| 2024 | Eddy Creek | 4.0584 | 1.62295082 | 0 | 0.4118 |
| 2024 | Eddy Creek | 3.0972 | 1.659090909 | 0 | 0.50404 |
| 2024 | Eddy Creek | 2.3496 | 1.647058824 | 0 | 0.2488 |
| 2024 | Eddy Creek | 3.738 | 1.636363636 | 0 | 0.29928 |
| 2024 | Lower California Creek 1 | 12.1752 | 1.670588235 | 0 | 0.86224 |
| 2024 | Lower California Creek 1 | 2.3496 | 1.628571429 | 0 | 0.21172 |
| 2024 | Lower California Creek 1 | 51.798 | 1.678321678 | 0 | 3.6776 |
| 2024 | Lower California Creek 1 | 10.146 | 1.664335664 | 0 | 0.90856 |
| 2024 | Lower California Creek 1 | 7.9032 | 1.660714286 | 0.0354 | 0.6772 |
| 2024 | Lower California Creek 1 | 48.1668 | 1.671130952 | 0 | 3.1974 |
| 2024 | Lower California Creek 1 | 6.8352 | 1.666666667 | 0 | 0.66448 |
| 2024 | Lower California Creek 1 | 46.992 | 1.654761905 | 0 | 4.1536 |
| 2024 | Lower California Creek 1 | 46.7784 | 1.650817236 | 0 | 4.12988 |
| 2024 | Lower California Creek 1 | 8.01 | 1.663716814 | 0 | 0.59616 |
| 2024 | Lower California Creek 1 | 23.0688 | 1.677115987 | 0 | 1.50156 |

| Year | Site | Chlorophyll-a (phaeo corrected; mg/m2) | 664/665 Ratio | Chlorophyll-b (mg/m2) | Chlorophyll-c (mg/m2) |
|------|-----------------------|--|---------------|-----------------------|-----------------------|
| 2024 | Lower Dome Creek | 3.6312 | 1.68 | 0 | 0.40704 |
| 2024 | Lower Dome Creek | 1.602 | 1.652173913 | 0 | 0.12872 |
| 2024 | Lower Dome Creek | 1.602 | 1.576923077 | 0 | 0.17636 |
| 2024 | Lower Dome Creek | 2.2428 | 1.636363636 | 0 | 0.19448 |
| 2024 | Lower Dome Creek | 2.5632 | 1.615384615 | 0 | 0.26972 |
| 2024 | Lower Dome Creek | 1.7088 | 1.64 | 0 | 0.17636 |
| 2024 | Lower Dome Creek | 3.3108 | 1.688888889 | 0 | 0.28784 |
| 2024 | Lower Dome Creek | 1.7088 | 1.666666667 | 0 | 0.21344 |
| 2024 | Lower Dome Creek | 1.8156 | 1.653846154 | 0 | 0.23068 |
| 2024 | Lower Dome Creek | 4.1652 | 1.661016949 | 0 | 0.15464 |
| 2024 | Lower Dome Creek | 3.6312 | 1.68 | 0 | 0.40704 |
| 2024 | Lower Dome Creek | 1.602 | 1.652173913 | 0 | 0.12872 |
| 2024 | Lower Dome Creek | 1.602 | 1.576923077 | 0 | 0.17636 |
| 2024 | Lower Dome Creek | 2.2428 | 1.636363636 | 0 | 0.19448 |
| 2024 | Lower Dome Creek | 2.5632 | 1.615384615 | 0 | 0.26972 |
| 2024 | Lower Dome Creek | 1.7088 | 1.64 | 0 | 0.17636 |
| 2024 | Lower Dome Creek | 3.3108 | 1.688888889 | 0 | 0.28784 |
| 2024 | Lower Dome Creek | 1.7088 | 1.666666667 | 0 | 0.21344 |
| 2024 | Lower Dome Creek | 1.8156 | 1.653846154 | 0 | 0.23068 |
| 2024 | Lower Dome Creek | 4.1652 | 1.661016949 | 0 | 0.15464 |
| 2024 | Lower Minnesota Creek | 6.8352 | 1.703296703 | 0 | 0.78908 |
| 2024 | Lower Minnesota Creek | 3.0972 | 1.644444444 | 0 | 0.36888 |
| 2024 | Lower Minnesota Creek | 33.5352 | 1.684095861 | 0 | 2.20996 |
| 2024 | Lower Minnesota Creek | 50.4096 | 1.650137741 | 0 | 3.08872 |
| 2024 | Lower Minnesota Creek | 16.6608 | 1.672413793 | 0 | 1.5584 |
| 2024 | Lower Minnesota Creek | 15.5928 | 1.67281106 | 0 | 1.05548 |
| 2024 | Lower Minnesota Creek | 16.554 | 1.651260504 | 0 | 1.39652 |
| 2024 | Lower Minnesota Creek | 12.4956 | 1.680232558 | 0 | 1.21428 |
| 2024 | Lower Minnesota Creek | 2.4564 | 1.621621622 | 0 | 0.28976 |
| 2024 | Lower Minnesota Creek | 4.5924 | 1.671875 | 0 | 0.5918 |
| 2024 | Upper Illinois Creek | 13.9908 | 1.557446809 | 0 | 1.93192 |
| 2024 | Upper Illinois Creek | 17.9424 | 1.629213483 | 0 | 1.79964 |
| 2024 | Upper Illinois Creek | 8.4372 | 1.642276423 | 0 | 0.6076 |
| 2024 | Upper Illinois Creek | 18.4764 | 1.65037594 | 0 | 1.9318 |
| 2024 | Upper Illinois Creek | 7.0488 | 1.66 | 0 | 0.69208 |
| 2024 | Upper Illinois Creek | 5.4468 | 1.64556962 | 0 | 0.5804 |
| 2024 | Upper Illinois Creek | 17.4084 | 1.56993007 | 1.84128 | 4.11908 |
| 2024 | Upper Illinois Creek | 5.4468 | 1.653846154 | 0 | 0.36052 |
| 2024 | Upper Illinois Creek | 3.5244 | 1.66 | 0 | 0.41372 |
| 2024 | Upper Illinois Creek | 27.9816 | 1.637469586 | 0 | 3.845 |
| 2024 | Upper Illinois Creek | 17.8356 | 1.623134328 | 0 | 1.79964 |
| 2024 | Waterpump Creek | 34.2828 | 1.628180039 | 1.24292 | 4.89584 |
| 2024 | Waterpump Creek | 8.01 | 1.675675676 | 0.38252 | 0.45752 |
| 2024 | Waterpump Creek | 2.136 | 1.526315789 | 0.66236 | 0.51992 |
| 2024 | Waterpump Creek | 23.496 | 1.650887574 | 0.0008 | 2.25816 |
| 2024 | Waterpump Creek | 5.7672 | 1.65060241 | 0 | 0.73668 |
| 2024 | Waterpump Creek | 11.9616 | 1.651162791 | 0 | 1.06528 |
| 2024 | Waterpump Creek | 31.9332 | 1.658590308 | 0.76504 | 3.29508 |
| 2024 | Waterpump Creek | 7.476 | 1.573770492 | 0.8816 | 1.3208 |
| 2024 | Waterpump Creek | 13.35 | 1.641025641 | 1.30664 | 0.72096 |
| 2024 | Waterpump Creek | 11.748 | 1.650887574 | 1.58804 | 0.64956 |
| 2024 | Waterpump Creek | 34.2828 | 1.628180039 | 1.24292 | 4.89584 |
| 2024 | Waterpump Creek | 8.01 | 1.675675676 | 0.38252 | 0.45752 |
| 2024 | Waterpump Creek | 2.136 | 1.526315789 | 0.66236 | 0.51992 |
| 2024 | Waterpump Creek | 23.496 | 1.650887574 | 0.0008 | 2.25816 |
| 2024 | Waterpump Creek | 5.7672 | 1.65060241 | 0 | 0.73668 |
| 2024 | Waterpump Creek | 11.9616 | 1.651162791 | 0 | 1.06528 |
| 2024 | Waterpump Creek | 31.9332 | 1.658590308 | 0.76504 | 3.29508 |
| 2024 | Waterpump Creek | 7.476 | 1.573770492 | 0.8816 | 1.3208 |
| 2024 | Waterpump Creek | 13.35 | 1.641025641 | 1.30664 | 0.72096 |
| 2024 | Waterpump Creek | 11.748 | 1.650887574 | 1.58804 | 0.64956 |

APPENDIX 3: BENTHIC MACROINVERTEBRATES IDENTIFIED IN SAMPLES AND CORRECTED FOR SUBSAMPLING FROM ALL SITES, 2024.

| Year | Order | Family | Genus | Upper Illinois Creek | CA Creek u/s of CO Crk | Control Site | Eddy Creek | Lower CA Creek 1 | Lower Dome Creek | Lower MN Creek | Waterpump Creek |
|------|-----------------|-----------------|---------------|----------------------|------------------------|--------------|------------|------------------|------------------|----------------|-----------------|
| 2024 | Acari | Acarina | spp | 255 | 579 | 21 | 40 | 223 | 6 | 16 | 316 |
| 2024 | Bivalvia | Sphaeriidae | Pisidium | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| 2024 | Collembola | Sminthuridae | Sminthurus | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 2024 | Copepoda | Harpacticoida | spp | 11 | 2 | 0 | 3 | 5 | 1 | 0 | 9 |
| 2024 | Copepoda | Cyclopoida | spp | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| 2024 | Copepoda | Calanoida | spp | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| 2024 | Diptera | Ceratopogonidae | spp | 40 | 188 | 11 | 32 | 49 | 1 | 21 | 3 |
| 2024 | Diptera | Chironomidae | spp | 4610 | 3219 | 694 | 549 | 4438 | 345 | 192 | 4122 |
| 2024 | Diptera | Simuliidae | Simulium | 7 | 21 | 7 | 38 | 9 | 0 | 6 | 28 |
| 2024 | Diptera | spp | spp | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 9 |
| 2024 | Diptera | Empididae | Chelifera | 346 | 0 | 110 | 16 | 9 | 0 | 0 | 30 |
| 2024 | Diptera | Empididae | spp | 3 | 0 | 2 | 0 | 1 | 0 | 0 | 0 |
| 2024 | Diptera | Simuliidae | spp | 6 | 0 | 1 | 22 | 4 | 15 | 10 | 68 |
| 2024 | Diptera | Tipulidae | Rhabdomastix | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 12 |
| 2024 | Diptera | Tipulidae | Tipula | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 2 |
| 2024 | Diptera | Tipulidae | Dicranota | 0 | 0 | 0 | 0 | 6 | 2 | 0 | 8 |
| 2024 | Diptera | Simuliidae | Nemoura | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 |
| 2024 | Diptera | Tipulidae | spp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 2024 | Ephemeroptera | Baetidae | Baetis | 579 | 513 | 632 | 526 | 1 | 254 | 1000 | 81 |
| 2024 | Ephemeroptera | Ephemerellidae | Drunella | 0 | 14 | 9 | 39 | 0 | 6 | 5 | 54 |
| 2024 | Ephemeroptera | Ephemerellidae | spp | 72 | 34 | 0 | 123 | 0 | 36 | 1 | 120 |
| 2024 | Ephemeroptera | Heptageniidae | Cinygmula | 36 | 32 | 574 | 630 | 6 | 325 | 259 | 868 |
| 2024 | Ephemeroptera | Heptageniidae | Epeorus | 0 | 14 | 18 | 38 | 1 | 33 | 19 | 108 |
| 2024 | Ephemeroptera | spp | spp | 45 | 33 | 2 | 27 | 38 | 66 | 6 | 136 |
| 2024 | Ephemeroptera | Ameletidae | Ameletus | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2024 | Ephemeroptera | Baetidae | spp | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 |
| 2024 | Ephemeroptera | Ephemerellidae | Caudatella | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 |
| 2024 | Gastropoda | Valvatidae | Valvata | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 2024 | Nematoda | spp | spp | 36 | 32 | 6 | 38 | 2 | 2 | 2 | 84 |
| 2024 | Oligochaeta | spp | spp | 78 | 33 | 424 | 212 | 261 | 25 | 55 | 87 |
| 2024 | Ostracoda | spp | spp | 400 | 48 | 2 | 45 | 4 | 8 | 6 | 464 |
| 2024 | Platyhelminthes | spp | spp | 64 | 123 | 165 | 354 | 31 | 14 | 15 | 618 |
| 2024 | Plecoptera | Chloroperlidae | Suwallia | 0 | 6 | 10 | 22 | 0 | 26 | 6 | 6 |
| 2024 | Plecoptera | Chloroperlidae | spp | 0 | 2 | 8 | 2 | 7 | 0 | 18 | 0 |
| 2024 | Plecoptera | Nemouridae | Zapada | 14 | 68 | 191 | 142 | 3 | 8 | 75 | 218 |
| 2024 | Plecoptera | spp | spp | 40 | 0 | 18 | 16 | 25 | 7 | 6 | 69 |
| 2024 | Plecoptera | Perlodidae | spp | 0 | 0 | 0 | 6 | 4 | 2 | 1 | 0 |
| 2024 | Plecoptera | Nemouridae | spp | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| 2024 | Plecoptera | Perlodidae | Isoperla | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| 2024 | Plecoptera | Leutridae | spp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 2024 | Trichoptera | Brachycentridae | Brachycentrus | 16 | 18 | 0 | 0 | 0 | 0 | 4 | 0 |
| 2024 | Trichoptera | Brachycentridae | spp | 6 | 2 | 0 | 0 | 1 | 0 | 11 | 0 |
| 2024 | Trichoptera | Glossosomatidae | spp | 0 | 999 | 7 | 0 | 0 | 0 | 0 | 0 |
| 2024 | Trichoptera | Ryachophiliide | Ryachophilia | 17 | 2 | 57 | 30 | 0 | 2 | 4 | 87 |
| 2024 | Trichoptera | spp | spp | 19 | 4 | 1 | 2 | 106 | 0 | 2 | 4 |
| 2024 | Trichoptera | Limnephilidae | spp | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| 2024 | Trichoptera | Ryachophiliide | spp | 0 | 0 | 0 | 27 | 0 | 0 | 0 | 0 |
| 2024 | Trichoptera | Hydroptilidae | spp | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 |

APPENDIX 4: TOTAL FISH CAPTURED AT ALL SITES, 2020–2024.

| Year | Site | Coho Salmon | Chinook Salmon | Slimy Sculpin | Dolly Varden | Alaska Blackfish | Arctic Grayling | Total |
|------|-------------------------------|-------------|----------------|---------------|--------------|------------------|-----------------|-------|
| 2024 | California Creek (u/s CO Crk) | 86 | 0 | 13 | 2 | 1 | 0 | 102 |
| 2023 | California Creek (u/s CO Crk) | 5 | 0 | 13 | 2 | 1 | 0 | 21 |
| 2022 | California Creek (u/s CO Crk) | 23 | 0 | 2 | 0 | 0 | 0 | 25 |
| 2021 | California Creek (u/s CO Crk) | 4 | 0 | 9 | 1 | 1 | 0 | 15 |
| 2020 | California Creek (u/s CO Crk) | 42 | 0 | 2 | 1 | 1 | 0 | 46 |
| 2024 | California Creek Headwaters | 0 | 0 | 0 | 5 | 0 | 0 | 5 |
| 2023 | California Creek Headwaters | 0 | 0 | 0 | 3 | 0 | 0 | 3 |
| 2022 | California Creek Headwaters | 0 | 0 | 0 | 5 | 0 | 0 | 5 |
| 2020 | California Creek Headwaters | 0 | 0 | 3 | 9 | 0 | 0 | 12 |
| 2024 | California Creek Trib 1 | 1 | 0 | 3 | 5 | 0 | 0 | 9 |
| 2023 | California Creek Trib 1 | 0 | 0 | 3 | 5 | 0 | 0 | 8 |
| 2022 | California Creek Trib 1 | 0 | 0 | 9 | 0 | 0 | 0 | 9 |
| 2020 | California Creek Trib 1 | 7 | 0 | 3 | 2 | 0 | 0 | 12 |
| 2024 | California Creek Trib 2 | 0 | 0 | 0 | 16 | 0 | 0 | 16 |
| 2023 | California Creek Trib 2 | 0 | 0 | 0 | 20 | 0 | 0 | 20 |
| 2022 | California Creek Trib 2 | 0 | 0 | 0 | 20 | 0 | 0 | 20 |
| 2020 | California Creek Trib 2 | 0 | 0 | 0 | 8 | 0 | 0 | 8 |
| 2024 | Colorado Creek | 0 | 0 | 3 | 2 | 0 | 0 | 5 |
| 2023 | Colorado Creek | 0 | 0 | 1 | 8 | 0 | 0 | 9 |
| 2022 | Colorado Creek | 0 | 0 | 3 | 2 | 0 | 0 | 5 |
| 2020 | Colorado Creek | 0 | 0 | 2 | 3 | 0 | 0 | 5 |
| 2024 | Control Site | 0 | 0 | 0 | 13 | 0 | 0 | 13 |
| 2024 | Dome Creek Tributary | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| 2023 | Dome Creek Tributary | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2022 | Dome Creek Tributary | 0 | 0 | 1 | 1 | 0 | 0 | 2 |
| 2021 | Dome Creek Tributary | 0 | 0 | 0 | 23 | 0 | 0 | 23 |
| 2020 | Dome Creek Tributary | 0 | 0 | 0 | 4 | 0 | 0 | 4 |
| 2024 | Eddy Creek | 1 | 0 | 3 | 9 | 1 | 0 | 14 |
| 2023 | Eddy Creek | 0 | 0 | 1 | 9 | 0 | 0 | 10 |
| 2022 | Eddy Creek | 0 | 0 | 1 | 3 | 0 | 0 | 4 |
| 2021 | Eddy Creek | 0 | 0 | 1 | 7 | 0 | 0 | 8 |
| 2020 | Eddy Creek | 6 | 0 | 1 | 6 | 0 | 0 | 13 |
| 2024 | Honker Trail Creek | 0 | 0 | 0 | 4 | 0 | 0 | 4 |
| 2023 | Honker Trail Creek | 0 | 0 | 0 | 9 | 0 | 0 | 9 |
| 2022 | Honker Trail Creek | 0 | 0 | 0 | 10 | 0 | 0 | 10 |
| 2021 | Honker Trail Creek | 0 | 0 | 0 | 11 | 0 | 0 | 11 |
| 2020 | Honker Trail Creek | 0 | 0 | 0 | 15 | 0 | 0 | 15 |
| 2024 | Lower California Creek 1 | 0 | 0 | 3 | 0 | 4 | 0 | 7 |
| 2023 | Lower California Creek 1 | 5 | 0 | 15 | 0 | 0 | 0 | 20 |
| 2022 | Lower California Creek 1 | 0 | 0 | 7 | 0 | 0 | 0 | 7 |
| 2021 | Lower California Creek 1 | 2 | 0 | 10 | 0 | 1 | 0 | 13 |
| 2020 | Lower California Creek 1 | 11 | 0 | 4 | 0 | 1 | 0 | 16 |
| 2024 | Lower California Creek 2 | 9 | 0 | 5 | 0 | 1 | 0 | 15 |
| 2023 | Lower California Creek 2 | 11 | 0 | 4 | 2 | 1 | 0 | 18 |
| 2022 | Lower California Creek 2 | 11 | 0 | 6 | 1 | 3 | 0 | 21 |
| 2021 | Lower California Creek 2 | 34 | 0 | 0 | 0 | 0 | 0 | 34 |
| 2020 | Lower California Creek 2 | 79 | 0 | 0 | 0 | 1 | 1 | 81 |
| 2024 | Lower Dome Creek | 9 | 0 | 5 | 0 | 0 | 0 | 14 |
| 2023 | Lower Dome Creek | 0 | 0 | 3 | 3 | 3 | 0 | 9 |
| 2022 | Lower Dome Creek | 0 | 0 | 3 | 6 | 8 | 0 | 17 |
| 2021 | Lower Dome Creek | 0 | 0 | 2 | 7 | 12 | 0 | 21 |
| 2020 | Lower Dome Creek | 6 | 0 | 6 | 1 | 1 | 0 | 14 |
| 2024 | Lower Illinois Creek | 45 | 0 | 6 | 0 | 0 | 0 | 51 |
| 2023 | Lower Illinois Creek | 22 | 5 | 11 | 0 | 0 | 0 | 38 |
| 2022 | Lower Illinois Creek | 31 | 0 | 3 | 0 | 2 | 0 | 36 |
| 2021 | Lower Illinois Creek | 116 | 0 | 8 | 0 | 1 | 0 | 125 |
| 2020 | Lower Illinois Creek | 304 | 0 | 7 | 0 | 0 | 0 | 311 |
| 2024 | Lower Minnesota Creek | 3 | 0 | 3 | 2 | 3 | 0 | 11 |
| 2022 | Lower Twin Creek | 0 | 0 | 1 | 3 | 0 | 0 | 4 |

| Year | Site | Coho Salmon | Chinook Salmon | Slimy Sculpin | Dolly Varden | Alaska Blackfish | Arctic Grayling | Total |
|------|------------------------|-------------|----------------|---------------|--------------|------------------|-----------------|-------|
| 2024 | Minnesota Creek Trib 1 | 0 | 0 | 0 | 7 | 0 | 0 | 7 |
| 2023 | Minnesota Creek Trib 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 2022 | Minnesota Creek Trib 1 | 0 | 0 | 0 | 6 | 0 | 0 | 6 |
| 2020 | Minnesota Creek Trib 1 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| 2024 | Minnesota Creek Trib 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2023 | Minnesota Creek Trib 2 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 2022 | Minnesota Creek Trib 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2020 | Minnesota Creek Trib 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2024 | Minnesota Creek Trib 3 | 0 | 0 | 4 | 5 | 1 | 0 | 10 |
| 2023 | Minnesota Creek Trib 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2022 | Minnesota Creek Trib 3 | 0 | 0 | 2 | 1 | 1 | 0 | 4 |
| 2020 | Minnesota Creek Trib 3 | 11 | 0 | 9 | 4 | 2 | 0 | 26 |
| 2024 | Upper Dome Creek | 0 | 0 | 3 | 1 | 0 | 0 | 4 |
| 2023 | Upper Dome Creek | 0 | 0 | 2 | 1 | 0 | 0 | 3 |
| 2022 | Upper Dome Creek | 0 | 0 | 3 | 1 | 0 | 0 | 4 |
| 2021 | Upper Dome Creek | 0 | 0 | 16 | 0 | 2 | 0 | 18 |
| 2020 | Upper Dome Creek | 0 | 0 | 4 | 0 | 2 | 0 | 6 |
| 2024 | Upper Illinois Creek | 5 | 0 | 16 | 0 | 0 | 0 | 21 |
| 2023 | Upper Illinois Creek | 6 | 2 | 11 | 0 | 0 | 0 | 19 |
| 2022 | Upper Illinois Creek | 8 | 0 | 8 | 0 | 0 | 0 | 16 |
| 2021 | Upper Illinois Creek | 229 | 0 | 7 | 0 | 0 | 0 | 236 |
| 2020 | Upper Illinois Creek | 62 | 0 | 6 | 0 | 0 | 0 | 68 |
| 2023 | Upper Minnesota Creek | 1 | 0 | 3 | 7 | 1 | 0 | 14 |
| 2022 | Upper Minnesota Creek | 2 | 0 | 9 | 10 | 0 | 0 | 21 |
| 2020 | Upper Minnesota Creek | 14 | 0 | 0 | 3 | 0 | 0 | 17 |
| 2024 | Upper Twin Creek | 0 | 0 | 0 | 2 | 4 | 0 | 6 |
| 2023 | Upper Twin Creek | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 2022 | Upper Twin Creek | 0 | 0 | 0 | 1 | 1 | 0 | 2 |
| 2020 | Upper Twin Creek | 0 | 0 | 0 | 3 | 0 | 0 | 3 |
| 2024 | Waterpump Creek | 8 | 0 | 0 | 18 | 0 | 0 | 26 |
| 2023 | Waterpump Creek | 4 | 0 | 5 | 8 | 0 | 0 | 17 |
| 2022 | Waterpump Creek | 26 | 0 | 0 | 3 | 0 | 0 | 29 |