

**NEW GOLD RAINY RIVER MINE
APPENDIX N
PINWOOD BIOLOGICAL, SULFATE
AND MERCURY MONITORING
REPORT**

PINEWOOD RIVER ANNUAL TERMS OF REFERENCE AND BIOLOGICAL MONITORING REPORT (2021)

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EXECUTIVE SUMMARY

The Rainy River Mine (RRM) is owned by New Gold Inc. (New Gold). The mine is located approximately 65 km northwest of Fort Frances and 420 km northwest of Thunder Bay, Ontario. It is located off of Highway 600 within the Township of Chapple and the District of Rainy River. The RRM is located within the Pinewood River watershed which flows past the mine, eventually draining into the Rainy River approximately 40 km downstream. At present, operations at RRM are comprised of open pit and underground mining with ore processed at the Rainy River Mill, located on site. The mine originally had an approved milling rate of 21,000 tonnes per day and an anticipated mine life of around 16 years (AMEC 2014). The mine came into commercial production in September 2017. The RRM is currently subject to amended Environmental Compliance Approval (ECA) Number 7004-BC7KQ5 as issued by the Ontario Ministry of Environment, Climate and Parks (MECP). The Amended ECA includes an allowable throughput of up to 32,400 tonnes of ore per day with a quarterly average throughput of up to 27,000 tonnes per day.

The current Environmental Compliance Approval (ECA, #7004-BC7KQ5) issued on February 11, 2020 and the former ECA (# 5178-9TUPD9) contain(ed) a number of conditions to assess the potential effects of the mine, particularly discharge and flow regime change, on the receiver, the Pinewood River. This report has been prepared to meet:

- ECA #7004-BC7KQ5 Condition 9(3) and Condition 12(8) – A long-term study to evaluate the potential effects of flow reductions on the biological communities within the Pinewood River watershed;
- ECA #7004-BC7KQ5 Condition 10(10) and Condition 12(10) – Potential loadings of sulphate and mercury to the Pinewood River watershed; and,
- Paragraph 35(2)(b) Fisheries Act Authorization #15-HCAA-00039 Condition 2.2.4.

These three above requirements are to be assessed in accordance with the following Terms of Reference (TOR) submitted to MECP as well as in compliance with the terms and schedule within the New Gold Fisheries Offset Plan (AMEC 2015).

- Terms of Reference: Study to Assess Potential Mercury Loadings to the Pinewood River Watershed. Per Environmental Compliance Approval #5178-9TUPD9 Condition 8(5). Version 1, August 2016
- Pinewood River Biological Monitoring Plan. Per Environmental Compliance Approval #5781-9VJQ2J Condition 10(5) and #5178-9TUPD9 Condition 8(7). Version 2. December 2016.

Overview of the Annual Pinewood River Aquatic Assessment Study

These annual assessment of a potential mine-related impact on the Pinewood River includes an assessment of:

- the fish community;
- small-bodied fish mercury tissue concentrations;
- water depth in both impounded and non-impounded habitat at four locations in the Pinewood River; and.
- A methylmercury surface water quality sampling program at six locations in the Pinewood including two reference and four possibly mine-influence downstream locations.

Conclusions

The current study provided the following conclusions:

- Water level loggers indicate that Area 1, 2 and 3 illustrate some seasonal and habitat type differences but none of the 2021 data indicate the mine is negatively affecting the flow regime.
- Mercury, both total and dissolved in the effluent discharged from the mine continue to be less than the detection limit and are not likely a major contributing factor to concentrations of mercury in the Pinewood River.
- Methylmercury concentrations at the two most downstream surface water sampling stations show slight increase year over year since 2017, however these concentrations are within the range of reference concentrations and an order of magnitude less than the applicable guideline.
- Fish communities in the reference and the two potentially mine-influenced areas are diverse abundant and similar although the density and dominant species does vary between areas and between years.
- An interaction was found between area and fork length when predicting mercury tissue concentrations in Common Shiner (*Luxilus cornutus*). Magnitude of Difference of the geometric means indicated differences above the critical effect size for the species at its minimum and maximum size ranges.;
- The relationship between size and tissue mercury concentration was inconsistent between the reference and near-field areas confounding the ability to compare slopes;

- In 2021 (similar to 2020) the mean tissue mercury concentration in Common Shiner at each of far-field, near-field and reference areas remained below both consumption guidelines for sensitive populations (0.5 mg/kg; MECP 2015) and the working MECP SDB guidelines for the protection of fish-eating wildlife (0.2 mg/kg). Tissue mercury concentrations in Common Shiner were much reduced at both far-field and near-field in 2020 and 2021 compared to 2019;
- Mean tissue mercury concentrations in Common Shiner at each area remained below contextual baseline concentrations, as provided through whole body composite sample analysis conducted in 2012. Concentrations were similarly higher in the vicinity of the near-field in 2012 as in 2021 potentially indicating a consistent elevation in that area prior to development; and,
- A greater tissue concentration of mercury in near-field Common Shiner was identified, yet this may be consistent with the background condition. The mean methylmercury concentration in the corresponding water (i.e., SW22A) were like those in the reference area.

Recommendations

The below are suggestions to modify or improve the program.

- 1) Review of the total and dissolved mercury surface water collection timing, frequency and analytical method. Total and dissolved mercury are typically less than their detection limit despite detections of methylmercury. A method with a lower detection should be investigated;
- 2) Assessment of the Type 2 habitat logger location in Area 3 based on potential changes to that reach following commissioning of the EDL2 discharge.
- 3) Young of the year (YOY) Common Shiner should be targeted in addition to the adults to attempt to determine the potential cause of the opposing mercury tissue concentration with age relationships observed when comparing the exposure and reference areas;
- 4) Further investigate fish tissue mercury concentration trends observed with additional sampling:
 - a. Increase the number of Common Shiner of a given age group (e.g. 20 fish of each size / age class.
 - b. Include young of the year (YOY) Common Shiner as an age class to be investigated due to their site affinity.
 - c. Add a second species to the program to further assess bioaccumulation potential in the environment and reduce bias associated with species specific life history.

- 5) Continue to monitor and augment the study as necessary based on the mine established discharge practices with the recently commissioned EDL1 and EDL2 structures now in place.

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1.0 Introduction

1.1 Site Description

The Rainy River Mine (RRM) is a gold-silver mine located in northwestern Ontario in the District of Rainy River, approximately 65 km northwest of Fort Frances and 420 km west of Thunder Bay (**Figure 1.1**). Located within the Pinewood River watershed, the Pinewood River flows past the RRM and continues for approximately 40 km until the confluence with Rainy River. The mine occupies approximately 6,050 hectares of land and is owned by New Gold Inc. (New Gold).

The RRM began processing ore in September 2017, fifty years after it was first explored in 1967. In 2005, the project was acquired by Rainy River Resources Ltd. with initial baseline studies conducted in 2008. In 2013, the RRM was acquired by New Gold. An Environmental Assessment (EA) report, which included baseline conditions, was submitted in 2014 (AMEC 2014). Provincial and Federal EA approvals were granted in 2015 leading to the RRM site construction.

1.2 Purpose and Objectives

Effluent discharge at the mine is intermittent and is regulated by the mine's current provincial ECA (Number 7004-BC7KQ5) issued by the MECP February 11, 2020. This ECA provides flow and seasonal requirements for discharge. Discharge of both treated water and site run-off is intermittent and is based on precipitation rather than mine production with the mine being self-sufficient from a water recycling point of view. For example, in 2021 discharge was limited to 11 days from Loslo Creek (EDL2) and 62 days from EDL1 in 2021. The location of these two discharge points is provided in **Figure 1.2**.

Compliance with New Gold's ECA conditions as well as conditions of their Fisheries Act Authorization #15-HCAA-00039 require several annual aquatic studies to be conducted on the Pinewood River. The study components described herein are intended to meet the requirements of Condition 9(3) and Condition 10(10) of the current ECA and were conducted following methods established in previously submitted Terms of Reference (AMEC, 2016, 2016b). Some of the biological effects components of the assessment of mine effluent discharge on the Pinewood River to satisfy Condition 10(9) have been harmonized with the timing of the Federal Environmental Effects (EEM) monitoring programs and are provided under separate cover (Ecometrix 2021a, b).

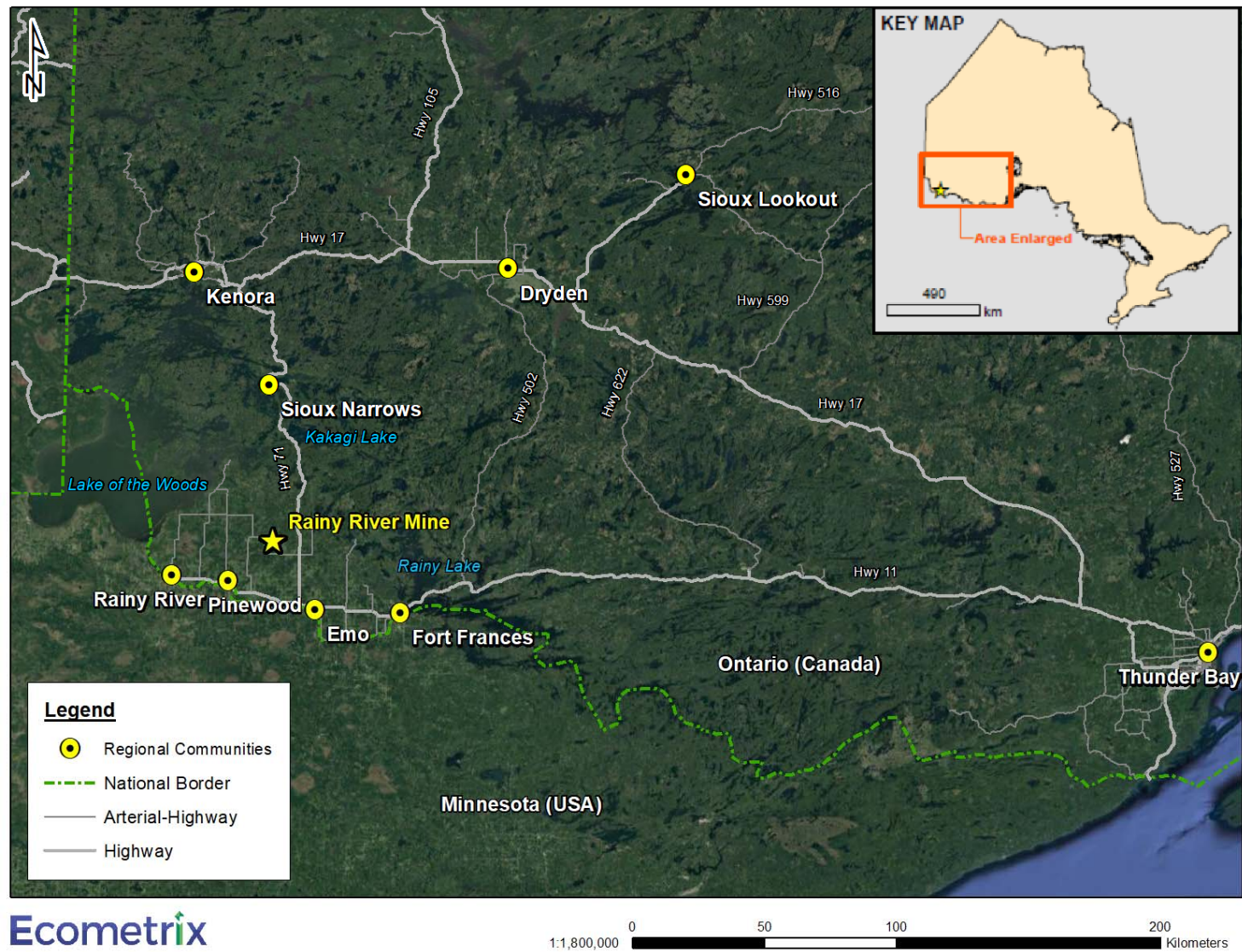


Figure 1.1: Regional Location of the Rainy River Mine.

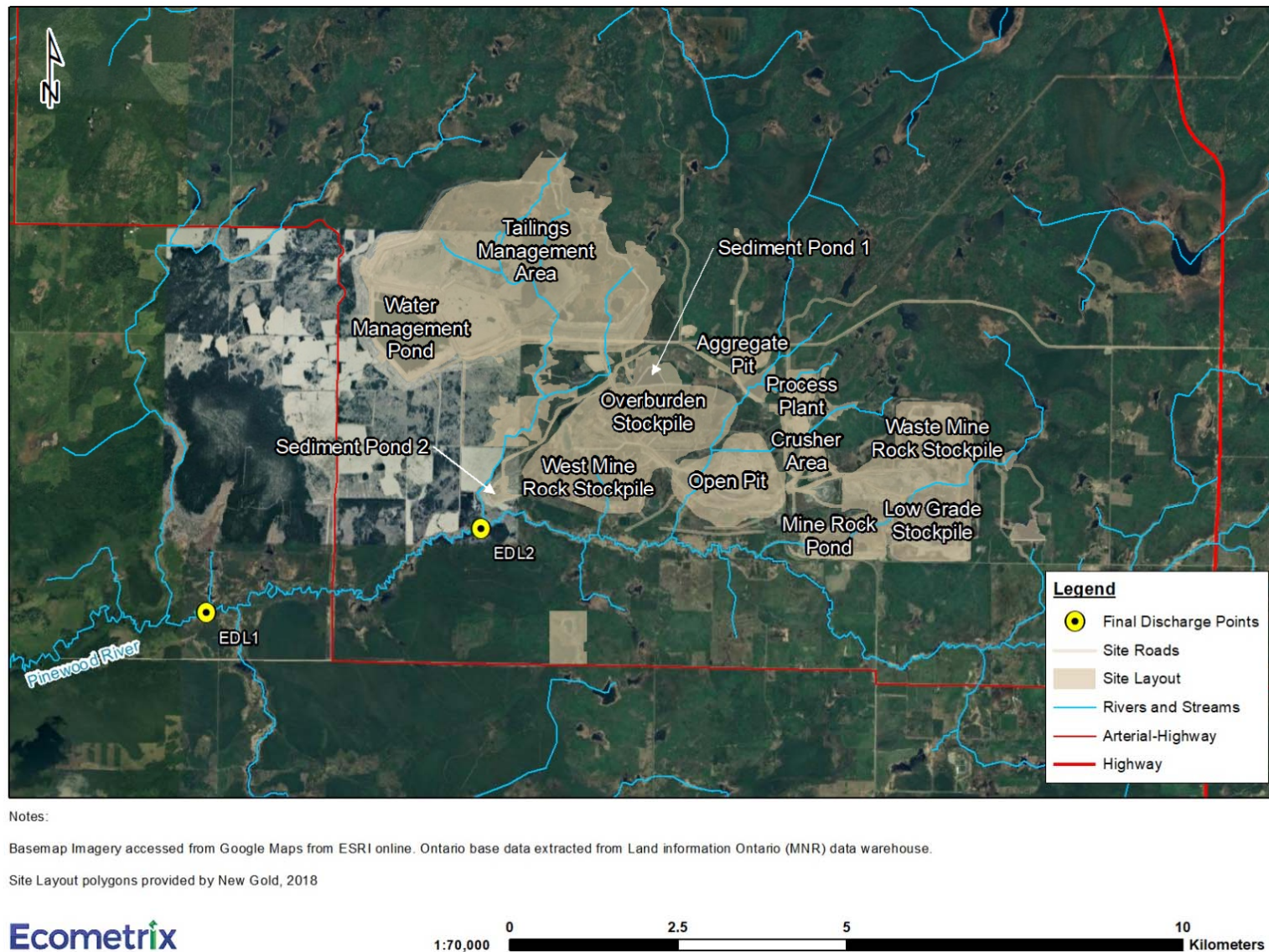


Figure 1.2: Layout of the Rainy River Mine including Discharge Locations

2.0 Methods

2.1 Pinewood River Annual Monitoring

The Annual Pinewood River Biological Monitoring Program was conducted from July 20th to 28th, 2021 during the low water season as outlined in the TOR (AMEC 2016). Survey components were employed to assess the potential effects of the changes in flow and effluent discharges on the resident fish community and small-bodied fish tissue mercury concentrations. Three areas along the Pinewood River near the mine were sampled to assess these components of the monitoring program. The same two exposure areas, one downstream of each of the major effluent discharges, and one reference area, upstream of the mine site and outside the influence of the mine operations utilized in the previous iterations of this monitoring were targeted (**Figure 2.1**). These areas are:

- a near-field (PWNF), downstream of the EDL2 Loslo Creek discharge;
- a far-field (PWFF), downstream of the EDL1 discharge; and,
- the reference (PWREF).

The fish community assessment utilized, at the minimum, the prescribed amount of fishing effort required according to the TOR (AMEC, 2016b). The amount of minimum effort is provided in **Table 2.1**.

Details of the individual components for the assessments are provided in subsequent sections.

Table 2.1: Annual Pinewood River Monitoring Program Components

Attribute	Monitoring Requirement	Report Schedule
Fish Habitat	Water Level monitoring (2 loggers per area 1 for non-impounded [Type 1] habitat and 1 for impounded [Type 2] habitat).	Annual Reports are due to both the MECP and the DFO on or before March 31 of each year.
Fish Species Presence, Life Cycle Usage, Abundance, and Tissue Quality	Fish Sampling will be conducted annually during the summer for 5 years.	
	Tissue quality sample size per area: 50 adult Common Shiner (<i>Luxilus cornutus</i>). Minimum effort per area: <ul style="list-style-type: none"> • Minnow traps (600 traps hours) • Seine nets (9 individual, 15 m net hauls) • Electrofishing (3,000 seconds) 	

	<ul style="list-style-type: none"> Gill nets (6 standard gill net sets (50 m multiple mesh panels for 12 to 16 hrs per set. 	
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2.2 Water Level Monitoring

In 2017, eight Solinst 3001 LT Levellogger Edge M10 water level loggers were installed to monitor water levels in the Pinewood River (**Figure 2.1**). Pairs of loggers were installed in four areas with one logger installed in a narrow non-impounded habitat, referred to as Type 1 habitat and the other installed in an impounded area, referred to as Type 2 habitat (AMEC 2018a). Each logger records water depth and temperature data at 15-minute intervals. Upon retrieval and download, logger measurements were pressure corrected using a Solinst 3001 Barologger Edge. RRM Environment Department staff downloaded the data and provided it to Ecometrix for interpretation. Upon receipt Ecometrix conducted the compensation calculations and screened the data for abnormal values. In 2021 the Area 4 reference area loggers were not downloaded owing to their locations on private property. If required, this data will be provided when it is downloaded in 2022 after access has been granted.

2.3 Water Quality Monitoring

2.3.1 Sample Collection

RRM Environmental Department staff collected the routine water quality samples for the methylmercury surface water program as part of their monthly sampling requirements during the open water season. Samples were collected at two reference locations upstream of the mine (Teeple Culvert and SW20) and four stations proceeding downstream from potential mine influence along the Pinewood River (SW10, SW22a, SW03 and SW24, **Figure 2.2**). Sample locations in relation to the mine infrastructure are provided in **Figure 2.2** and are the same as those used in previous annual assessments. Each sample was collected below the surface into an upstream facing pre-labelled sample bottle to avoid floating material and contamination by the sample collector. Preservative was added in the field following collection, if required.

After all requisite bottles were filled, they were placed on ice in coolers for transport to the RRM environmental laboratory. Upon arrival at the laboratory on site samples were either shipped the same day or stored in the refrigerator prior to shipment to ALS in Thunder Bay. Each sample was analyzed for mercury (total, dissolved and methyl) and sulphate.

2.3.2 Data Analysis

Each of the four water quality parameters were evaluated graphically both within the 2021 sampling year and by comparing the mean values at each sampling locations each parameter since the program began in 2017. Concentrations reported were compared to both Provincial Water Quality Objectives for Ontario (PWQO, OMOEE, 1994) and the more recent BC Ministry of Environment & Climate Change Strategy water quality guidelines (BCMECCS 2019, 2021).

2.4 Fish Community Survey

2.4.1 Sample Collection

The fish community within the Pinewood River reference, near-field and far-field areas was assessed utilizing a backpack electrofisher unit, seine nets, overnight minnow trap effort and gill net sets. The backpack electrofishing unit was adjusted to appropriate voltage, frequency, and duty cycle settings based on target fish size, water conductivity, and temperature to minimize the risk of harm to fish. Minnow traps were baited with dry cat food prior to deployment and checked every 24 hours. All fish captured were identified and enumerated. Live non-sentinel and excess sentinel species fish were released back into the area in which they were collected. Incidental mortalities were recorded and disposed of as per the conditions of the Licence to Collect Fish for Scientific Purposes No. 1098775 issued by the Ontario Ministry of Natural Resources and Forestry. Adult Common Shiner were retained for further processing.

2.4.2 Fish Tissue Quality Survey

Common Shiner were targeted as the species for the small-bodied mercury tissues assessment. This is the same species used in both 2019 and 2020. Common Shiner are typically found in all three study areas in sufficient density for the assessment. During the fish community assessment up to fifty (50) adult Common Shiner were targeted for tissue metals analysis. All retained fish were measured for both fork and total length to the nearest millimetre using a fish measuring board and weight was determined using an appropriately calibrated analytical balance to the nearest milligram.

For each sacrificed Common Shiner otoliths were collected with forceps and a scalpel, cleaned of excess tissue and placed in a labelled 2.5 mL microcentrifuge vial. These were collected for the purposes of age determination. Following removal of otoliths each fish was placed in its own clean, labeled Whirl-Pak™ bag, and frozen until analysis for tissue chemistry. At the conclusion of the field collections all tissue samples were submitted to Bureau Veritas (BV) in Thunder Bay, along with a chain-of-custody (COC) record. BV then shipped all the samples to their Burnaby, BC laboratory that specializes in tissue analysis. Total mercury and moisture analysis were conducted on a homogenized portion of each fish. The mercury concentrations were provided in wet weight values using the Cold Vapor Atomic Fluorescence methodology. Otoliths, along with a COC were shipped to AAE Tech Services Inc. in La Salle, Manitoba for fish age determination.

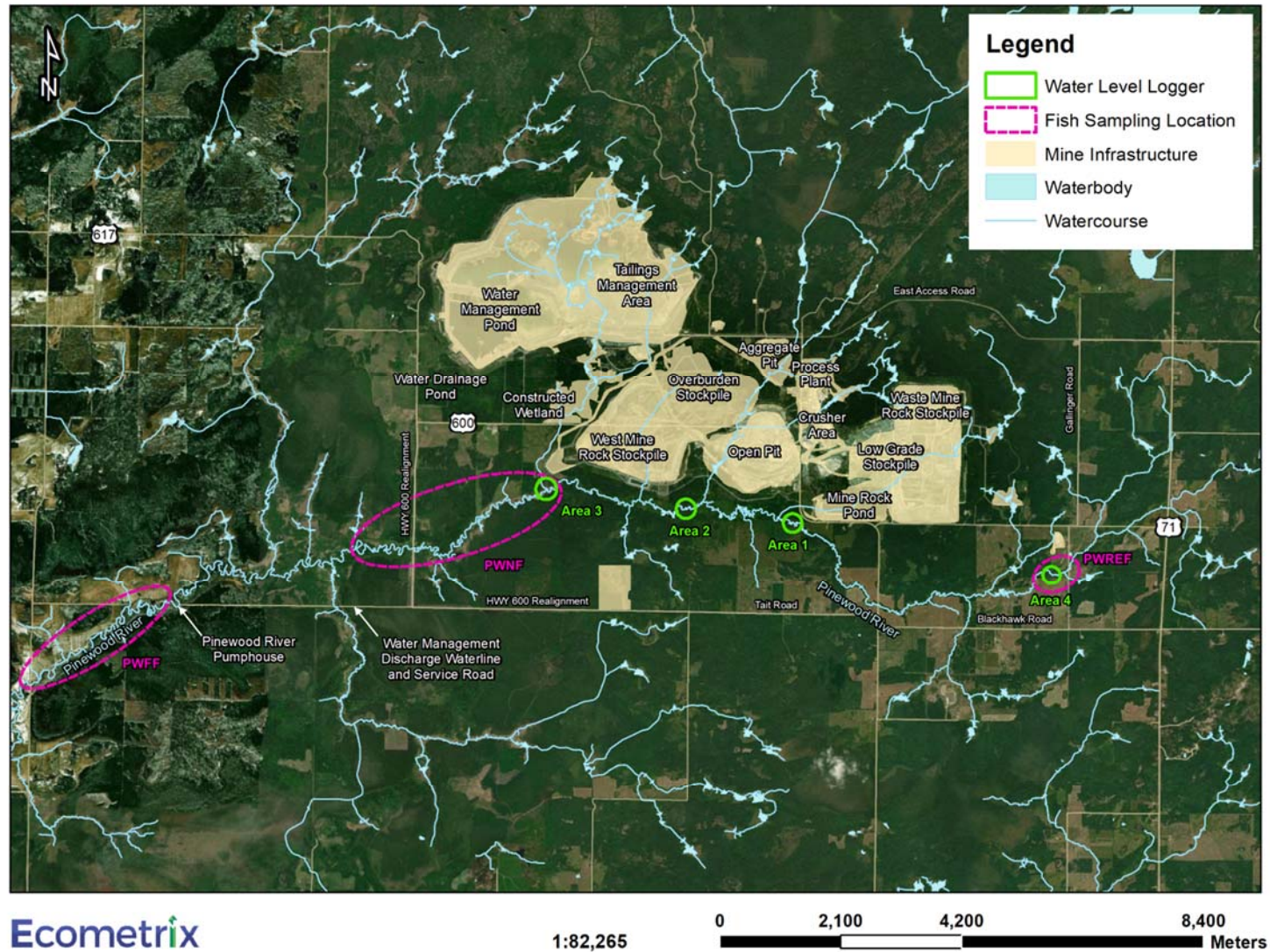


Figure 2.1: Fish Community, Fish Tissue and Water Level Sampling Locations, 2021.

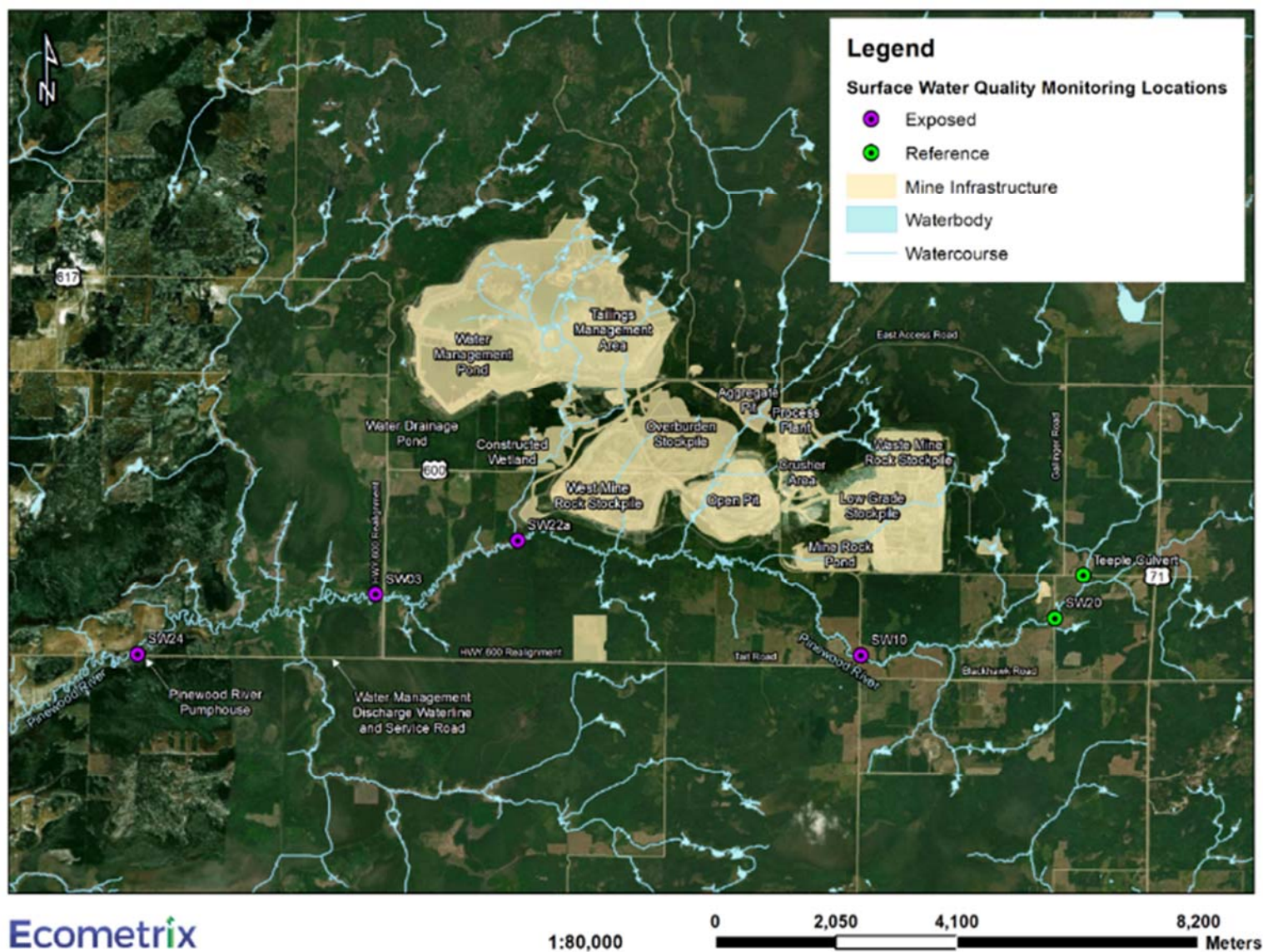


Figure 2.2: Methylmercury Program Water Sampling Locations, 2021.

2.4.3 Data Analysis

The Ministry of the Environment Conservation and Parks (MECP) Standards Development Branch (SDB) working guideline for the protection of fish-eating wildlife is 0.2 mg/kg. Health Canada has also established a standard of 0.5 mg/kg wet weight (wwt) as the maximum acceptable concentration of mercury in commercially sold fish, enforceable by the Canadian Food Inspection Agency (Health Canada 2007). Although this guideline is only applicable to commercially sold fish, 0.5 mg/kg wwt is also the level at which the MECP recommends a complete consumption restriction for vulnerable populations (i.e., women of child-bearing age and children under 15; MECP 2015). Common Shiner are not typically consumed by humans, yet this guideline is referenced to provide some perspective on mercury body burden levels in edible fish. Relationships between tissue mercury concentrations and fish size (fork length) were also investigated.

A statistical comparison of Common Shiner mercury tissue concentration between the reference, near-field and far-field areas was conducted using Analysis of Covariance (ANCOVA), with log10-transformed total mercury tissue concentration (wet weight) as the response variable, Area as a factor, and log10-transformed fork length as a covariate. continuous data were transformed to meet the assumption of normality. Main effects (i.e., area and fork length) were assessed at alpha of 0.1 and the interaction between area and fork length were assessed at an alpha of 0.05. If the interaction was significant, the difference in mercury concentration between areas was dependent on the covariate values. Magnitude of difference (MOD) in the predicted values of the response variables was conducted at the minimum and maximum values of the overlap in covariate values between areas. MOD was calculated using the following equation:

$$\text{MOD} = \text{MCT}_{\text{Exp}} - \text{MCT}_{\text{Ref}} / \text{MCT}_{\text{Ref}} \times 100$$

Where MCT denotes measure of central tendency and MCT_{Ref} and MCT_{Exp} are the predicted geometric mean mercury tissue concentrations at the reference area (MCT_{Ref}) and the near-field and far-field exposed areas (MCT_{Exp}) respectively.

Differences in mercury tissue concentrations between areas was considered not to be significantly different if MODs were lower than the critical effect size (CES) of 25%. If a MOD value was larger than the CES, mercury tissue concentrations were considered to differ significantly, and further analyses were explored to understand the nature of those differences.

As tissue mercury concentrations can accrue over an individual's lifespan and is affected by their body size, a subsample was examined to better compare differences in mercury levels while accounting for the affects of age and the binomial size distribution. This subsample included only fish that were 3 years old, with a fork length between 7 and 7.75 cm. ANCOVA was repeated on this sub-sample dataset to investigate if older fish (greater than 3 years) were highly influencing the results.

Lastly, mercury tissue concentrations from 2019, 2020, and 2021 were compared to values from baseline sampling in 2012 (AMEC, 2013). Three Common Shiner composite samples were

collected in 2012 from the Pinewood River, ranging from 3-48 individuals with a minimum weight of 35.7g (Appendix H5 of AMEC, 2013). One of these composite samples was collected near the current reference area, and thus was used as the reference baseline. The second composite was collected downstream of the reference area, at the HWY 600 crossing. This is considerably further upstream than the current near-field area, but as it is within the zone of exposure from the mine this sample was used as the near-field baseline. The last composite was collected between the current far-field area and HWY 619, and was therefore used as the far-field baseline. With the 2012 data being limited to one data point per area, the comparison was limited to a non-statistical assessment that included plotting the values for visual comparison between the baseline and the 2019 to 2021 data as well as compared to known guideline criteria.

3.0 Results

3.1 Water Level

It should be noted the following interpretation is based on Area 1, 2 and 3 data only as Area 4 reference data from upstream of the mine was not available for the report preparation.

3.1.1 Non-impoundment Habitat (Type 1)

The Type 1 habitat showed seasonal responses to precipitation events. All three areas had increases in depth in mid-March likely the result of spring freshet. In April spring rain resulted in another increase in water levels that persisted through May (**Figure 3.1**). May through the start of August was extremely dry at the RRM site with many sections of the Pinewood River becoming isolated. Low water and beaver activity creates naturalized pooling between the assessed areas. These factors like result in the time lag until detection of increase water levels at logger locations until later in the fall. Area 3 is the furthest downstream of the three stations reported for 2021 and therefore should reflect a point which receives input from the larger watershed area (compared to Area 1 and 2). However, in 2021 this logger reported slightly lower depth under certain conditions compared to those further upstream. This trend was even more pronounced during the summer drought (**Figure 3.1**). This trend was similarly evident in 2020. Areas 1 and 3 showed the greatest fluctuations similar to the results from previous years (Minnow, 2021). Although no upstream data was available the overall depth pattern and flow regime in 2021 was comparable to those previously reported when the summer low precipitation conditions are considered. No distinct pattern was identified to suggest the non-impounded areas are affected by mine-related activities. In non-drought conditions, precipitation events led to increases in depth in all non-impounded areas as expected.

3.1.2 Impounded Habitat (Type 2)

Type 2 impounded habitat depth data was similar in its overall seasonal patterns and variability to that of Type 1 non-impounded habitat data. Response to precipitation events occurred in a similar timeframe to that reported for non-impounded areas. One difference that may be of note is the impounded area had much shallower depths during the drought conditions from June through to late August and this was particularly pronounced in Area 3 (**Figure 3.1**). Overall, the response in all three areas was similar in the spring during freshet. However, Area 3, the most downstream location appears to have had a larger secondary increase in depth around mid-April perhaps the results of discharge from Sediment Pond 2 commencing. Like the non-impounded habitat Area 3 had lower depths throughout the year when compared to Area 1 and 2. Overall, Area 2 had the most stable water depth (**Figure 3.1**). In the fall season Area 1 and 3 show more pronounced fluctuations similar to the non-impounded results for the same areas. Water depth patterns in the impounded areas do not indicate mine-related impacts on the flow regime in the Pinewood River.

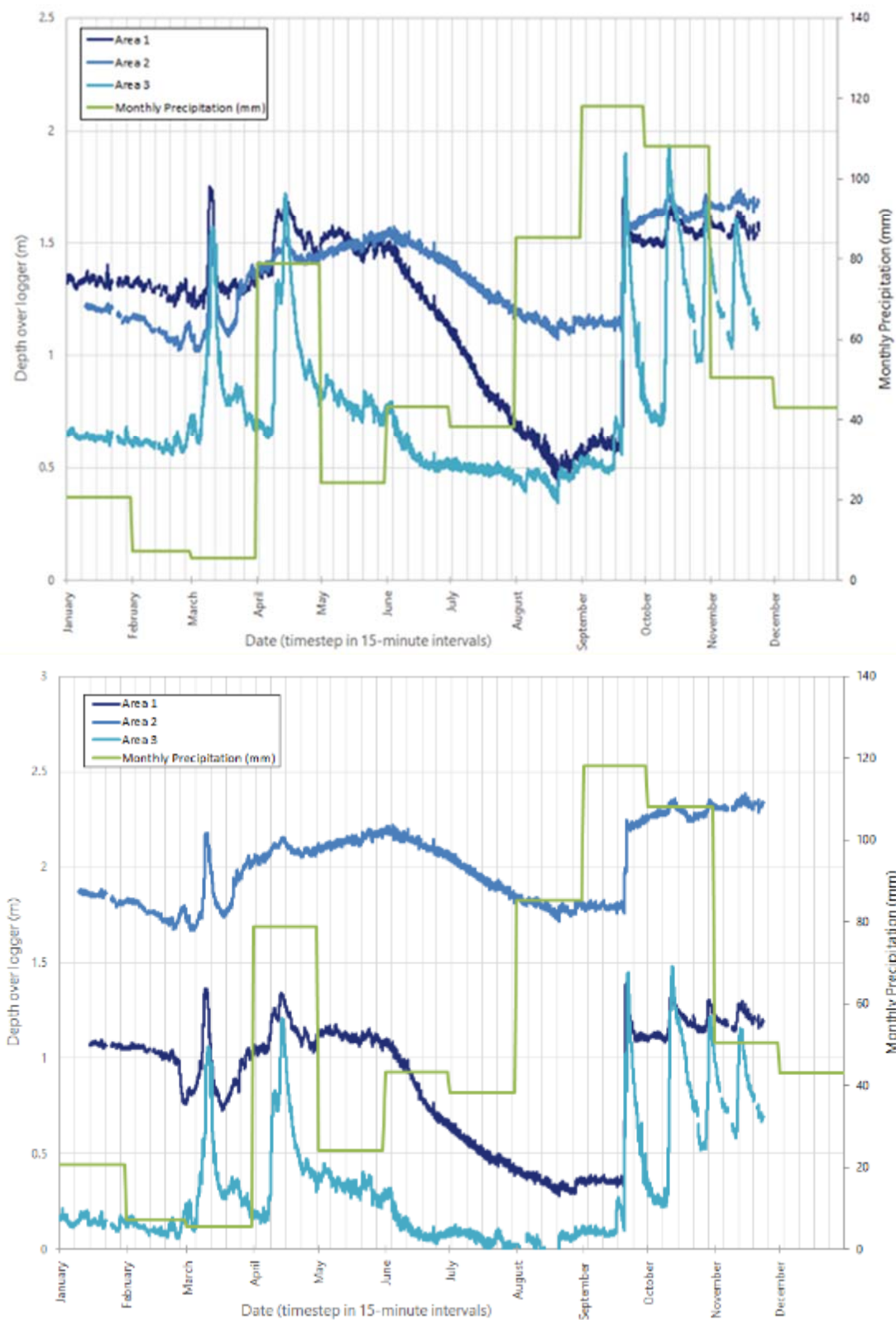


Figure 3.1: Water Level Logger Data from the Pinewood River in Non-impounded (Type 1 - top) and Impounded (Type 2- bottom) Habitat, 2021

3.2 Water Quality

Total, dissolved and methyl mercury concentrations in the Pinewood River downstream of the mine (i.e., stations SW10, SW22A, SW03 and SW24) were similar to the concentrations in the upstream reference areas (i.e., Teeple Culvert [SW01] and SW20, [Figure 3.2]). Dissolved and methylmercury concentrations were well below respective water quality criteria in water samples from both upstream (reference) and downstream of the mine (Figure 3.2; Appendix Table A.11). All total and dissolved mercury concentrations were below their respective detection limits in all areas except for a single sample from the Teeple Culvert reference area in June (Figure 3.2; Appendix Table A.11). Methylmercury was detected in all sampling both upstream and downstream of the mine and the mean concentration in the reference and downstream locations in 2021 was similar. In 2021, mean methylmercury concentrations at all stations remained and order of magnitude lower than the Canadian Water Quality Guideline (CWQG) guideline of 4 ng/L.

Based on the surface water quality data that there is no indication of a mine related increase in any mercury concentrations in the Pinewood River in 2021 and in fact during the June and October sampling events the Teeple Culvert sample or the SW10 sample had higher concentrations than those stations further downstream and subject to mine discharge (Figure 3.2; Appendix Table A.11).

Figure 3.3 provides the mean annual total, dissolved and methyl mercury as well as sulphate concentrations from 2017 to 2021 at the same locations discussed for 2021. For this interpretation the two upstream reference stations were pooled and represented as a single value. Mean methylmercury concentrations in the reference, SW10 and SW22a locations were within the range of previously reported values. The mean methylmercury concentration at SW03 and SW24 were both higher than previous years and there appears to be slight increasing trend. However, as noted above, despite this increase the mean value remains an order of magnitude below the CWQG of 4 ng/L and at or below the mean value report for the reference area in 2021.

There was an indication of a mine-related increase in sulphate concentrations at stations downstream of the mine discharges compared to upstream reference areas. This pattern is most evident in the October samples following a period of discharge. Despite these elevated values compared to background there were only three instances of sulphate exceeding the BCMECCS guidelines (128 mg/L and 218 mg/L) (BCMECCS 2019,2021). The two values that exceeded the most conservative criteria (128 mg/L) occurred in October at station SW24 (156 mg/L) and SW22A (144 mg/L). The single exceedance (223 mg/L) of the upper criteria (218 mg/L) occurred in September at SW22A. The two October values are likely related to discharge however the September concentration preceded fall discharge and at present the source is unconfirmed but may be the result of more consistent Sediment Pond 2 discharge (Figure 3.2; Appendix Table A.12). Elevated sulphate is common downstream of mine discharges and in the case of the RRM is likely the result of copper-sulphate in the milling process.

Sulphate data has consistently been elevated downstream of the mine discharges at stations SW22A, SW03 and SW24. Mean sulphate at SW22a was the highest yet reported but remained below the BCMECCS' most conservative guideline (**Figure 3.3**). This higher value is likely the result of the consistent discharge of water from Sediment Pond 2 with a sulphate of around 170 mg/L combined with an extremely low water year. Overall, the methylmercury water sampling program indicates that there are higher sulphate concentrations downstream of the mine but there is not substantial increase in mercury concentrations outside the range of natural variability.

3.3 Fish Community

In the Pinewood River reference area (PWREF), the fish community included (listed in order of abundance) Brook Stickleback (*Culaea inconstans*), Finescale Dace (*Chrosomus neogaeus*), Pearl Dace (*Margariscus margarita*), Central Mudminnow (*Umbra limi*), Common Shiner, Brassy Minnow (*Hybognathus hankinsoni*), Fathead Minnow (*Pimephales promelas*), Creek Chub (*Semotilus atromaculatus*), Golden Shiner (*Notemigonus crysoleucas*), White Sucker (*Catostomus commersonii*) and Brown Bullhead (*Ameiurus nebulosus*) (**Table 3.1**). There was an abundant fish community with 2,711 fish captured, representing 11 species. This resulted in Catch Per Unit Efforts (CPUEs) of 0.67 fish per gill net set, 0.66 fish per 60 seconds of electrofishing effort, 4.19 fish per seine netting effort and 1.36 fish per minnow trap hour (**Table 3.2, Appendix Tables A-7 to A-10**). Length frequency histograms indicate that multiple age classes of a variety of the species were captured in 2021 (**Appendix Figure A-1**). It should be noted that some minnow traps containing high number of fish resulted in high mortality rates due to low oxygen levels.

In the Pinewood River near-field area (PWNF), the fish community included (listed in order of abundance) Common Shiner, Golden Shiner, White Sucker, Northern Pike (*Esox lucius*), Pearl Dace, Johnny Darter (*Etheostoma nigrum*), Brown Bullhead, Central Mudminnow, Blackside Darter (*Percina maculata*), Creek Chub and Finescale Dace (**Table 3.1**). The fish community survey yielded 399 fish, representing 11 species. These captures resulted in CPUEs of 0.46 fish per gill net set, 0.23 fish per 60 seconds of electrofishing effort, 0.70 fish per of seine net effort and 0.01 fish per minnow trap hour (**Table 3.2, Appendix Tables A-7 to A-10**). Length frequency histograms indicate that multiple age classes of all species, including young of year fish for multiple species were captured in 2021 (**Appendix Figure A-2**).

In the Pinewood River far-field area (PWFF), the fish community included (listed in order of abundance) White Sucker, Central Mudminnow, Johnny Darter, Northern Pike, Common Shiner, Trout Perch (*Percopsis omiscomaycus*), River Darter (*Percina shumardi*), Brown Bullhead, Creek Chub, Golden Shiner, Finescale Dace, Pearl Dace and Rock Bass (*Ambloplites rupestris*) (**Table 3.1**). The fish community survey yielded 510 fish representing 13 species. This resulted in CPUEs of 0.29 fish per gill net set, 1.76 fish per 60 seconds of electrofishing effort, 0.48 fish per seine net effort and 0.01 fish per minnow trap hour (**Table 3.2, Appendix Tables A-7 to A-10**). Length frequency histograms indicate that multiple age classes of a variety of species were captured in 2021 (**Appendix Figure A-3**).

A total of 3,620 fish representing 17 species were captured during the 2021 Pinewood River fish community survey within the three areas (PWREF, PWNF, PWFF) (**Table 3.1**). Fish abundance has been lower within the PWNF and PWFF areas in all years since 2017. With the exception of changes in fish abundance, the fish community has been similar in all years from 2017 to 2021 indicating Rainy River Mine operations have minimal impact on the resident fish communities within the Pinewood River.

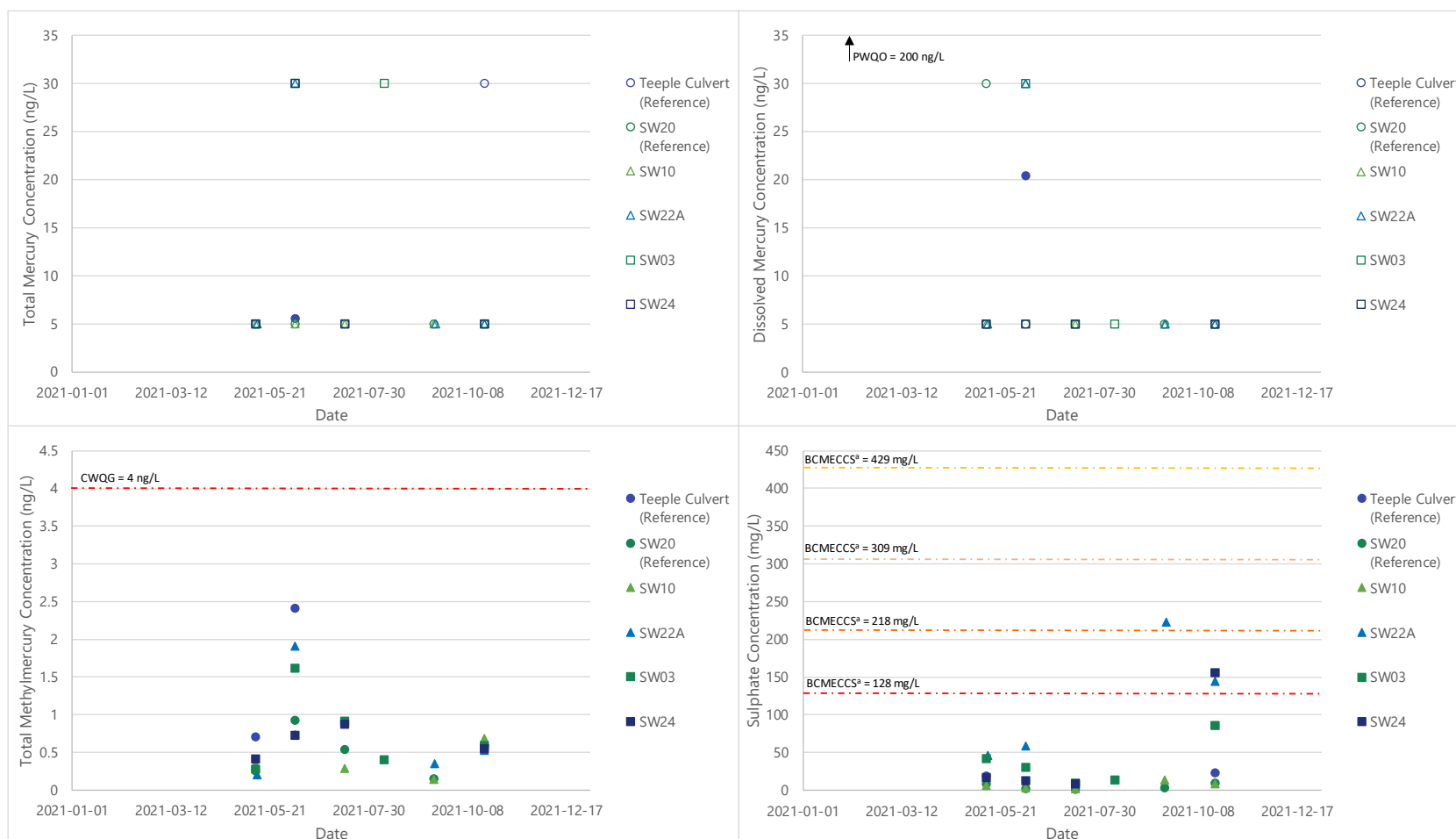


Figure 3.2: 2021 Methylmercury Program Surface Water Sampling Results.

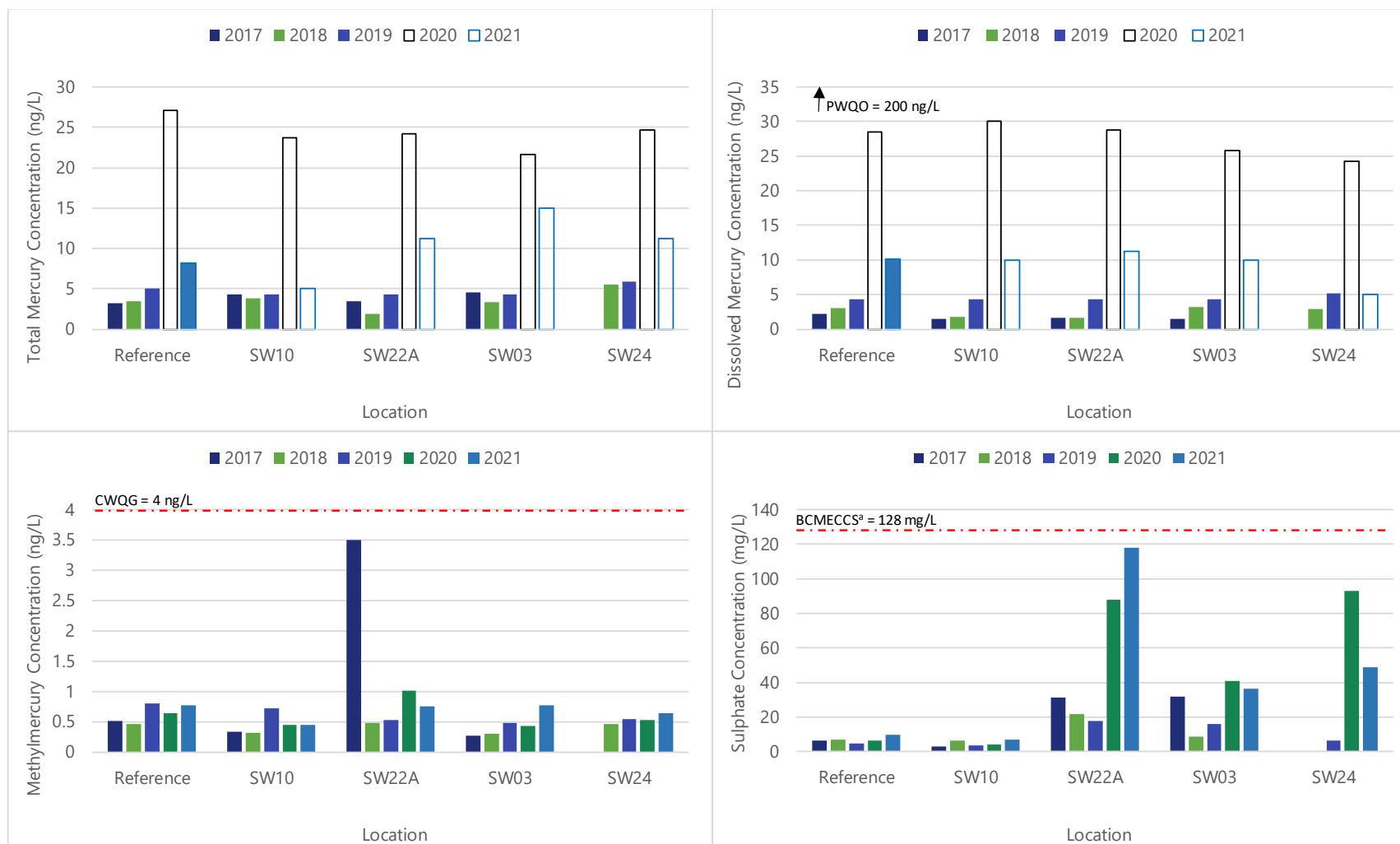


Figure 3.3: Mean Annual Methylmercury Program Surface Water Concentrations, 2017 to 2021.

Table 3.1: Total Catch Summary by Species in Pinewood River – July 2021

Species	Pinewood River Reference	Pinewood River Near-Field	Pinewood River Far-field
Blackside Darter	0	4	0
Brassy Minnow	14	0	0
Brook Stickleback	1360	0	0
Brown Bullhead	2	11	14
Central Mudminnow	79	7	30
Common Shiner	54	80	21
Creek Chub	9	3	7
Fathead Minnow	13	0	0
Finescale Dace	982	1	4
Golden Shiner	9	67	5
Johnny Darter	0	15	27
Northern Pike	0	21	25
Pearl Dace	149	17	4
River Darter	0	0	18
Rock Bass	0	0	4
Trout Perch	0	0	20
White Sucker	4	35	33
YOY cyprinid	36	138	298
Total Catch	2711	399	510

Table 3.2: Fish Catch and Effort Summary for Pinewood River – July 2021

Area	Gill Netting											
	Effort (hours)				Total Catch				CPUE (# fish/hour)			
	2017	2019	2020	2021	2017	2019	2020	2021	2017	2019	2020	2021
Pinewood River Reference	81	117	114	120	16	476	153	81	0.2	4.1	1.3	0.7
Pinewood River Near-Field	96	129	109	130	4	24	28	59	0.04	0.2	0.3	0.5
Pinewood River Far-field	-	77	102	118	-	6	18	34	-	0.1	0.2	0.3

Area	Electrofishing											
	Effort (seconds)				Total Catch				CPUE (# fish/minute)			
	2017	2019	2020	2021	2017	2019	2020	2021	2017	2019	2020	2021
Pinewood River Reference	3,030	3,000	3,003	4,017	57	185	119	44	1.1	3.7	2.4	0.7
Pinewood River Near-Field	6,108	5,510	3,325	3,421	10	85	113	13	0.1	0.9	2	0.2
Pinewood River Far-field	-	3,002	3,000	3,468	-	99	51	102	-	2	1	1.8

Area	Seine Netting											
	Effort (hauls)				Total Catch				CPUE (# fish/haul)			
	2017	2019	2020	2021	2017	2019	2020	2021	2017	2019	2020	2021
Pinewood River Reference	9	9	9	9	201	1,272	1,335	1591	22.3	141.3	148.3	176.8
Pinewood River Near-Field	9	16	12	9	19	325	897	322	2.1	20.3	74.8	35.8
Pinewood River Far-field	-	16	13	9	-	753	484	365	-	47.1	37.2	40.6

Area	Minnow Trapping											
	Effort (hours)				Total Catch				CPUE (# fish/hour)			
	2017	2019	2020	2021	2017	2019	2020	2021	2017	2019	2020	2021
Pinewood River Reference	659	971	792	733	360	57	124	995	0.5	0.1	0.2	1.36
Pinewood River Near-Field	622	3,480	701	660	18	83	22	5	0.03	0.02	0.03	0.01
Pinewood River Far-field	-	1,644	654	729	-	14	3	9	-	0.01	0.005	0.01

Note: "-" indicates no fish captured in 2017 for that area

3.4 Fish Tissue Quality

In 2021, Common Shiner average total mercury concentration (whole body analysis) was below the consumption guidelines for sensitive populations (0.5 mg/kg; MECP 2015) and the working MECP SDB guidelines for the protection of fish-eating wildlife (0.2 mg/kg) at each area. Maximum concentrations in whole body samples were marginally above the MECP SDB guideline at each of PWREF and PWNF (Table 3.3; Figure 3.4).

There was a significant interaction between area and fork length among PWNF and PWREF, where tissue mercury concentrations were significantly higher at PWNF than PWREF for small Common Shiner, and similar between PWNF and PWREF for larger Common Shiner (Table 3.4; Figure 3.5). No significant size relationship was found in PWFF tissue mercury concentrations ($P=0.18$, Figure 3.4). Similar to results in 2019, tissue concentrations decreased with fork length for PWNF, opposite of the expected relationship seen in PWREF Common Shiner, where tissue mercury concentrations increase with size. The magnitude of difference (MOD) in the predicted values for mercury concentration was conducted at the minimum and maximum values of the overlap in fork length between areas (Table 3.4). While mercury concentrations were greater for the minimum size of fish at PWNF (MOD = 150%; Table 3.4), no other MOD values between areas or size were above the critical effect size (CES).

Fish body size across the three areas was found to follow a bimodal distribution, with the first mode to be dominated by age three fish, and the second dominated by age four and five fish (Figure 3.6). As tissue mercury concentration can accrue over an individual's lifespan and is affected by their body size, a subsample was examined to better compare differences in mercury levels while accounting for the affects of age and the binomial size distribution. This subsample included only fish that were 3 years old, with a fork length between 7 and 7.75 cm. Due to the small sample size from PWFF, the comparison only included fish from PWNF and PWREF (Table 3.5; Figure 3.7). The ANCOVA was re-run on the subsample with log10-transformed mercury tissue concentration (wet weight) as the response variable, Area as a factor, and log10-transformed Fork Length as a covariate. Results from the ANCOVA indicate that there is still a significant interaction between area and fork length for age 3 fish, despite selecting individuals in a similar size range.

The MOD for mercury concentrations was positive (greater at PWNF than PWREF) at both the minimum and maximum sizes of the distribution and in both cases above the CES (175% and 39%, respectively (Table 3.4).

Common Shiner captured downstream of the mine had average tissue mercury concentrations ranging from 0.076 to 0.151 mg/kg wet weight, which are below the MECP working guideline for the protection of fish-eating wildlife (0.2 mg/kg ww; **Figure 3.4; Appendix Tables A.4 to A.6**). It should be noted that a small number of samples from PWNF exceeded this working guideline ($n=8$, Max=0.236 mg/kg), as well as one sample from PWREF (0.203 mg/kg). While average tissue mercury concentrations were higher in 2021 than in the previous year (Table 3.3), they remained lower than average baseline values collected in 2012 (Figure 3.4). In both cases, the mean whole body mercury concentration for Common Shiner was reduced at each of PWFF and

PWNF from 2019 to 2020 with a small increase in this mean from 2020 to 2021. The lack of data collected in the reference area in 2019 does not allow for a time series comparison between areas. It is unclear if the large amount of variability seen between 2019 and 2021 in body burden levels for Common Shiner in the Pinewood River is related to natural variation or another reason, however, an additional year of data collection will allow for further investigation of potential anomalies in the dataset.

For all the sampling areas the baseline (2012) concentration for Common Shiner composite samples was greater than the average for either 2020 or 2021 (Figure 3,4). Although data from 2012 is limited, it is based on composite whole bodies samples which included several individuals and therefore provides a reasonable reference point. Baseline tissue concentration was greater at PWNF than PWREF in 2012 as well. The relationship between tissue mercury concentration and size is inconsistent between the PWREF and PWNF areas. At the reference area, the general increase in mercury body burden observed was what may be expected based on bioaccumulation over time. However, at PWNF the opposite was observed with an increase in size correlating to a reduction in tissue mercury concentration. This trend was consistent both with all size(age) groups included and when limited to age 3 fish only. These trends should be further assessed with another year of data to ensure their validity.

Table 3.3: Summary of Common Shiner Whole Body Mercury Concentrations (mg/kg wwt) in the Upper Pinewood River during 2019, 2020, and 2021

Area ^a	Minimum			Maximum			Mean				Median		
	2019	2020	2021	2019	2020	2021	2012	2019	2020	2021	2019	2020	2021
PWREF	- ^b	0.027	0.043	- ^b	0.167	0.203	0.12	- ^b	0.084	0.076	- ^b	0.084	0.074
PWNF	0.246	0.049	0.076	0.717	0.177	0.236	0.19	0.432	0.107	0.151	0.408	0.102	0.145
PWFF	0.084	0.038	0.076	0.382	0.139	0.150	0.14	0.198	0.056	0.099	0.198	0.051	0.091

^a PWREF denotes Pinewood River Reference area, PWNF denotes Pinewood River Near-field area, PWFF denotes Pinewood River Far-field area.

^b PWREF fish tissue samples were lost in 2019

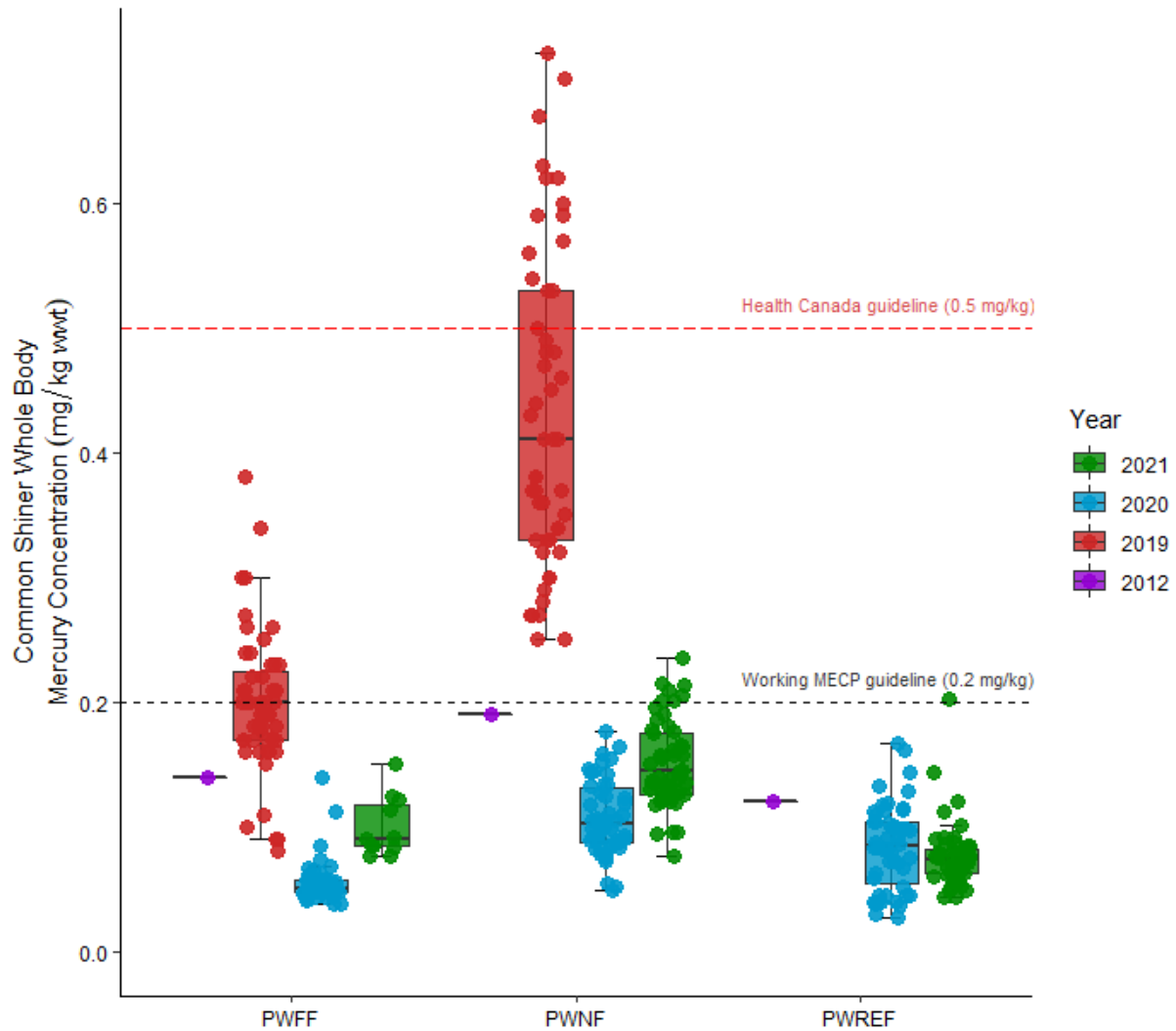
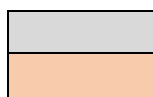


Figure 3.4: Whole Body Mercury Concentrations for Common Shiner Captured at Pinewood River Reference and Mine-exposed areas for 2019, 2020, 2021, and during Baseline sampling in 2012

Table 3.4: ANCOVA Results Comparing Tissue Mercury Concentrations (mg/kg wet weight) in Common Shiners from Pinewood River between PWREF, PWNF, and PWFF, 2021

ANCOVA Results			Geometric Mean			MOD (%) ^a					
Test	Variable	P-Value	PWREF	PWNF	PWFF	PWREF vs. PWNF		PWREF vs. PWFF		PWNF vs. PWFF	
						Min	Max	Min	Max	Min	Max
ANCOVA	Area	-	0.321	0.435	0.364	+150	+13	+18	-24	-17	-22
	Fork Length	-									
	Area*Fork Length	<0.001									
	Area	-									
	Fork Length	-									
	Area*Fork Length	0.011	0.325	0.442	-	+175	+39	-	-	-	-



P < 0.05

MOD > 25% Critical Effect Size

^aMOD = $\frac{MCT_{Exp} - MCT_{Ref}}{MCT_{Ref}} \times 100$, where MCT is the geometric mean, and Ref is the first site in the comparison, and Exp is the second site in comparison. In comparisons between the PWNF and PWFF, PWNF was considered the "Ref" site.

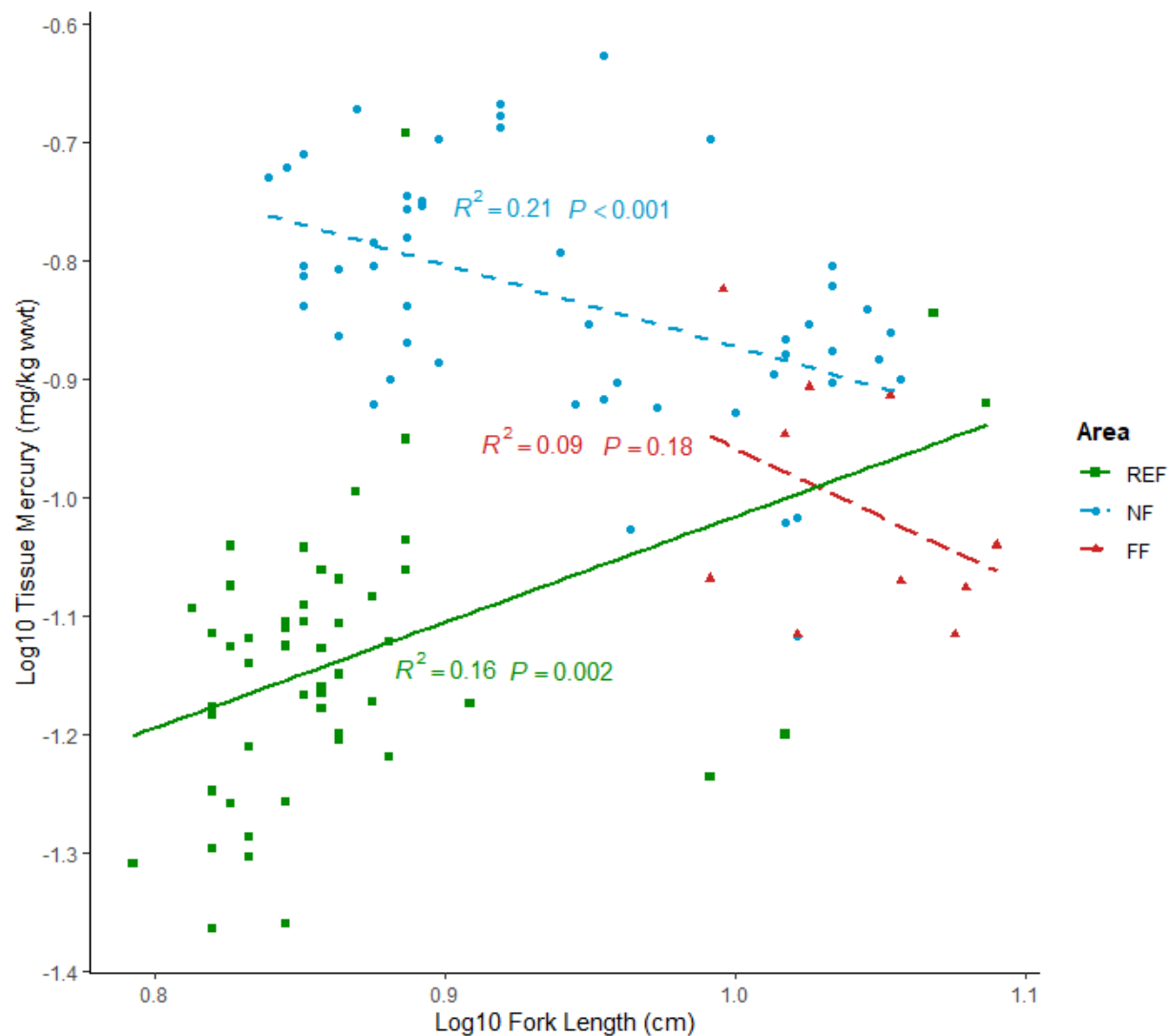


Figure 3.5: Relationship Between Fork Length and Tissue Mercury Concentration in Common Shiners in Pinewood River, 2021

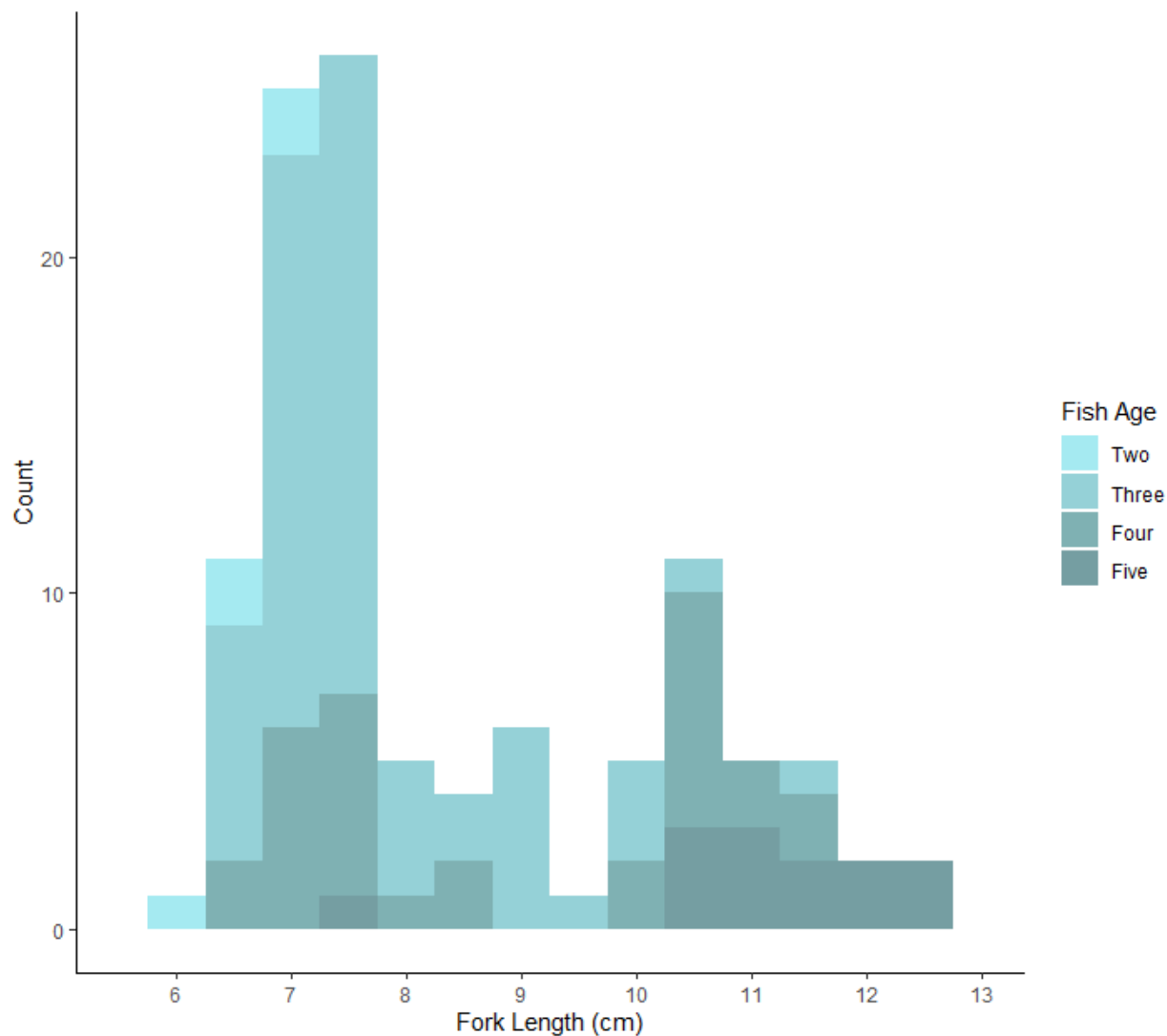


Figure 3.6: Fork Length Frequency and Age Distribution Among Common Shiners Captured from PWREF, PWNF, and PWFF sites in the Pinewood River, 2021

Table 3.5: Summary of Regression Equations, Size, and Age Distributions for all 2021 Common Shiners, and for the Subsample

Area ^a	Regression Formula	n	Fork Length Summary			Age Summary		
			Max	Min	Mean	Max	Min	Mean
Full 2021 Data								
PWREF	y=-1.9+0.89x	50	12.2	6.20	7.39	5	2	3.27
PWNF	y=-18-0.69x	50	11.4	6.90	8.85	5	3	3.47
PWFF	y=0.19-1.2x	11	12.3	9.80	11.13	5	3	4.36
Subsample of 2021 Data								
PWREF	y=-5.7+05.4x	14	7.7	7	7.28	3		
PWNF	y=0.76-1.8x	18	7.7	7	7.37	3		

^a PWREF denotes Pinewood River Reference area, PWNF denotes Pinewood River Near-field area, PWFF denotes Pinewood River Far-field area.

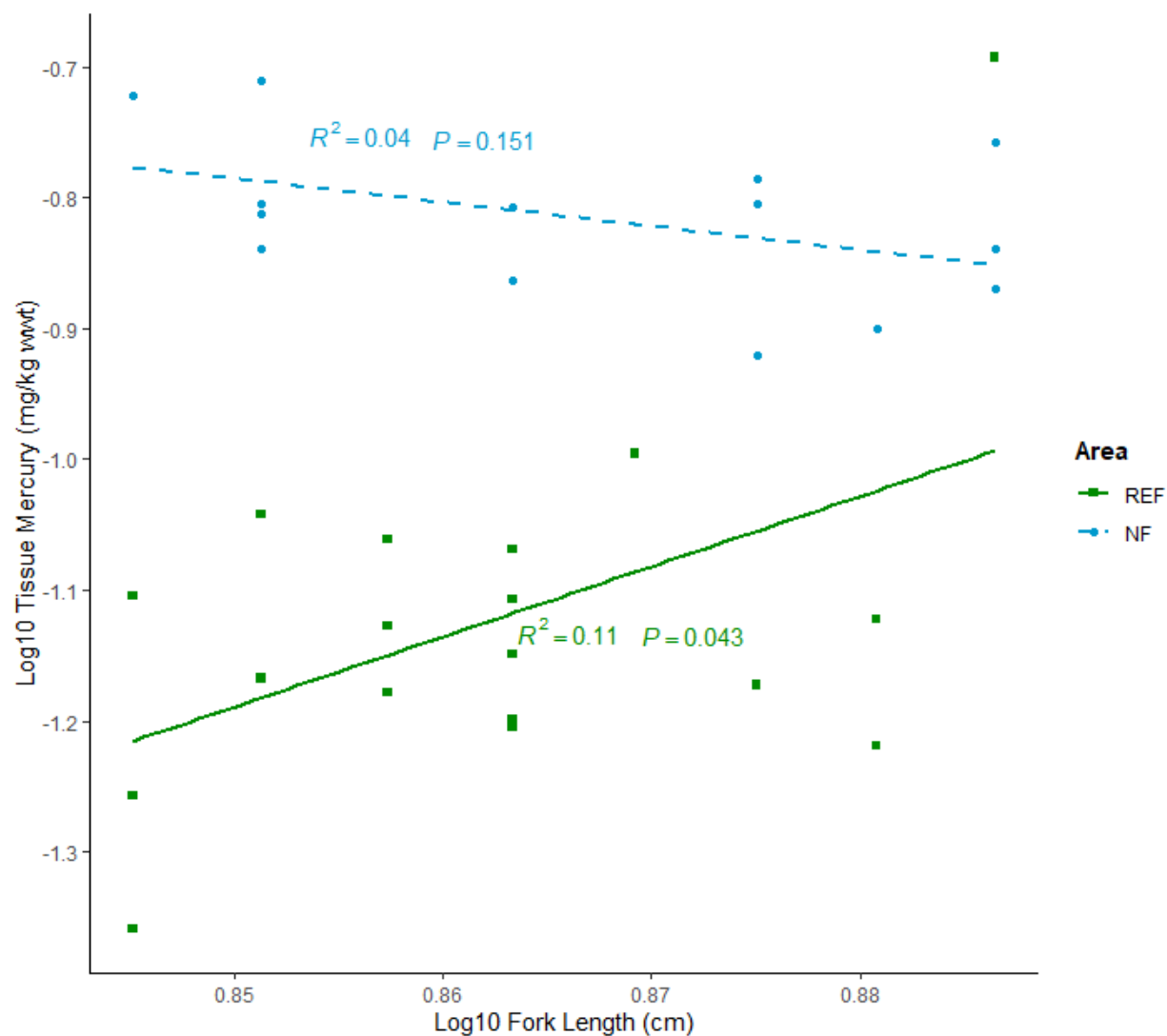


Figure 3.7: Relationship Between Fork Length and Tissue Mercury Concentration in Age 3 Common Shiners Between 7.0-7.7 cm in Fork Length, 2021

4.0 Conclusions and Recommendations

4.1 Conclusions

The current study provided the following conclusions:

- Water level loggers indicate that Area 1, 2 and 3 illustrate some seasonal and habitat type differences but none of the 2021 data indicate the mine is negatively affecting the flow regime.
- Mercury, both total and dissolved in the effluent discharged from the mine continue to be less than the detection limit and are not likely a major contributing factor to concentrations of mercury in the Pinewood River.
- Methylmercury concentrations at the two most downstream surface water sampling stations show slight increase year over year since 2017, however these concentrations are within the range of reference concentrations and an order of magnitude less than the applicable guideline.
- Fish communities in the reference and the two potentially mine-influenced areas are diverse abundant and similar although the density and dominant species does vary between areas and between years.

It is understood that that naturally elevated mercury concentrations are often observed in fish (particularly for predatory species) in northern lakes and depositional rivers due to naturally elevated environmental mercury levels, atmospheric deposition of mercury, and biogeochemical conditions that favour mercury methylation (Evers et al. 2011; Kidd and Batchelar 2012).

Methylated mercury is biomagnified through the food chain and has a long residence time in tissues and, with continued exposure, will bioaccumulate over the organism's lifetime (Evers et al. 2011; Kidd and Batchelar 2012). The purpose of this study was to identify potential changes in the mercury bioaccumulation potential resulting from the RRM. In the case of the Pinewood River the following is concluded:

- An interaction was found between area and fork length when predicting mercury tissue concentrations in Common Shiner. Magnitude of Difference of the geometric means indicated differences above the CES for the species at its minimum and maximum size ranges;
- The relationship between size and tissue mercury concentration was inconsistent between the reference and near-field areas confounding the ability to compare slopes;
- In 2021 (similar to 2020) the mean tissue mercury concentration in Common Shiner at each of PWFF, PWNF and PWREF remained below both consumption guidelines for sensitive populations (0.5 mg/kg; MECP 2015) and the working MECP SDB guidelines for the protection of fish-eating wildlife (0.2 mg/kg). Tissue mercury concentrations in

Common Shiner were much reduced at both PWFF and PWNF in 2020 and 2021 compared to 2019;

- Mean tissue mercury concentrations in Common Shiner at each area remained below contextual baseline concentrations, as provided through whole body composite sample analysis conducted in 2012. Concentrations were similarly higher in the vicinity of the near-field in 2012 as in 2021 potentially indicating a consistent elevation in that area prior to development; and,
- A greater tissue concentration of mercury in near-field Common Shiner was identified, yet this may be consistent with the background condition. The mean methylmercury concentration in the corresponding water (i.e., SW22A) were like those in the reference area.

4.2 Recommendations

The below are suggestions to modify or improve the program.

- 1) Review of the total and dissolved mercury surface water collection timing, frequency and analytical method. Total and dissolved mercury are typically less than their detection limit despite detections of methylmercury. A method with a lower detection should be investigated;
- 2) Assessment of the Type 2 habitat logger location in Area 3 based on potential changes to that reach following commissioning of the EDL2 discharge.
- 3) Young of the year (YOY) Common Shiner should be targeted in addition to the adults to attempt to determine the potential cause of the opposing mercury tissue concentration with age relationships observed when comparing the exposure and reference areas;
- 4) Further investigate fish tissue mercury concentration trends observed with additional sampling:
 - a. Increase the number of Common Shiner of a given age group (e.g. 20 fish of each size / age class.
 - b. Include young of the year (YOY) Common Shiner as an age class to be investigated due to their site affinity.
 - c. Add a second species to the program to further assess bioaccumulation potential in the environment and reduce bias associated with species specific life history.
- 5) Continue to monitor and augment the study as necessary based on the mine established discharge practices with the recently commissioned EDL1 and EDL2 structures now in place.

5.0 References

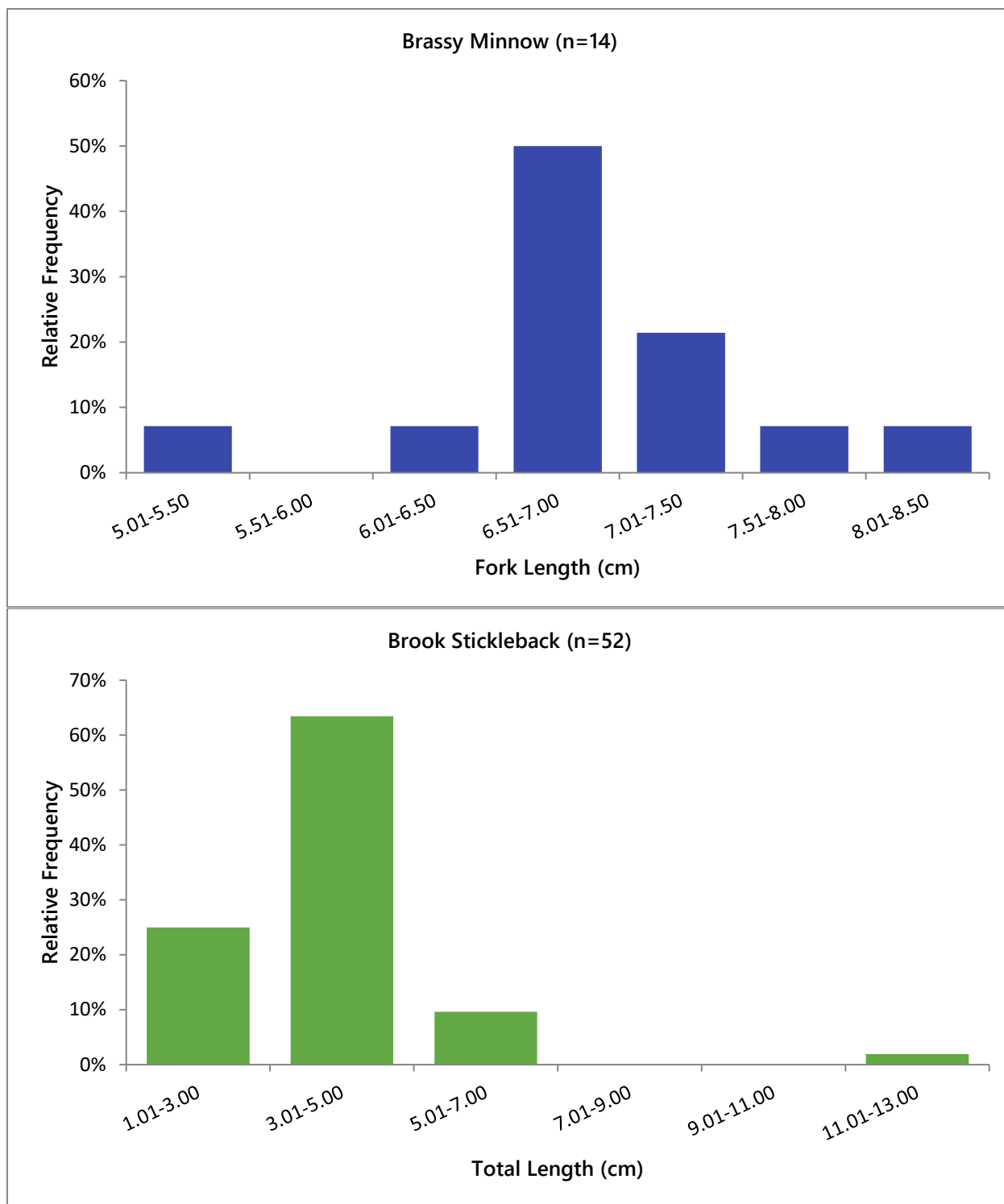
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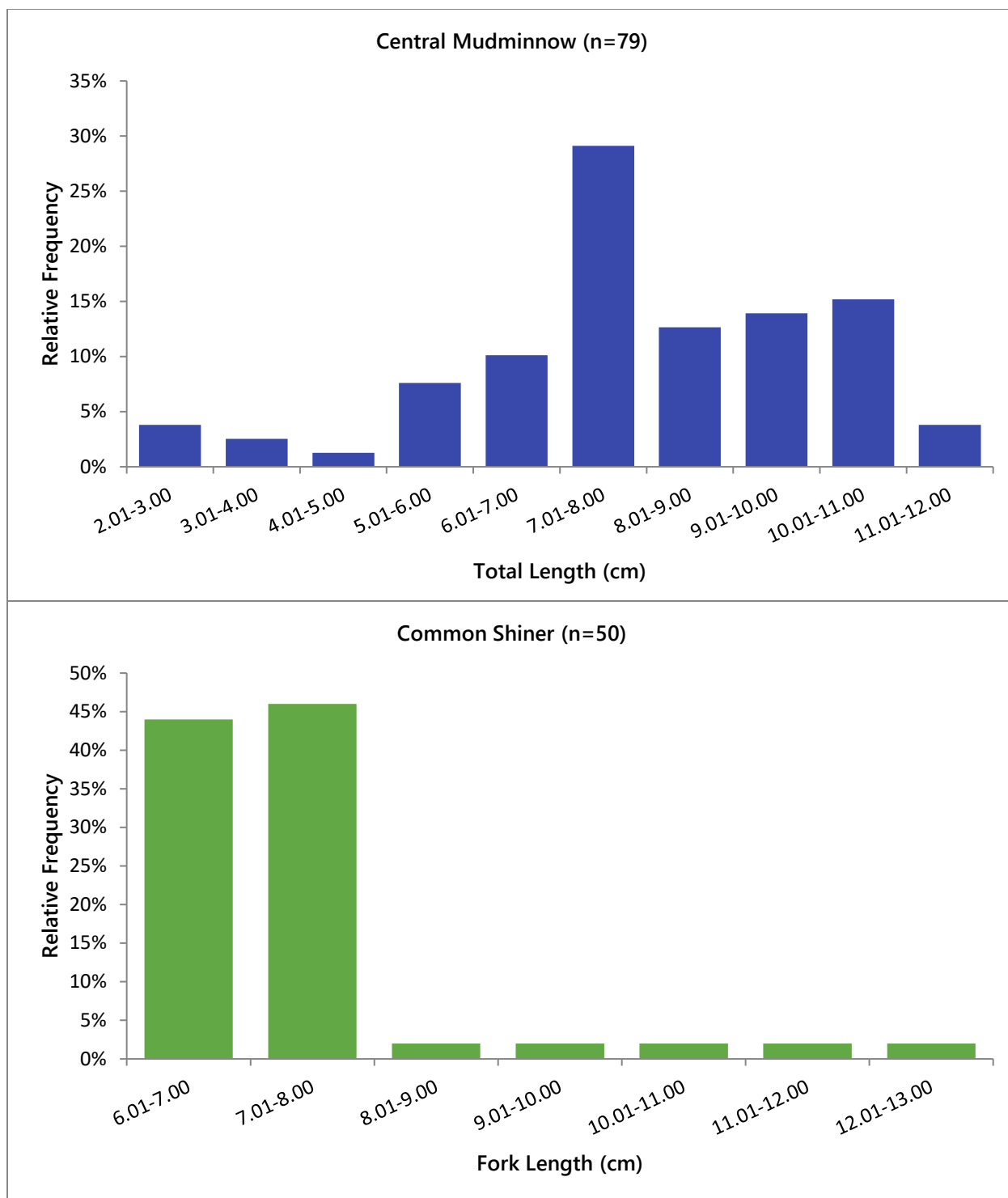
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Appendix A Detailed Data



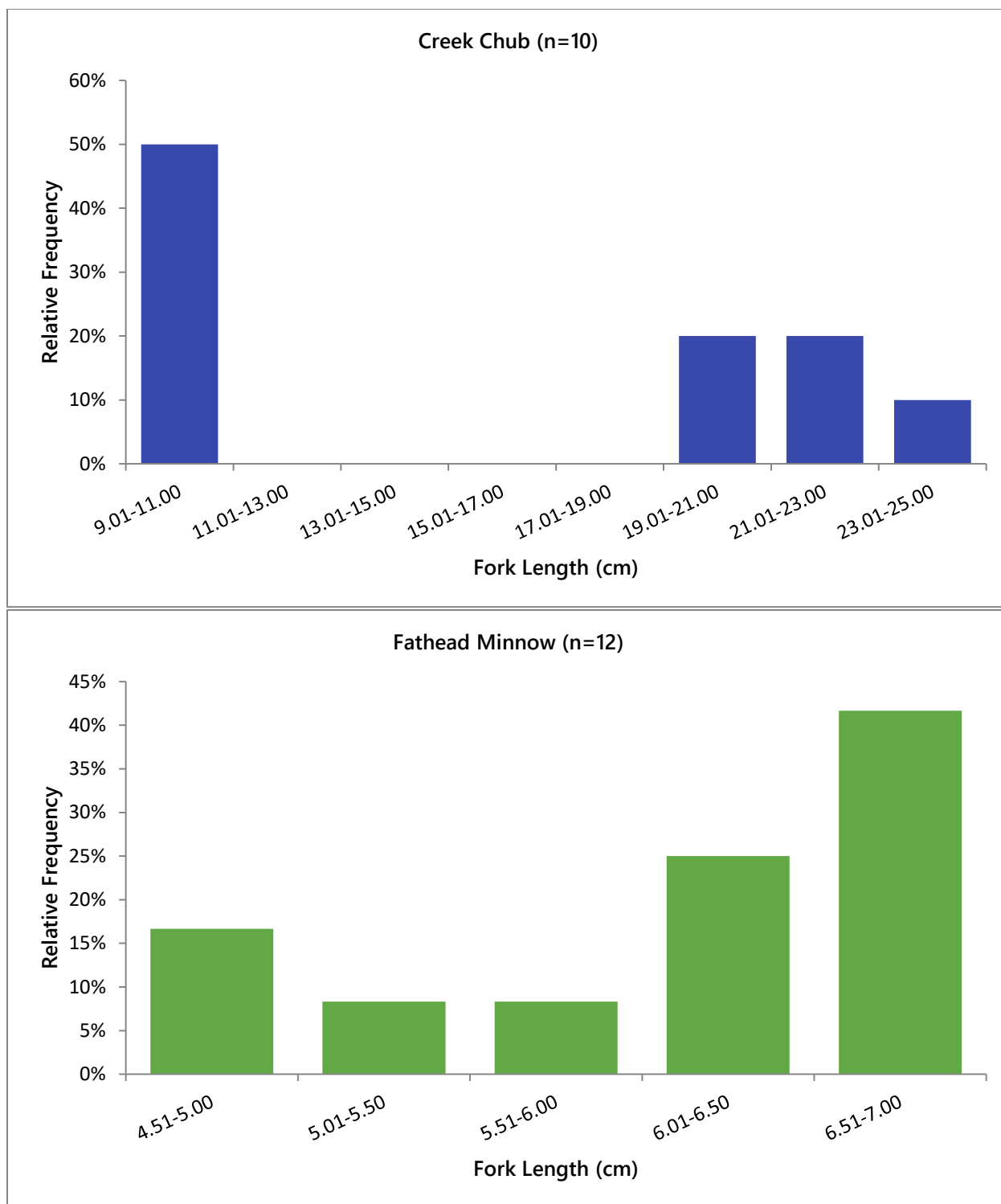
Appendix Figure A-1: Length-frequency Distributions for Fish Collected at Pinewood River Reference Area, July 2021

Note: Brown Bullhead (n=2), Golden Shiner (n=7) and White Sucker (n=3) not plotted due to low capture numbers



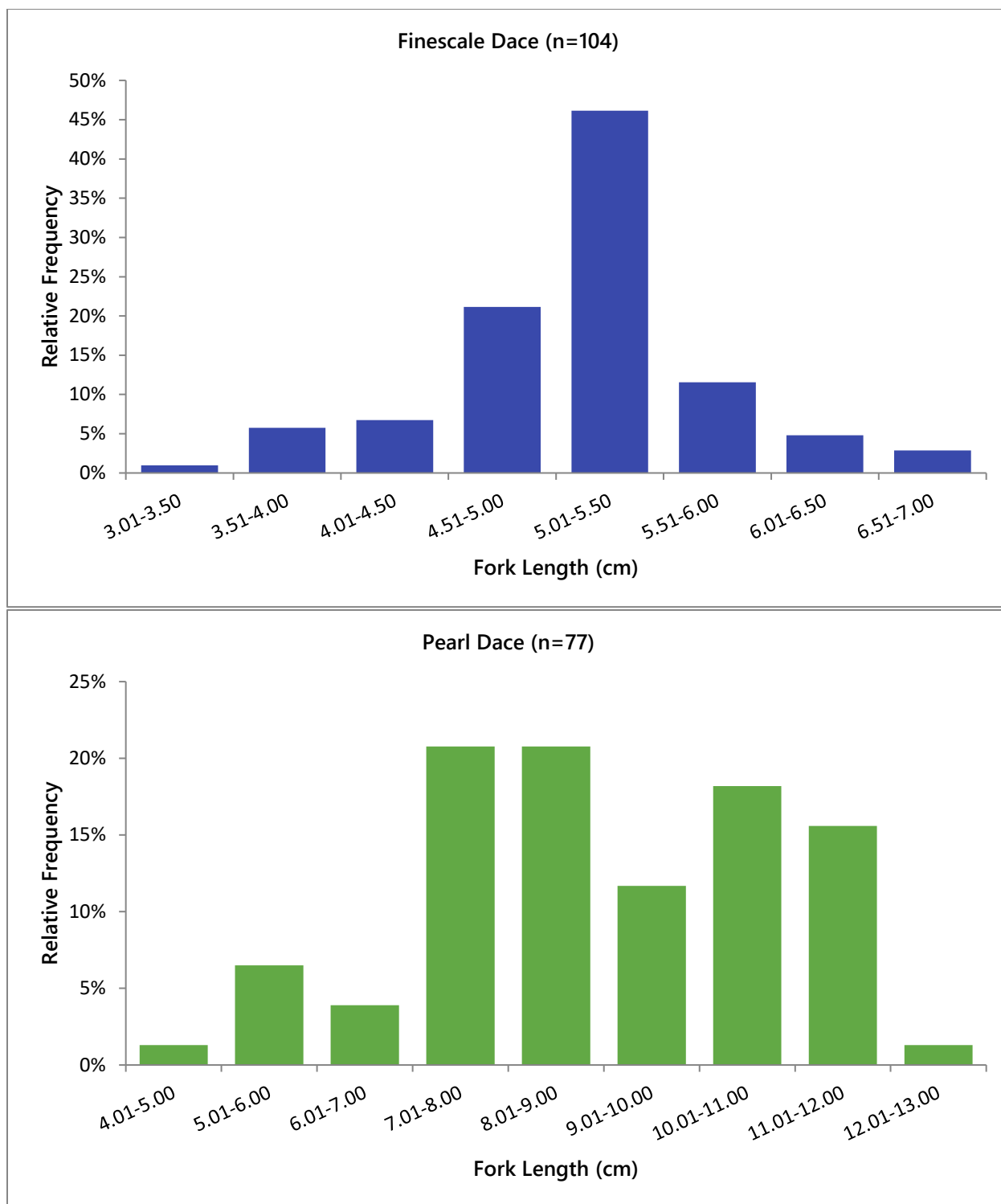
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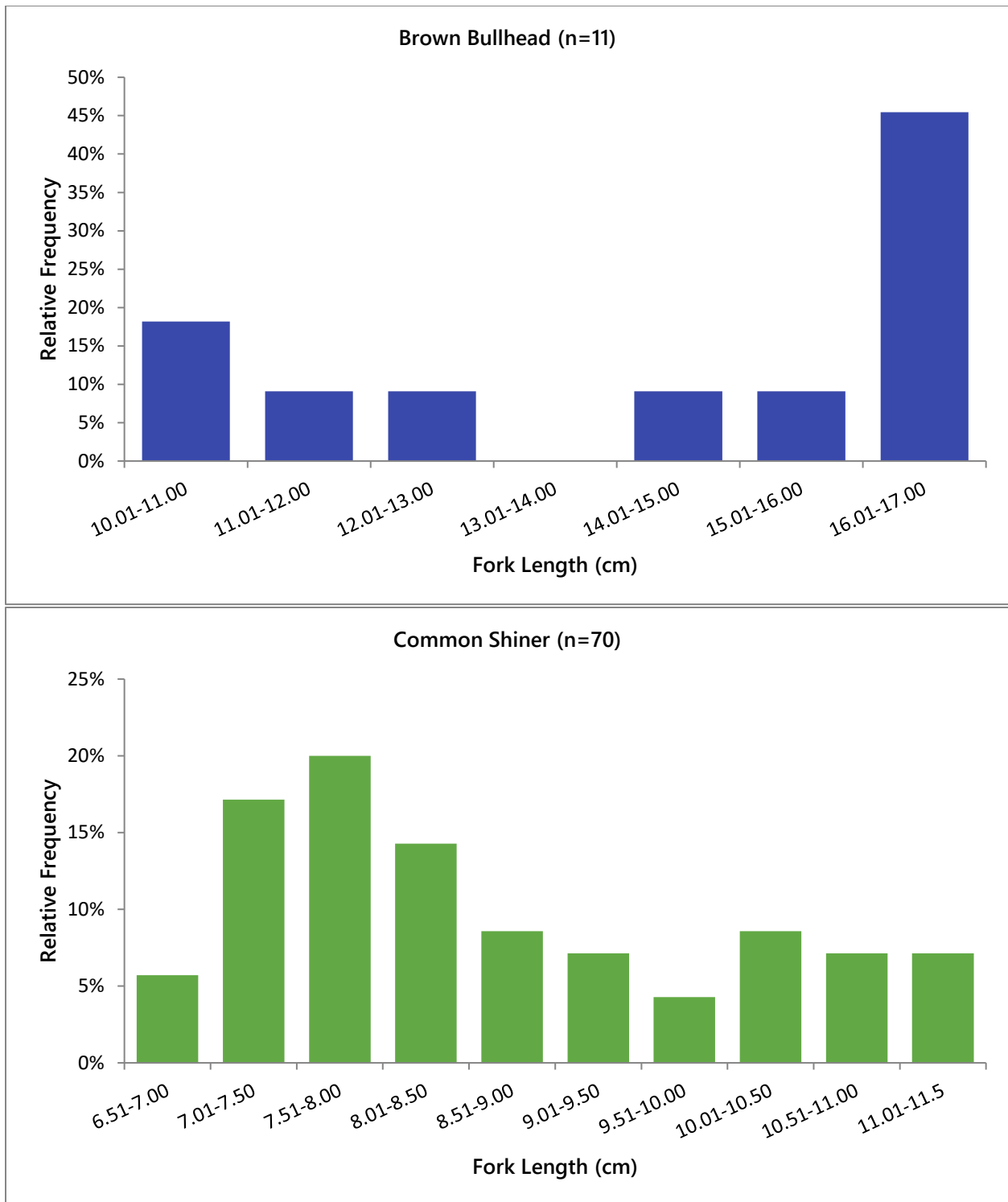
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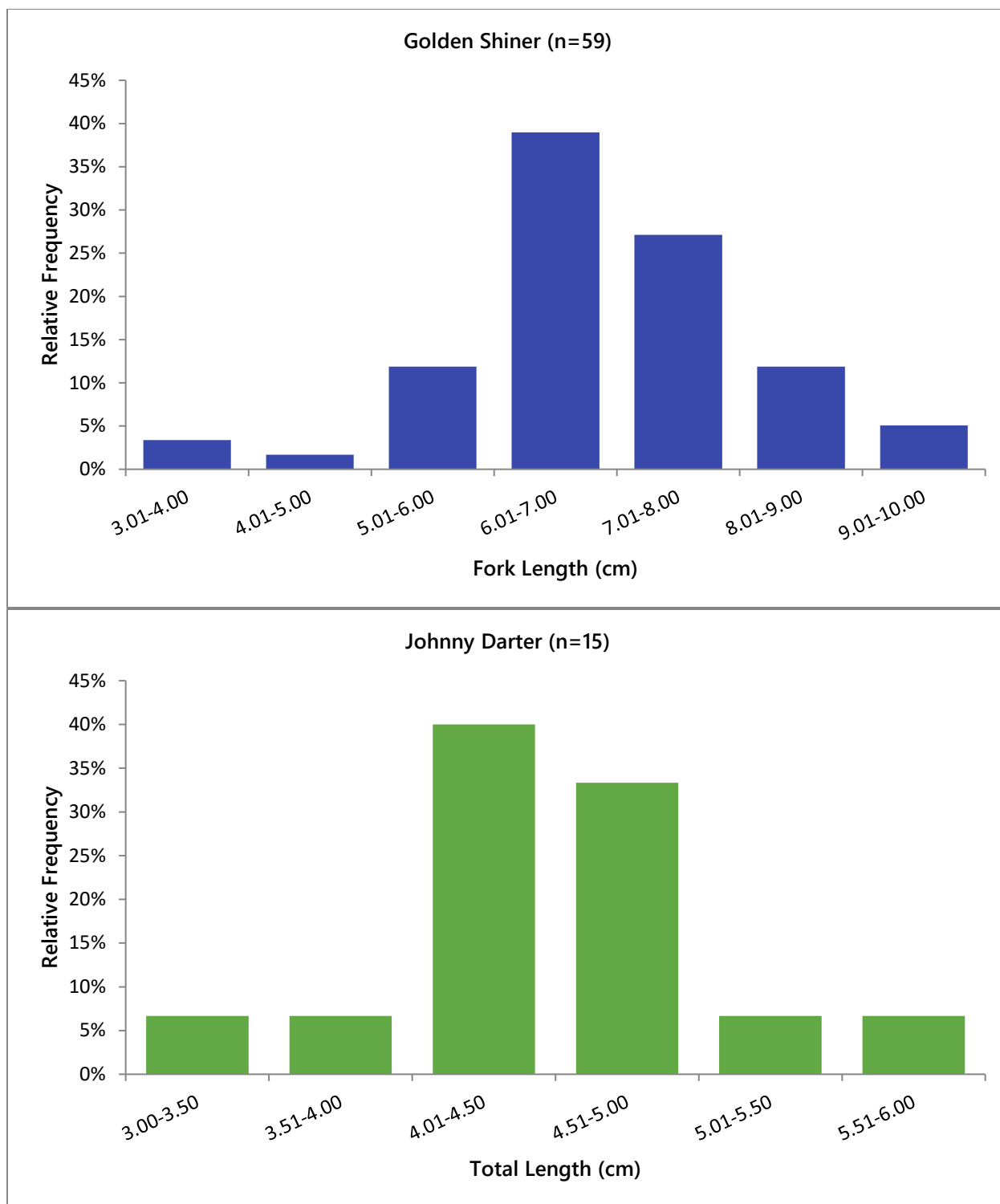
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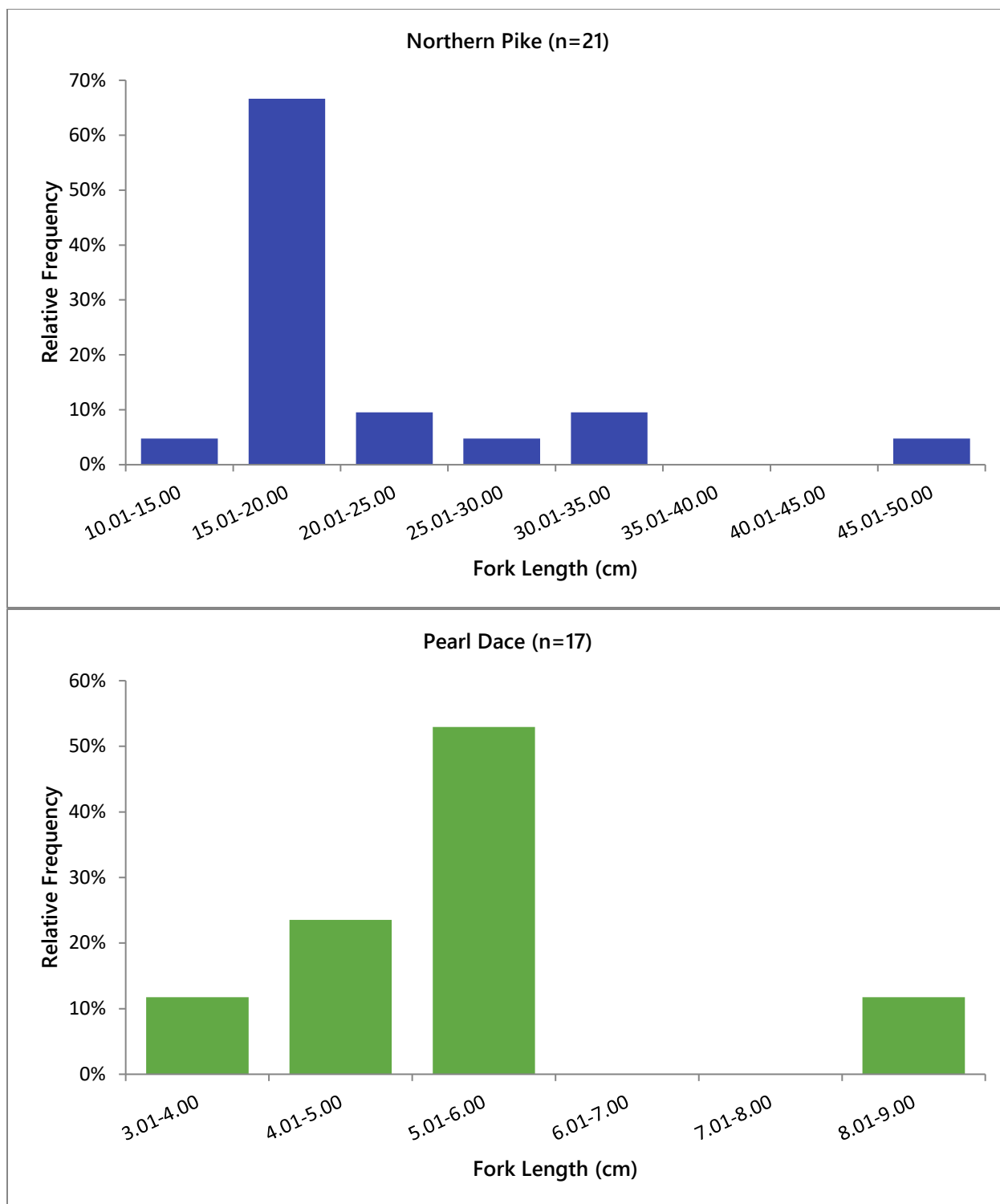
Appendix Figure A-2: Length-frequency Distributions for Fish Collected at Pinewood River Near-field Area, July 2021

Note: Blackside Darter (n=4), Central Mudminnow (n=6), Creek Chub (n=3) and Finescale Dace (n=1) not plotted due to low capture numbers



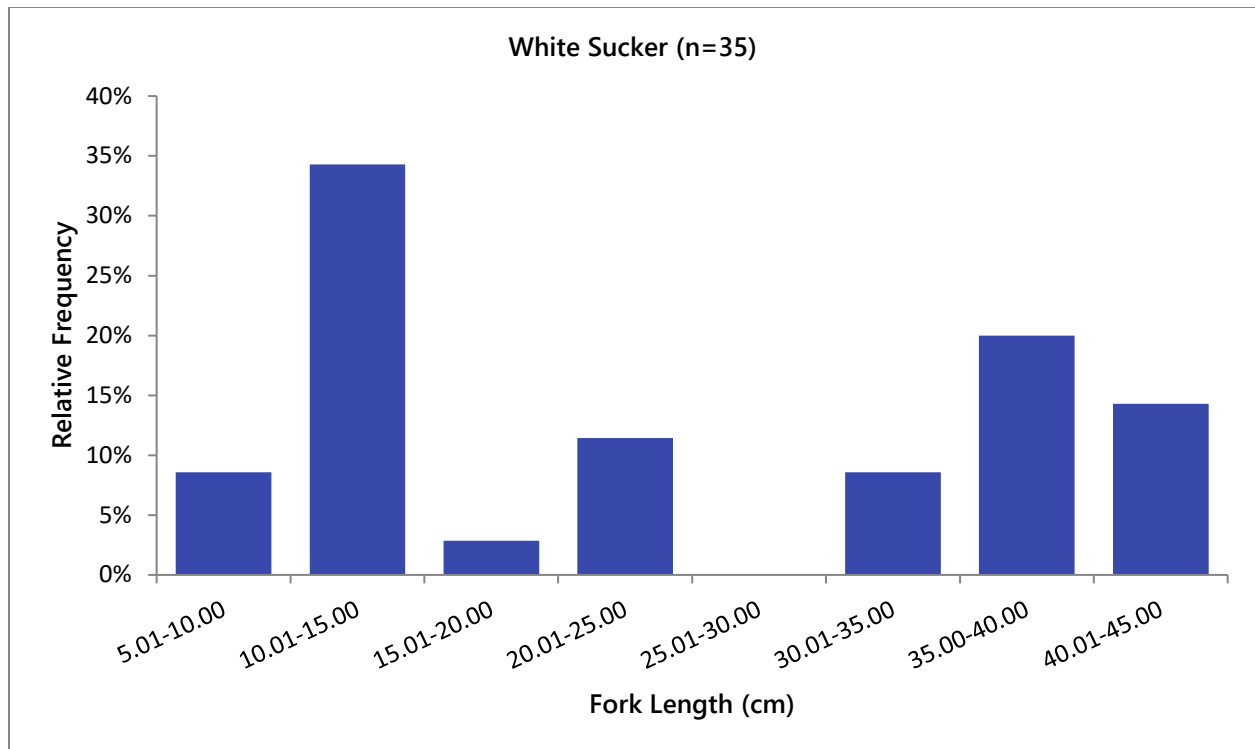
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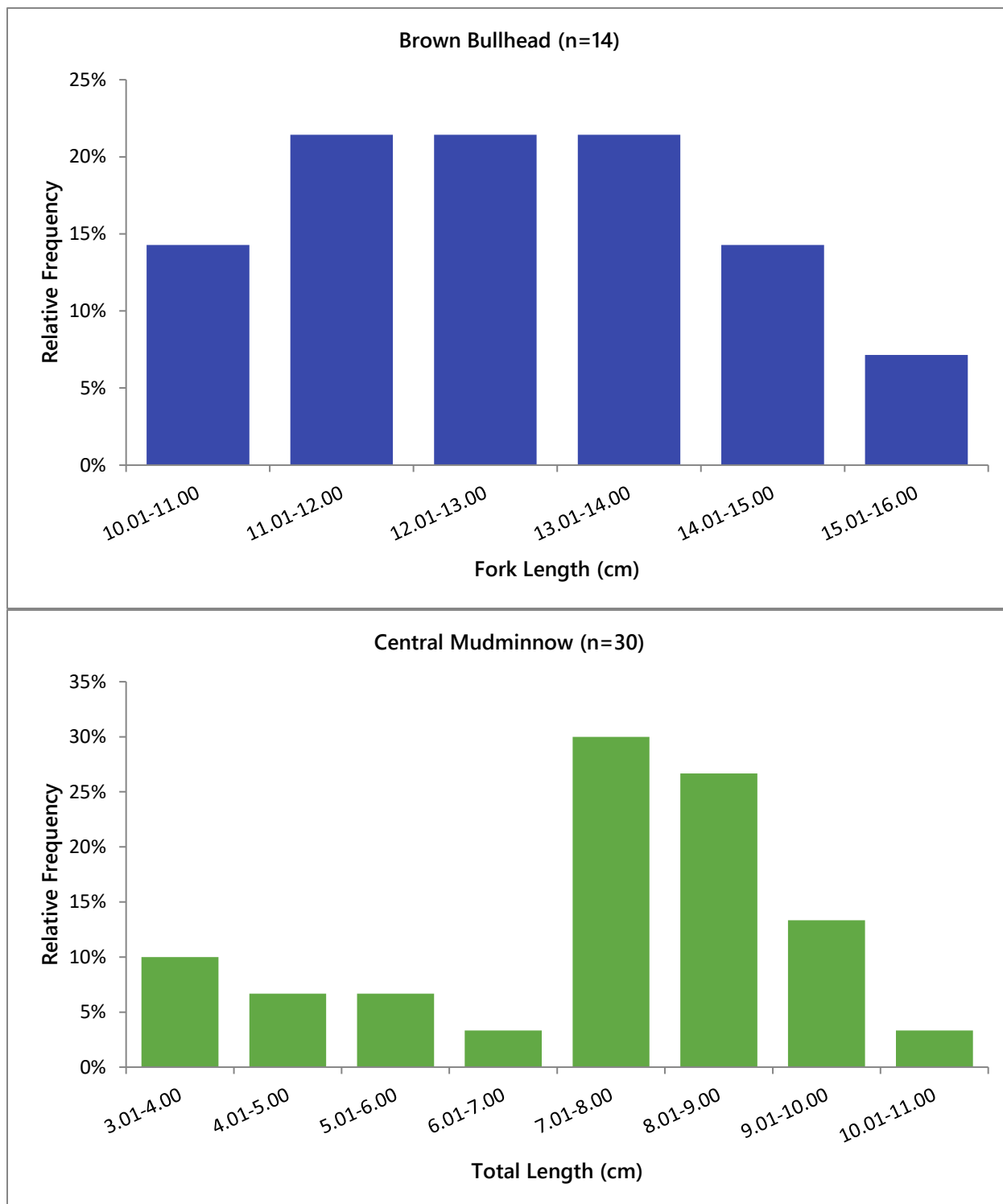
Appendix Figure A-2: Length-frequency Distributions for Fish Collected at Pinewood River Near-field Area, July 2021

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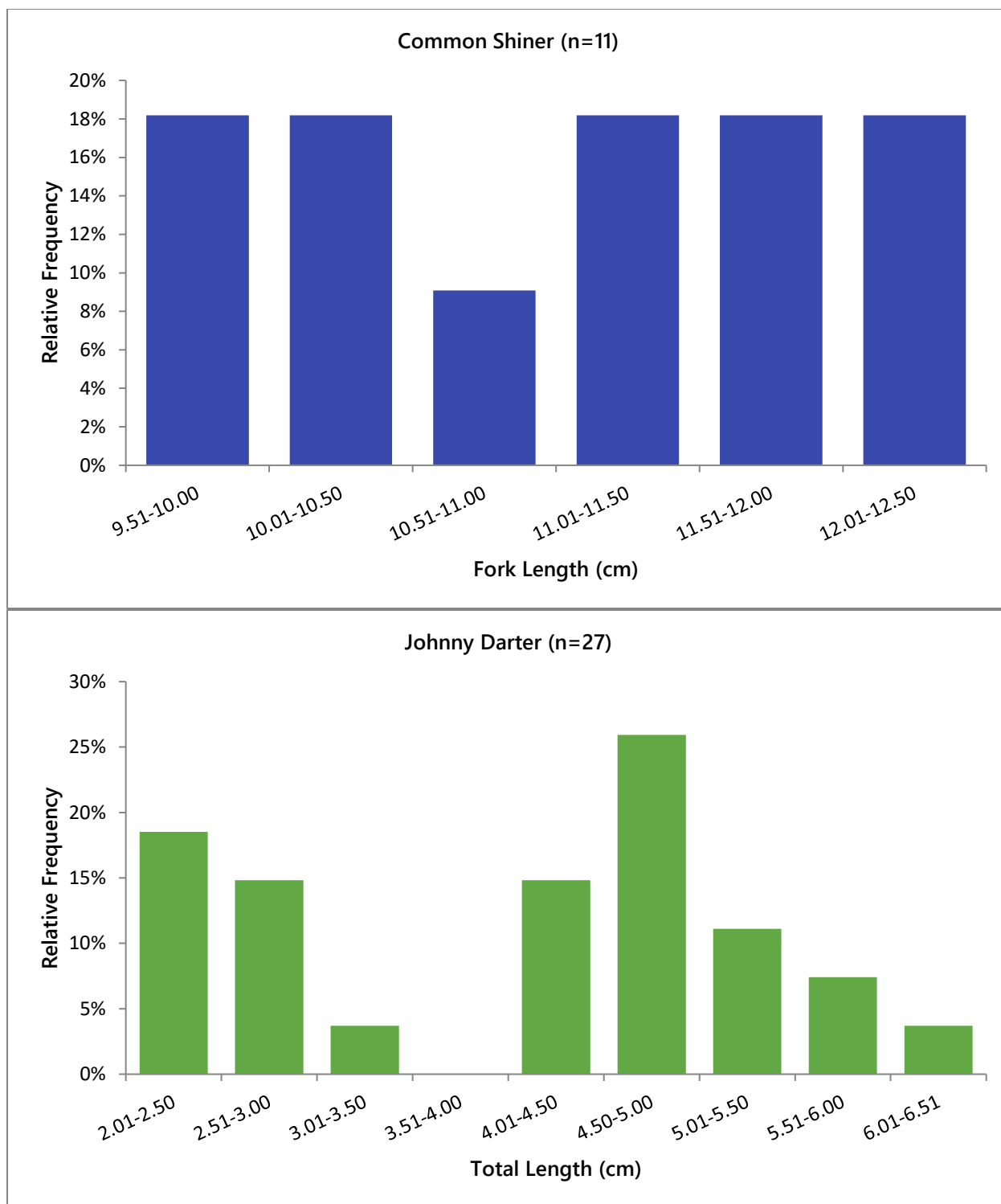
Appendix Figure A-2: Length-frequency Distributions for Fish Collected at Pinewood River Near-field Area, July 2021

Note: Blackside Darter (n=4), Central Mudminnow (n=6), Creek Chub (n=3) and Finescale Dace (n=1) not plotted due to low capture numbers



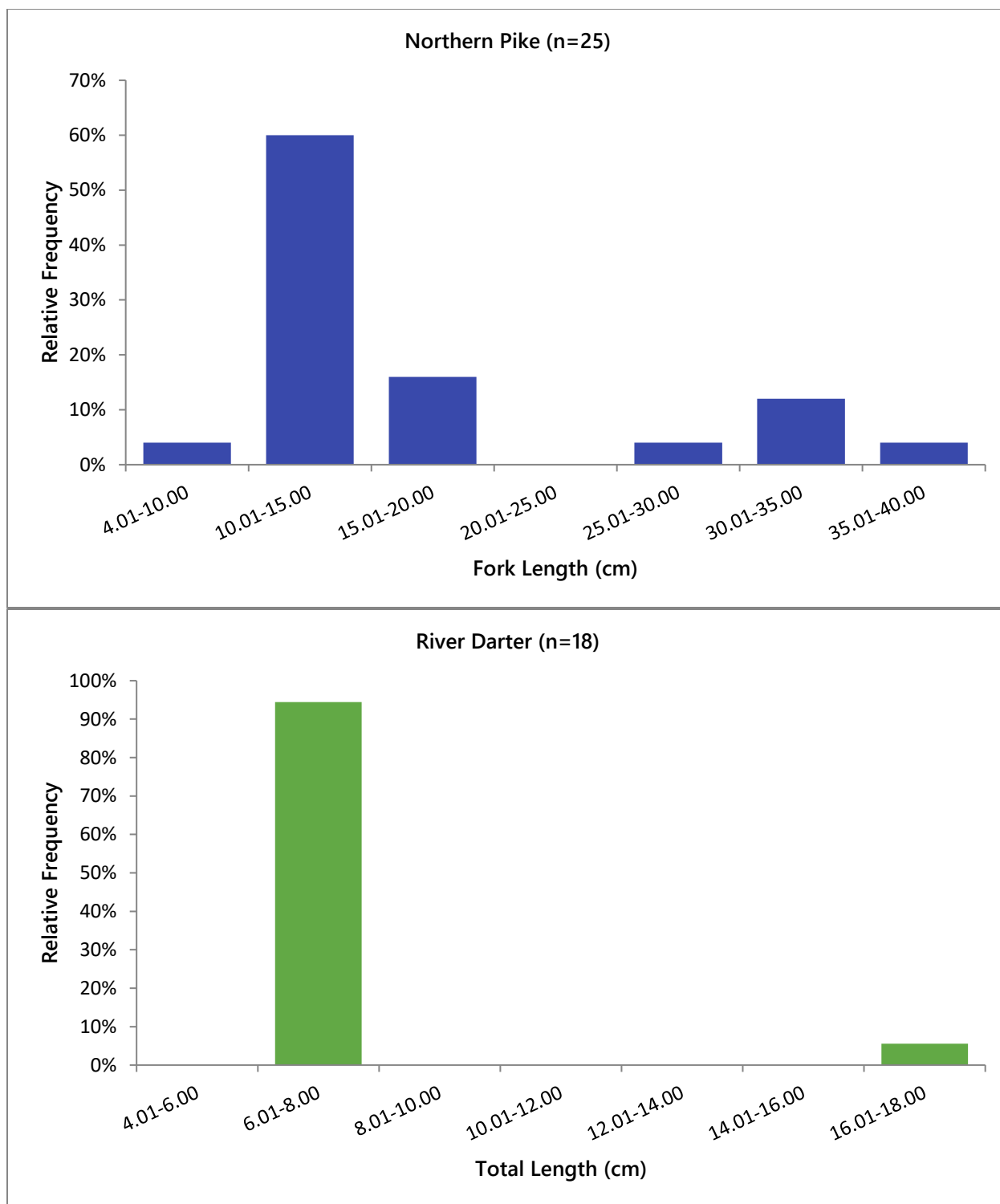
Appendix Figure A-3: Length-frequency Distributions for Fish Collected at Pinewood River Far-field Area, July 2021

Note: Creek Chub (n=7), Golden Shiner (n=5), Pearl Dace (n=4) and Rock Bass (n=4) not plotted due to low capture numbers



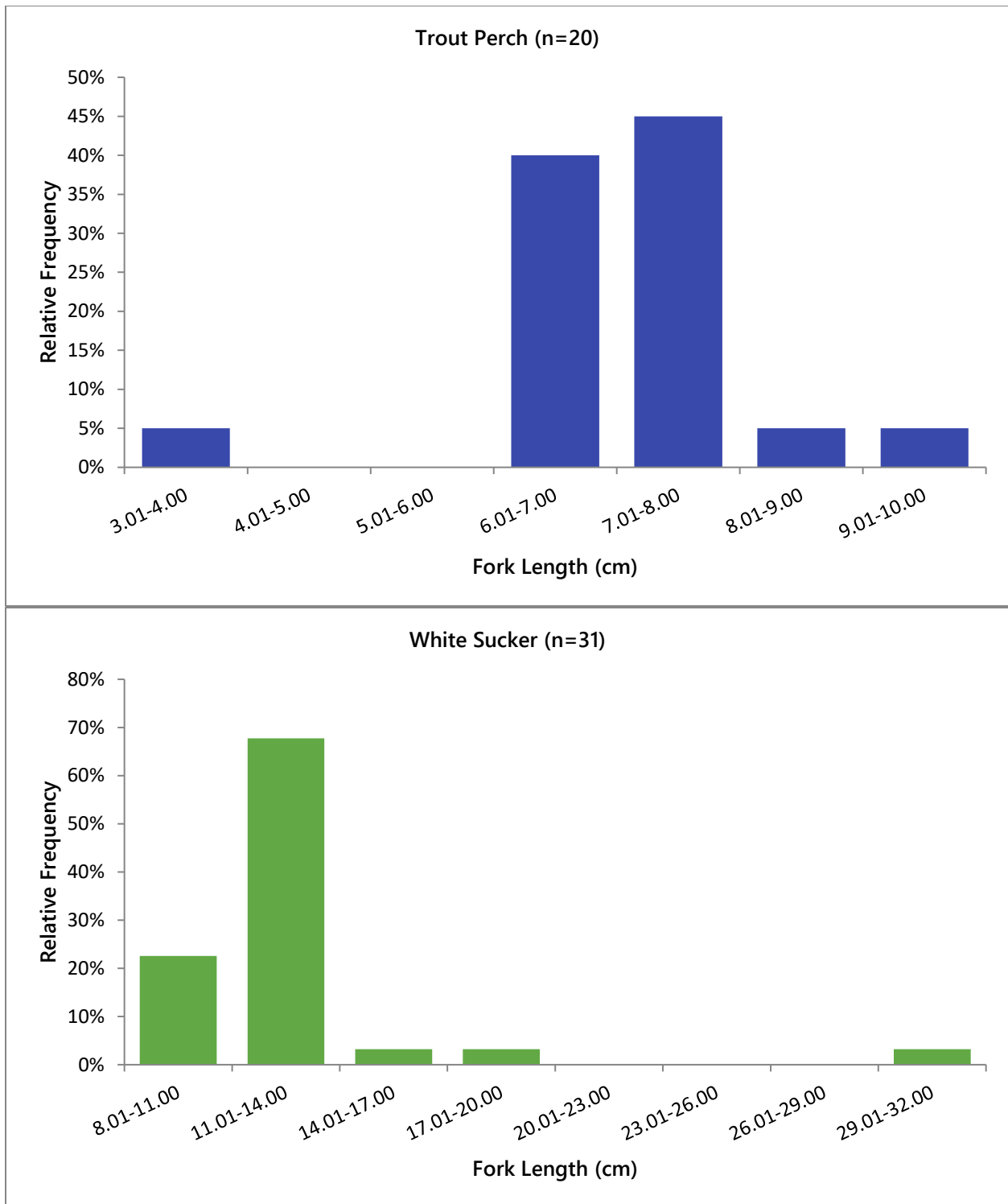
Appendix Figure A-3: Length-frequency Distributions for Fish Collected at Pinewood River Far-field Area, July 2021

Note: Creek Chub (n=7), Golden Shiner (n=5), Pearl Dace (n=4) and Rock Bass (n=4) not plotted due to low capture numbers



Appendix Figure A-3: Length-frequency Distributions for Fish Collected at Pinewood River Far-field Area, July 2021

Note: Creek Chub (n=7), Golden Shiner (n=5), Pearl Dace (n=4) and Rock Bass (n=4) not plotted due to low capture numbers



Appendix Figure A-3: Length-frequency Distributions for Fish Collected at Pinewood River Far-field Area, July 2021

Note: Creek Chub (n=7), Golden Shiner (n=5), Pearl Dace (n=4) and Rock Bass (n=4) not plotted due to low capture numbers

Appendix Table A-1: Fish Data Measurements for Pinewood River Reference - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
26-Jul-21	Brassy Minnow	7.4	6.6	3.2	-
26-Jul-21	Brassy Minnow	7.4	7.1	3.5	-
26-Jul-21	Brassy Minnow	7.6	7.2	3.8	-
26-Jul-21	Brassy Minnow	5.6	5.2	1.8	-
26-Jul-21	Brassy Minnow	8.5	8	5.8	-
26-Jul-21	Brassy Minnow	7.7	7.4	3.6	-
26-Jul-21	Brassy Minnow	7.3	6.9	3.6	-
26-Jul-21	Brassy Minnow	7.3	6.9	3.1	-
26-Jul-21	Brassy Minnow	7.3	6.8	3.4	-
26-Jul-21	Brassy Minnow	6.7	6.3	2	-
26-Jul-21	Brassy Minnow	7.3	6.9	3.3	-
26-Jul-21	Brassy Minnow	8.9	8.4	5.4	-
26-Jul-21	Brassy Minnow	7.4	7	3.5	-
26-Jul-21	Brassy Minnow	7.2	6.7	3.1	-
26-Jul-21	Brook Stickleback	5.9	-	1.1	-
26-Jul-21	Brook Stickleback	5.2	-	1.2	-
26-Jul-21	Brook Stickleback	5.7	-	1.6	-
26-Jul-21	Brook Stickleback	3.4	-	0.2	-
26-Jul-21	Brook Stickleback	3.6	-	0.3	-
26-Jul-21	Brook Stickleback	5.4	-	1	-
26-Jul-21	Brook Stickleback	3.1	-	0.3	-
26-Jul-21	Brook Stickleback	3.7	-	0.4	-
26-Jul-21	Brook Stickleback	3.1	-	0.4	-
27-Jul-21	Brook Stickleback	3.5	-	0.5	-
27-Jul-21	Brook Stickleback	3.5	-	0.3	-
27-Jul-21	Brook Stickleback	4.3	-	0.5	-
27-Jul-21	Brook Stickleback	3.1	-	0.2	-
27-Jul-21	Brook Stickleback	3.8	-	0.4	-
27-Jul-21	Brook Stickleback	3.8	-	0.4	-
27-Jul-21	Brook Stickleback	3.3	-	0.2	-
27-Jul-21	Brook Stickleback	3.8	-	0.4	-
27-Jul-21	Brook Stickleback	2.9	-	0.2	-
27-Jul-21	Brook Stickleback	3.9	-	0.4	-
27-Jul-21	Brook Stickleback	3.3	-	0.3	-
27-Jul-21	Brook Stickleback	3.7	-	0.3	-
27-Jul-21	Brook Stickleback	3	-	0.2	-
27-Jul-21	Brook Stickleback	3.8	-	0.6	-
27-Jul-21	Brook Stickleback	2.8	-	0.1	-
27-Jul-21	Brook Stickleback	4.7	-	0.8	-
27-Jul-21	Brook Stickleback	3.8	-	0.7	-
27-Jul-21	Brook Stickleback	3.2	-	0.3	-

Appendix Table A-1: Fish Data Measurements for Pinewood River Reference - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
27-Jul-21	Brook Stickleback	3.7	-	0.5	-
27-Jul-21	Brook Stickleback	3.3	-	0.3	-
27-Jul-21	Brook Stickleback	3.1	-	0.2	-
27-Jul-21	Brook Stickleback	2.9	-	0.2	-
27-Jul-21	Brook Stickleback	3.6	-	0.4	-
27-Jul-21	Brook Stickleback	3.8	-	0.5	-
27-Jul-21	Brook Stickleback	4	-	0.5	-
27-Jul-21	Brook Stickleback	2.7	-	0.1	-
27-Jul-21	Brook Stickleback	3.2	-	0.3	-
27-Jul-21	Brook Stickleback	3.8	-	0.3	-
27-Jul-21	Brook Stickleback	1.8		<0.1	-
27-Jul-21	Brook Stickleback	2		<0.1	-
27-Jul-21	Brook Stickleback	2.1		<0.1	-
27-Jul-21	Brook Stickleback	3		0.3	-
27-Jul-21	Brook Stickleback	2.7		0.1	-
27-Jul-21	Brook Stickleback	2.8		0.1	-
27-Jul-21	Brook Stickleback	1.9		<0.1	-
27-Jul-21	Brook Stickleback	3.5	-	0.5	-
27-Jul-21	Brook Stickleback	3.9	-	0.6	-
27-Jul-21	Brook Stickleback	3.2	-	0.2	-
27-Jul-21	Brook Stickleback	3.3	-	0.2	-
27-Jul-21	Brook Stickleback	3.3	-	0.2	-
27-Jul-21	Brook Stickleback	2	-	0.1	-
25-Jul-21	Brown Bullhead	17	16.6	73.2	-
26-Jul-21	Brown Bullhead	3.5	3.4	0.4	-
25-Jul-21	Central Mudminnow	10.9	-	14.6	-
25-Jul-21	Central Mudminnow	10.3	-	11.4	-
25-Jul-21	Central Mudminnow	10.8	-	14.3	-
25-Jul-21	Central Mudminnow	9.3	-	8	-
25-Jul-21	Central Mudminnow	10.7	-	15.7	-
25-Jul-21	Central Mudminnow	11.3	-	20.1	-
25-Jul-21	Central Mudminnow	9.5	-	11.2	-
25-Jul-21	Central Mudminnow	10.5	-	14.2	weight low due to bite
25-Jul-21	Central Mudminnow	10.6	-	15.7	-
25-Jul-21	Central Mudminnow	10.5	-	12.5	-
25-Jul-21	Central Mudminnow	11.2	-	17.6	-
25-Jul-21	Central Mudminnow	10.9	-	14.9	-
25-Jul-21	Central Mudminnow	9.5	-	11.7	-
25-Jul-21	Central Mudminnow	9.5	-	12.4	-
25-Jul-21	Central Mudminnow	11.8	-	13.7	-
25-Jul-21	Central Mudminnow	10.6	-	14.5	-
25-Jul-21	Central Mudminnow	9.7	-	12.9	-

Appendix Table A-1: Fish Data Measurements for Pinewood River Reference - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
25-Jul-21	Central Mudminnow	10.2	-	12.2	-
25-Jul-21	Central Mudminnow	8.4	-	9.4	-
25-Jul-21	Central Mudminnow	10	-	12.6	-
25-Jul-21	Central Mudminnow	10	-	11.4	-
25-Jul-21	Central Mudminnow	9.6	-	10.3	-
25-Jul-21	Central Mudminnow	9.9	-	11.9	-
25-Jul-21	Central Mudminnow	9.2	-	10	-
26-Jul-21	Central Mudminnow	8.7	-	8.6	-
26-Jul-21	Central Mudminnow	9.7	-	11.8	-
26-Jul-21	Central Mudminnow	10.3	-	11.9	-
26-Jul-21	Central Mudminnow	5.5	-	2.2	-
26-Jul-21	Central Mudminnow	8.5	-	4.5	-
26-Jul-21	Central Mudminnow	6.9	-	3.4	-
26-Jul-21	Central Mudminnow	7.4	-	12.7	-
26-Jul-21	Central Mudminnow	6.6	-	3.3	-
26-Jul-21	Central Mudminnow	5.8	-	2.1	-
26-Jul-21	Central Mudminnow	5.6	-	2	-
26-Jul-21	Central Mudminnow	6.6	-	3.2	-
26-Jul-21	Central Mudminnow	7.5	-	4.7	-
26-Jul-21	Central Mudminnow	8.5	-	6.3	-
26-Jul-21	Central Mudminnow	7.4	-	5.6	-
26-Jul-21	Central Mudminnow	6.7	-	4	-
26-Jul-21	Central Mudminnow	7.4	-	4.6	-
26-Jul-21	Central Mudminnow	7.3	-	4.8	-
26-Jul-21	Central Mudminnow	8	-	5.2	-
26-Jul-21	Central Mudminnow	10.2	-	10.6	-
26-Jul-21	Central Mudminnow	7.9	-	5.3	-
26-Jul-21	Central Mudminnow	8.6	-	7.4	-
26-Jul-21	Central Mudminnow	6.6	-	3.3	-
26-Jul-21	Central Mudminnow	7.9	-	5.4	-
26-Jul-21	Central Mudminnow	7.5	-	4.9	-
26-Jul-21	Central Mudminnow	7.7	-	4	-
26-Jul-21	Central Mudminnow	7.5	-	4.7	-
26-Jul-21	Central Mudminnow	7.4	-	4.6	-
26-Jul-21	Central Mudminnow	8.1	-	5.8	-
26-Jul-21	Central Mudminnow	7.1	-	3.6	-
26-Jul-21	Central Mudminnow	8.3	-	5.8	-
26-Jul-21	Central Mudminnow	8.3	-	5.9	-
27-Jul-21	Central Mudminnow	7.4	-	4.6	-
27-Jul-21	Central Mudminnow	4.3	-	0.5	-
27-Jul-21	Central Mudminnow	8.2	-	3.9	-
27-Jul-21	Central Mudminnow	8.3	-	6.1	-

Appendix Table A-1: Fish Data Measurements for Pinewood River Reference - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
27-Jul-21	Central Mudminnow	7.3	-	4.2	-
27-Jul-21	Central Mudminnow	2.9	-	0.3	-
28-Jul-21	Central Mudminnow	7.4	-	4.2	-
28-Jul-21	Central Mudminnow	6.7	-	3	-
28-Jul-21	Central Mudminnow	6.9	-	3.1	-
28-Jul-21	Central Mudminnow	7.7	-	4.8	-
28-Jul-21	Central Mudminnow	7.3	-	4.2	-
28-Jul-21	Central Mudminnow	7.6	-	4.3	-
28-Jul-21	Central Mudminnow	5.3	-	1.7	-
28-Jul-21	Central Mudminnow	7.4	-	4.1	-
28-Jul-21	Central Mudminnow	7.4	-	4.3	-
28-Jul-21	Central Mudminnow	7.2	-	4.4	-
28-Jul-21	Central Mudminnow	5.9	-	2	-
28-Jul-21	Central Mudminnow	6.7	-	3.3	-
28-Jul-21	Central Mudminnow	5.6	-	1.7	-
28-Jul-21	Central Mudminnow	3.2	-	0.3	-
28-Jul-21	Central Mudminnow	2.7	-	0.2	-
28-Jul-21	Central Mudminnow	7.1	-	3.4	-
28-Jul-21	Central Mudminnow	3.3	-	0.4	-
28-Jul-21	Central Mudminnow	3	-	0.3	-
25-Jul-21	Creek Chub	20.8	19.9	93.9	-
25-Jul-21	Creek Chub	21.7	20.6	118.8	-
25-Jul-21	Creek Chub	23.1	22	118.5	-
25-Jul-21	Creek Chub	23.8	22.7	134.9	-
25-Jul-21	Creek Chub	24.7	23.5	147.2	-
25-Jul-21	Creek Chub	11.3	10.7	13.7	-
25-Jul-21	Creek Chub	11.2	10.6	15.2	-
25-Jul-21	Creek Chub	9.9	9.5	10.9	-
26-Jul-21	Creek Chub	9.8	9.2	8.6	-
27-Jul-21	Creek Chub	10.2	9.7	11.1	-
26-Jul-21	Fathead Minnow	7.4	6.9	4.1	-
27-Jul-21	Fathead Minnow	7.2	6.7	3.7	-
27-Jul-21	Fathead Minnow	6.3	5.8	2.4	-
27-Jul-21	Fathead Minnow	7.3	6.9	4.4	-
27-Jul-21	Fathead Minnow	6.6	6.2	2.9	-
27-Jul-21	Fathead Minnow	6.6	6.2	2.8	-
27-Jul-21	Fathead Minnow	5.5	5.2	1.6	-
27-Jul-21	Fathead Minnow	5.3	5	1.3	-
27-Jul-21	Fathead Minnow	6.7	6.2	3	-
27-Jul-21	Fathead Minnow	7.2	6.8	3.4	-
28-Jul-21	Fathead Minnow	7.3	6.9	4.5	-
28-Jul-21	Fathead Minnow	5.3	4.9	1.3	-

Appendix Table A-1: Fish Data Measurements for Pinewood River Reference - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
28-Jul-21	Fathead Minnow	6.7	-	2.7	-
25-Jul-21	Finescale Dace	4.9	4.6	1.1	-
25-Jul-21	Finescale Dace	5.7	5.3	1.5	-
25-Jul-21	Finescale Dace	5.3	4.9	1.4	-
25-Jul-21	Finescale Dace	5.1	4.8	1.2	-
25-Jul-21	Finescale Dace	5.6	5.3	1.6	-
25-Jul-21	Finescale Dace	5.4	5.1	1.2	-
25-Jul-21	Finescale Dace	5.7	5.3	1.4	-
25-Jul-21	Finescale Dace	5.3	4.9	1	-
25-Jul-21	Finescale Dace	5.9	5.5	1.7	-
25-Jul-21	Finescale Dace	5.3	5	1.2	-
25-Jul-21	Finescale Dace	5.5	5.1	1.1	-
25-Jul-21	Finescale Dace	5.5	5.2	1.2	-
25-Jul-21	Finescale Dace	5.4	5.1	1.1	-
25-Jul-21	Finescale Dace	5.2	4.8	0.9	-
25-Jul-21	Finescale Dace	5.5	5.2	1.1	-
25-Jul-21	Finescale Dace	5.3	5.1	1.3	-
25-Jul-21	Finescale Dace	5.5	5.2	1.3	-
25-Jul-21	Finescale Dace	5.3	5.1	1.1	-
25-Jul-21	Finescale Dace	7.4	7	3.2	-
25-Jul-21	Finescale Dace	5.5	5.1	1.3	-
25-Jul-21	Finescale Dace	6.1	6.8	2.1	-
25-Jul-21	Finescale Dace	5.9	5.5	2.2	-
25-Jul-21	Finescale Dace	5.6	5.2	1.5	-
25-Jul-21	Finescale Dace	6	5.7	1.8	-
25-Jul-21	Finescale Dace	5.1	4.9	1.4	-
25-Jul-21	Finescale Dace	5.1	4.8	1.2	-
25-Jul-21	Finescale Dace	6.5	6.2	2.3	-
25-Jul-21	Finescale Dace	5.6	5.3	1.2	-
25-Jul-21	Finescale Dace	5.5	5.2	1.1	-
25-Jul-21	Finescale Dace	6.4	6.1	2.2	-
25-Jul-21	Finescale Dace	5.7	5.4	1.5	-
25-Jul-21	Finescale Dace	5.9	5.5	1.7	-
25-Jul-21	Finescale Dace	5.4	5.1	1	-
25-Jul-21	Finescale Dace	6.3	5.8	1.9	-
25-Jul-21	Finescale Dace	6.8	6.5	2.2	-
25-Jul-21	Finescale Dace	6.2	6.3	2.1	-
25-Jul-21	Finescale Dace	5.3	5.1	1.2	-
25-Jul-21	Finescale Dace	5.9	5.6	1.6	-
26-Jul-21	Finescale Dace	6	5.7	1.9	-
26-Jul-21	Finescale Dace	5.8	5.5	1.7	-
26-Jul-21	Finescale Dace	5.5	5.2	1.4	-

Appendix Table A-1: Fish Data Measurements for Pinewood River Reference - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
26-Jul-21	Finescale Dace	6.3	6	1.8	-
26-Jul-21	Finescale Dace	6	5.6	1.7	-
26-Jul-21	Finescale Dace	5.7	5.4	1.5	-
26-Jul-21	Finescale Dace	5.3	5	1.2	-
26-Jul-21	Finescale Dace	4.5	4.2	0.6	-
26-Jul-21	Finescale Dace	4.6	4.3	0.8	-
26-Jul-21	Finescale Dace	4.3	4.1	0.7	-
26-Jul-21	Finescale Dace	5.3	5.1	1.4	-
26-Jul-21	Finescale Dace	4.3	4.1	0.5	-
26-Jul-21	Finescale Dace	5.3	5	1.3	-
26-Jul-21	Finescale Dace	7	6.6	3.1	-
26-Jul-21	Finescale Dace	6.3	5.9	1.9	-
26-Jul-21	Finescale Dace	5.5	5.2	1.3	-
26-Jul-21	Finescale Dace	5.1	4.8	1	-
26-Jul-21	Finescale Dace	5.4	5.1	1.3	-
26-Jul-21	Finescale Dace	5.9	5.5	1.4	-
26-Jul-21	Finescale Dace	5.6	5.3	1.3	-
26-Jul-21	Finescale Dace	4.3	4	0.6	-
26-Jul-21	Finescale Dace	5.3	5	1.1	-
26-Jul-21	Finescale Dace	4.4	4.2	0.6	-
27-Jul-21	Finescale Dace	6.5	6.1	2.6	-
27-Jul-21	Finescale Dace	6.1	5.7	1.7	-
27-Jul-21	Finescale Dace	4.3	4	0.5	-
28-Jul-21	Finescale Dace	5.7	5.4	1.4	-
28-Jul-21	Finescale Dace	5.2	5	1.3	-
28-Jul-21	Finescale Dace	5.7	5.4	1.4	-
28-Jul-21	Finescale Dace	5.2	4.9	1.6	-
28-Jul-21	Finescale Dace	5.7	5.3	1.3	-
28-Jul-21	Finescale Dace	5.9	5.6	1.6	-
28-Jul-21	Finescale Dace	4.4	4.1	0.6	-
28-Jul-21	Finescale Dace	5.5	5.2	1.3	-
28-Jul-21	Finescale Dace	5.9	5.6	1.9	-
28-Jul-21	Finescale Dace	4.9	4.6	0.7	-
28-Jul-21	Finescale Dace	5.2	4.9	1.3	-
28-Jul-21	Finescale Dace	5.5	5.2	1.3	-
28-Jul-21	Finescale Dace	5.5	5.2	1.4	-
28-Jul-21	Finescale Dace	6.1	5.7	2	-
28-Jul-21	Finescale Dace	5.2	4.9	1.2	-
28-Jul-21	Finescale Dace	3.8	3.6	0.3	-
28-Jul-21	Finescale Dace	3.9	3.8	0.3	-
28-Jul-21	Finescale Dace	3.9	3.7	0.4	-
28-Jul-21	Finescale Dace	5.3	5	1.3	-

Appendix Table A-1: Fish Data Measurements for Pinewood River Reference - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
28-Jul-21	Finescale Dace	5.5	5.2	1.4	-
28-Jul-21	Finescale Dace	4.2	3.9	0.6	-
28-Jul-21	Finescale Dace	5.2	4.9	1.1	-
28-Jul-21	Finescale Dace	5.1	4.8	1.1	-
28-Jul-21	Finescale Dace	6.2	5.8	1.9	-
28-Jul-21	Finescale Dace	5.4	3.2	1.2	-
28-Jul-21	Finescale Dace	5.8	5.4	1.5	-
28-Jul-21	Finescale Dace	5.7	5.4	1.5	-
28-Jul-21	Finescale Dace	4.5	4.2	0.7	-
28-Jul-21	Finescale Dace	5.4	5.1	1.4	-
28-Jul-21	Finescale Dace	5.7	5.4	1.5	-
28-Jul-21	Finescale Dace	5.2	4.9	1.2	-
28-Jul-21	Finescale Dace	5.2	4.9	1.3	-
28-Jul-21	Finescale Dace	5.3	4.9	1.4	-
28-Jul-21	Finescale Dace	5.5	5.2	1.4	-
28-Jul-21	Finescale Dace	5.7	5.3	1.5	-
28-Jul-21	Finescale Dace	5.6	5.4	1.9	-
28-Jul-21	Finescale Dace	5.6	5.3	1.8	-
28-Jul-21	Finescale Dace	5.8	5.4	2.1	-
28-Jul-21	Finescale Dace	5.6	5.3	1.7	-
28-Jul-21	Finescale Dace	5.8	5.4	1.8	-
28-Jul-21	Finescale Dace	5.4	5.1	1.4	-
25-Jul-21	Golden Shiner	9.7	8.6	9.3	-
25-Jul-21	Golden Shiner	11.3	10.3	14.3	-
25-Jul-21	Golden Shiner	11.8	10.8	16.5	-
25-Jul-21	Golden Shiner	11.3	10.3	16.1	-
25-Jul-21	Golden Shiner	9.9	9.6	11.4	total length low due to deformed gill
25-Jul-21	Golden Shiner	10	9.2	11.2	-
25-Jul-21	Golden Shiner	9.3	8.5	8.5	-
25-Jul-21	Golden Shiner	-	8.8	8.6	total length not possible bitten off
25-Jul-21	Pearl Dace	11.3	11.9	15.6	-
25-Jul-21	Pearl Dace	11.3	10.6	14.8	-
25-Jul-21	Pearl Dace	11.5	11	16.9	-
25-Jul-21	Pearl Dace	12.5	11.8	20.1	-
25-Jul-21	Pearl Dace	11.6	10.9	15.2	-
25-Jul-21	Pearl Dace	10.4	9.8	12.3	-
25-Jul-21	Pearl Dace	11.6	10.9	14.6	-
25-Jul-21	Pearl Dace	12.2	11.5	20.3	-
25-Jul-21	Pearl Dace	11.9	11.2	16.9	-
25-Jul-21	Pearl Dace	12.2	11.6	17.2	-
25-Jul-21	Pearl Dace	10.2	10	11.5	-
25-Jul-21	Pearl Dace	12	11.4	15.8	-

Appendix Table A-1: Fish Data Measurements for Pinewood River Reference - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
25-Jul-21	Pearl Dace	11.7	11	13.7	-
25-Jul-21	Pearl Dace	10.4	9.8	11.8	-
25-Jul-21	Pearl Dace	12.3	11.6	16	-
25-Jul-21	Pearl Dace	11.4	10.8	14.7	-
25-Jul-21	Pearl Dace	11.1	10.5	13.5	-
25-Jul-21	Pearl Dace	12	11.3	11.8	-
25-Jul-21	Pearl Dace	13	12.3	18.4	-
25-Jul-21	Pearl Dace	11.9	11.3	15.4	-
25-Jul-21	Pearl Dace	11.6	11	11.7	-
25-Jul-21	Pearl Dace	10.8	10.2	9.9	-
25-Jul-21	Pearl Dace	12.2	11.7	19.8	-
25-Jul-21	Pearl Dace	12.1	11.4	13.9	-
25-Jul-21	Pearl Dace	10.4	9.8	6.9	-
26-Jul-21	Pearl Dace	10.8	10.3	13.3	-
26-Jul-21	Pearl Dace	12.6	11.9	18.2	-
26-Jul-21	Pearl Dace	10.9	10.3	12.2	-
26-Jul-21	Pearl Dace	12.1	11.4	15.8	-
26-Jul-21	Pearl Dace	10.6	10	10.9	-
26-Jul-21	Pearl Dace	9.2	8.6	6.9	-
26-Jul-21	Pearl Dace	10.6	10.3	10.8	-
26-Jul-21	Pearl Dace	9.2	8.7	5.8	-
26-Jul-21	Pearl Dace	8.4	8	5.6	-
26-Jul-21	Pearl Dace	7.5	7.1	3.8	-
26-Jul-21	Pearl Dace	9.3	8.8	6.5	-
26-Jul-21	Pearl Dace	8	7.6	4.3	-
26-Jul-21	Pearl Dace	10.8	10.2	9.9	-
26-Jul-21	Pearl Dace	8.1	7.6	4.6	-
26-Jul-21	Pearl Dace	8.5	8.1	5.1	-
26-Jul-21	Pearl Dace	8.2	7.8	5	-
26-Jul-21	Pearl Dace	9.5	9	8.4	-
26-Jul-21	Pearl Dace	10.8	10.2	10.5	-
26-Jul-21	Pearl Dace	10.6	10	9.8	-
26-Jul-21	Pearl Dace	9.5	8.8	7.3	-
26-Jul-21	Pearl Dace	10.2	9.6	12.5	-
26-Jul-21	Pearl Dace	9.7	9.3	8.2	-
26-Jul-21	Pearl Dace	8.6	8.1	5.4	-
26-Jul-21	Pearl Dace	8.8	8.3	5.9	-
26-Jul-21	Pearl Dace	9.5	8.9	8	-
26-Jul-21	Pearl Dace	8.8	8.3	6.3	-
26-Jul-21	Pearl Dace	7.5	7	3.4	-
26-Jul-21	Pearl Dace	9.1	8.6	6.6	-
26-Jul-21	Pearl Dace	9.4	8.9	7.2	-

Appendix Table A-1: Fish Data Measurements for Pinewood River Reference - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
26-Jul-21	Pearl Dace	9.1	8.7	6.5	-
26-Jul-21	Pearl Dace	7.9	7.5	4.3	-
26-Jul-21	Pearl Dace	8.2	7.7	4.7	-
26-Jul-21	Pearl Dace	8.6	8.1	5.8	-
26-Jul-21	Pearl Dace	7.1	6.8	3.2	-
26-Jul-21	Pearl Dace	8.8	8.4	6	-
26-Jul-21	Pearl Dace	7.8	7.5	5.6	-
26-Jul-21	Pearl Dace	7.9	7.6	5.5	-
26-Jul-21	Pearl Dace	8.4	8	6.1	-
26-Jul-21	Pearl Dace	9.3	8.9	7.7	-
26-Jul-21	Pearl Dace	8.1	7.6	5.8	-
26-Jul-21	Pearl Dace	7.6	7.2	5.1	-
26-Jul-21	Pearl Dace	7.8	7.5	4.6	-
26-Jul-21	Pearl Dace	5.8	5.3	1.6	-
26-Jul-21	Pearl Dace	5.9	5.6	1.8	-
26-Jul-21	Pearl Dace	5.4	5.1	1.4	-
26-Jul-21	Pearl Dace	5.7	5.3	1.4	-
26-Jul-21	Pearl Dace	5.6	5.3	1.2	-
27-Jul-21	Pearl Dace	5.2	4.8	1.5	-
27-Jul-21	Pearl Dace	10.2	9.6	9	-
27-Jul-21	Pearl Dace	8.1	7.7	4.7	-
28-Jul-21	Pearl Dace	8.2	7.7	4.2	-
28-Jul-21	Pearl Dace	7.8	7.4	4.2	-
28-Jul-21	Pearl Dace	7.1	6.7	3.6	-
28-Jul-21	Pearl Dace	7.2	-	3.5	-
25-Jul-21	White Sucker	24.7	23.2	161.9	-
25-Jul-21	White Sucker	24.6	23.2	144.5	-
25-Jul-21	White Sucker	23.1	21.9	129.1	-
25-Jul-21	White Sucker	24.5	23.2	150.4	-

Appendix Table A-2: Fish Data Measurements for Pinewood River Near-field - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
24-Jul-21	Blackside Darter	6.5	-	2.3	-
24-Jul-21	Blackside Darter	7.5	-	3.1	-
24-Jul-21	Blackside Darter	7.6	-	3.8	-
27-Jul-21	Blackside Darter	7	-	2.8	-
22-Jul-21	Brown Bullhead	17.1	16.6	72	-
22-Jul-21	Brown Bullhead	16.8	16.4	69.8	-
22-Jul-21	Brown Bullhead	16.1	15.7	61.2	-
22-Jul-21	Brown Bullhead	17.3	16.8	73.1	-
22-Jul-21	Brown Bullhead	17	16.5	76.1	-
22-Jul-21	Brown Bullhead	16.8	16.3	70.1	-
22-Jul-21	Brown Bullhead	13.2	13	34.8	-
22-Jul-21	Brown Bullhead	11.4	11.1	19.2	-
22-Jul-21	Brown Bullhead	10.6	10.3	15.4	-
22-Jul-21	Brown Bullhead	15	14.5	47.8	-
22-Jul-21	Brown Bullhead	10.3	10.1	14.9	-
24-Jul-21	Central Mudminnow	8.2	-	6.3	-
24-Jul-21	Central Mudminnow	8.4	-	6.6	-
26-Jul-21	Central Mudminnow	6	-	2.1	-
26-Jul-21	Central Mudminnow	3.3	-	0.3	-
26-Jul-21	Central Mudminnow	3.4	-	0.3	-
26-Jul-21	Central Mudminnow	8.5	-	6.5	-
24-Jul-21	Creek Chub	14.7	13.9	29.3	-
24-Jul-21	Creek Chub	17.1	16.2	44	-
27-Jul-21	Creek Chub	9.7	9.1	8.5	-
24-Jul-21	Finescale Dace	7.4	7	2.9	-
22-Jul-21	Golden Shiner	10.5	9.5	10.8	-
22-Jul-21	Golden Shiner	9.8	8.7	9.2	-
22-Jul-21	Golden Shiner	10.5	9.6	11.5	-
22-Jul-21	Golden Shiner	9.7	8.9	8.6	-
22-Jul-21	Golden Shiner	9.9	8.9	8.9	-
22-Jul-21	Golden Shiner	10.3	9.3	9.9	-
26-Jul-21	Golden Shiner	7.5	6.9	3.6	-
26-Jul-21	Golden Shiner	7.2	6.5	2.8	-
26-Jul-21	Golden Shiner	7	6.3	2.5	-
27-Jul-21	Golden Shiner	7.9	7.1	3.7	-
27-Jul-21	Golden Shiner	9	8.2	6.3	-
27-Jul-21	Golden Shiner	8.3	7.3	4.4	-
27-Jul-21	Golden Shiner	8	7.2	3.8	-
27-Jul-21	Golden Shiner	6.7	5.8	2.1	-
27-Jul-21	Golden Shiner	7.5	6.7	2.9	-
27-Jul-21	Golden Shiner	6.4	5.6	1.9	-
27-Jul-21	Golden Shiner	7.5	6.7	3	-

Appendix Table A-2: Fish Data Measurements for Pinewood River Near-field - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
27-Jul-21	Golden Shiner	7.3	6.6	2.9	-
27-Jul-21	Golden Shiner	6.9	6.2	2.6	-
27-Jul-21	Golden Shiner	8.3	7.6	4.8	-
27-Jul-21	Golden Shiner	7.7	6.9	3.6	-
27-Jul-21	Golden Shiner	8.6	7.8	5.2	-
27-Jul-21	Golden Shiner	7.5	6.7	3.1	-
27-Jul-21	Golden Shiner	8.2	7.3	4.2	-
27-Jul-21	Golden Shiner	7.4	6.7	3.1	-
27-Jul-21	Golden Shiner	8.8	7.9	5.1	-
27-Jul-21	Golden Shiner	8.2	7.4	3.8	-
27-Jul-21	Golden Shiner	6.7	5.6	2	-
27-Jul-21	Golden Shiner	8	7.3	4.1	-
27-Jul-21	Golden Shiner	7.5	6.7	3.3	-
27-Jul-21	Golden Shiner	7.1	6.4	2.9	-
27-Jul-21	Golden Shiner	9.7	8.7	7.3	-
27-Jul-21	Golden Shiner	8.7	7.7	5.3	-
27-Jul-21	Golden Shiner	9.2	8.3	6.7	-
27-Jul-21	Golden Shiner	6.1	5.5	1.6	-
27-Jul-21	Golden Shiner	7.4	6.6	3.2	-
27-Jul-21	Golden Shiner	7.8	7.1	4	-
27-Jul-21	Golden Shiner	7.2	6.5	3	-
27-Jul-21	Golden Shiner	7.8	7	3.8	-
27-Jul-21	Golden Shiner	7.2	6.4	3.4	-
27-Jul-21	Golden Shiner	8.4	7.5	4.6	-
27-Jul-21	Golden Shiner	7.2	6.5	2.6	-
27-Jul-21	Golden Shiner	7	6.2	2.8	-
27-Jul-21	Golden Shiner	8	7.1	3.5	-
27-Jul-21	Golden Shiner	6.6	5.8	2.2	-
27-Jul-21	Golden Shiner	6.7	6	2.2	-
27-Jul-21	Golden Shiner	7.9	7.2	4.3	-
27-Jul-21	Golden Shiner	8.4	7.5	4.8	-
27-Jul-21	Golden Shiner	7.9	7	4	-
27-Jul-21	Golden Shiner	7.1	6.5	3.1	-
27-Jul-21	Golden Shiner	7.9	7.1	3.9	-
27-Jul-21	Golden Shiner	7.2	6.5	2.9	-
27-Jul-21	Golden Shiner	7.8	7	3.4	-
27-Jul-21	Golden Shiner	6.4	5.8	2.1	-
27-Jul-21	Golden Shiner	7.5	6.7	3.4	-
27-Jul-21	Golden Shiner	9.1	8.1	6.3	-
27-Jul-21	Golden Shiner	4.6	4.1	0.7	-
27-Jul-21	Golden Shiner	4.1	3.7	0.4	-
27-Jul-21	Golden Shiner	3.4	3.2	0.3	-

Appendix Table A-2: Fish Data Measurements for Pinewood River Near-field - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
24-Jul-21	Johnny Darter	4.8	-	1.1	-
26-Jul-21	Johnny Darter	4.5	-	0.6	-
26-Jul-21	Johnny Darter	4.9	-	0.9	-
27-Jul-21	Johnny Darter	5.6	-	1	-
27-Jul-21	Johnny Darter	4.3	-	0.6	-
27-Jul-21	Johnny Darter	4.2	-	0.5	-
27-Jul-21	Johnny Darter	4.6	-	0.7	-
27-Jul-21	Johnny Darter	3.3	-	1.2	-
27-Jul-21	Johnny Darter	5.4	-	1.1	-
27-Jul-21	Johnny Darter	4.7	-	0.6	-
27-Jul-21	Johnny Darter	4.6	-	0.6	-
27-Jul-21	Johnny Darter	4.5	-	0.6	-
27-Jul-21	Johnny Darter	4.4	-	0.5	-
27-Jul-21	Johnny Darter	4	-	0.4	-
27-Jul-21	Johnny Darter	4.2	-	0.4	-
22-Jul-21	Northern Pike	20.2	19.3	58.6	-
22-Jul-21	Northern Pike	19.6	18.6	46.9	-
22-Jul-21	Northern Pike	36.7	34.3	280.8	-
22-Jul-21	Northern Pike	19.7	18.5	57.1	-
22-Jul-21	Northern Pike	35.1	33	270	-
22-Jul-21	Northern Pike	16.9	15.7	30.1	-
22-Jul-21	Northern Pike	16.7	15.6	28.5	-
22-Jul-21	Northern Pike	17.4	16.5	36.2	-
22-Jul-21	Northern Pike	18.7	17.9	38	-
22-Jul-21	Northern Pike	16.4	15.4	29.1	-
22-Jul-21	Northern Pike	22.3	21	81.5	-
22-Jul-21	Northern Pike	19.7	18.3	45.8	-
22-Jul-21	Northern Pike	18.6	17.6	39	-
22-Jul-21	Northern Pike	19.9	18.8	60.9	-
22-Jul-21	Northern Pike	18.7	17.6	39.9	-
22-Jul-21	Northern Pike	23.9	22.8	81.3	-
22-Jul-21	Northern Pike	-	15.6	25.8	-
22-Jul-21	Northern Pike	26.4	25.4	136.7	-
24-Jul-21	Northern Pike	16.6	15.7	22.8	-
27-Jul-21	Northern Pike	12.5	11.7	9.2	-
27-Jul-21	Northern Pike	48.5	45.5	640	-
27-Jul-21	Pearl Dace	9.2	8.8	6.1	-
27-Jul-21	Pearl Dace	5.1	4.7	1	-
27-Jul-21	Pearl Dace	5.5	5.1	1.3	-
27-Jul-21	Pearl Dace	5.8	5.3	1.5	-
27-Jul-21	Pearl Dace	5.8	5.4	1.6	-
27-Jul-21	Pearl Dace	5.7	5.3	1.6	-

Appendix Table A-2: Fish Data Measurements for Pinewood River Near-field - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
27-Jul-21	Pearl Dace	5	4.6	0.8	-
27-Jul-21	Pearl Dace	5.7	5.3	1.8	-
27-Jul-21	Pearl Dace	5.7	5.4	1.7	-
27-Jul-21	Pearl Dace	5.9	5.4	1.5	-
27-Jul-21	Pearl Dace	9.1	8.4	6	-
27-Jul-21	Pearl Dace	5.7	5.3	1.5	-
27-Jul-21	Pearl Dace	5.6	5.2	1.5	-
27-Jul-21	Pearl Dace	4.5	4.2	0.6	-
27-Jul-21	Pearl Dace	4.5	4.2	0.7	-
27-Jul-21	Pearl Dace	4.2	4	0.5	-
27-Jul-21	Pearl Dace	4.3	4	0.6	-
22-Jul-21	White Sucker	34.4	32.4	442.7	-
22-Jul-21	White Sucker	46.2	42.5	850	-
22-Jul-21	White Sucker	36.2	33.6	460	-
22-Jul-21	White Sucker	40.3	37.8	620	-
22-Jul-21	White Sucker	45.9	42.5	1000	-
22-Jul-21	White Sucker	44.8	41.5	940	-
22-Jul-21	White Sucker	38.6	35.8	520	-
22-Jul-21	White Sucker	41.9	39.4	680	-
22-Jul-21	White Sucker	23.6	22.3	129.8	-
22-Jul-21	White Sucker	45	43.2	880	-
22-Jul-21	White Sucker	37.8	35.3	580	-
22-Jul-21	White Sucker	33	30.9	404.8	-
22-Jul-21	White Sucker	23.9	22.4	152.8	-
22-Jul-21	White Sucker	22.2	20.8	110.7	-
22-Jul-21	White Sucker	10.9	10.2	12.6	-
24-Jul-21	White Sucker	43.6	40.6	800	-
24-Jul-21	White Sucker	24.9	23.7	183	-
24-Jul-21	White Sucker	15.2	14.4	38.2	-
24-Jul-21	White Sucker	13.6	13	26.4	-
24-Jul-21	White Sucker	13.6	12.7	24.5	-
24-Jul-21	White Sucker	16.5	15.5	44	-
24-Jul-21	White Sucker	13.1	12.3	21.5	-
27-Jul-21	White Sucker	40.2	37.6	600	-
27-Jul-21	White Sucker	42.9	39.7	720	-
27-Jul-21	White Sucker	40.5	38.7	740	-
27-Jul-21	White Sucker	12.9	12.3	20.5	-
27-Jul-21	White Sucker	13.6	12.8	23.6	-
27-Jul-21	White Sucker	10.7	10	12.3	-
27-Jul-21	White Sucker	14.4	13.6	29.9	-
27-Jul-21	White Sucker	10.3	9.7	10.6	-
27-Jul-21	White Sucker	11.5	10.7	14.2	-

Appendix Table A-2: Fish Data Measurements for Pinewood River Near-field - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
27-Jul-21	White Sucker	10.8	10.2	13	-
27-Jul-21	White Sucker	10	9.4	9.6	-
27-Jul-21	White Sucker	11.5	10.7	14.8	-
27-Jul-21	White Sucker	11.6	10.9	14.3	-

Appendix Table A-3: Fish Data Measurements for Pinewood River Far-field - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
21-Jul-21	Brown Bullhead	14.2	13.9	57.2	-
22-Jul-21	Brown Bullhead	12.7	12.5	26.3	-
22-Jul-21	Brown Bullhead	11.9	11.7	21.1	-
22-Jul-21	Brown Bullhead	11.9	11.6	21.9	-
22-Jul-21	Brown Bullhead	11.8	11.6	21.3	-
22-Jul-21	Brown Bullhead	14.5	14.3	43.4	-
22-Jul-21	Brown Bullhead	11.1	10.9	17.4	-
22-Jul-21	Brown Bullhead	16	15.8	62.6	-
23-Jul-21	Brown Bullhead	10.5	10.2	14	-
23-Jul-21	Brown Bullhead	12.8	12.6	29.4	-
23-Jul-21	Brown Bullhead	14.9	14.6	46.4	-
23-Jul-21	Brown Bullhead	13.8	13.5	36.6	-
23-Jul-21	Brown Bullhead	12.5	12.1	24.9	-
23-Jul-21	Brown Bullhead	14.1	13.8	3.8	-
22-Jul-21	Central Mudminnow	8.7	-	7.1	-
22-Jul-21	Central Mudminnow	9.2	-	8.3	-
22-Jul-21	Central Mudminnow	7	-	3.3	-
22-Jul-21	Central Mudminnow	5.5	5.2	1.3	-
22-Jul-21	Central Mudminnow	7.6	-	5.4	-
22-Jul-21	Central Mudminnow	8.5	-	6.6	-
22-Jul-21	Central Mudminnow	8.3	-	6.2	-
22-Jul-21	Central Mudminnow	4	-	0.6	-
23-Jul-21	Central Mudminnow	7.5	-	4	-
23-Jul-21	Central Mudminnow	7.4	-	4.1	-
23-Jul-21	Central Mudminnow	8.8	-	6.3	-
23-Jul-21	Central Mudminnow	10.8	-	14.2	-
23-Jul-21	Central Mudminnow	7.1	-	4	-
23-Jul-21	Central Mudminnow	7.6	-	4.3	-
23-Jul-21	Central Mudminnow	7.3	-	4.4	-
23-Jul-21	Central Mudminnow	7.9	-	5.3	-
23-Jul-21	Central Mudminnow	9	-	7.3	-
23-Jul-21	Central Mudminnow	8.6	-	6.7	-
23-Jul-21	Central Mudminnow	8.1	-	5.6	-
23-Jul-21	Central Mudminnow	9.4	-	9.6	-
23-Jul-21	Central Mudminnow	8.2	-	6	-
23-Jul-21	Central Mudminnow	9.1	-	7.4	-
23-Jul-21	Central Mudminnow	9.4	-	9	-
23-Jul-21	Central Mudminnow	7.2	-	4.1	-
23-Jul-21	Central Mudminnow	8	-	5.7	-
23-Jul-21	Central Mudminnow	4.5	-	0.7	-
23-Jul-21	Central Mudminnow	4.2	-	0.7	-
23-Jul-21	Central Mudminnow	3.9	-	0.5	-

Appendix Table A-3: Fish Data Measurements for Pinewood River Far-field - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
23-Jul-21	Central Mudminnow	3.9	-	0.5	-
23-Jul-21	Central Mudminnow	5.1	-	1.2	-
23-Jul-21	Creek Chub	13.6	12.8	24.1	-
23-Jul-21	Creek Chub	16.1	15.3	43.6	-
23-Jul-21	Creek Chub	15.3	14.5	39.5	-
23-Jul-21	Creek Chub	11.6	10.9	16.8	-
23-Jul-21	Creek Chub	11	10.4	14.3	-
23-Jul-21	Creek Chub	17.1	-	54.2	-
23-Jul-21	Creek Chub	11.6	-	18.5	-
21-Jul-21	Golden Shiner	10.4	9.4	9.7	-
23-Jul-21	Golden Shiner	7.5	6.7	3.4	-
23-Jul-21	Golden Shiner	7.7	6.9	3.9	-
23-Jul-21	Golden Shiner	13.1	11.8	21.4	-
23-Jul-21	Golden Shiner	9.1	8.2	6.6	-
21-Jul-21	Johnny Darter	5.8	-	1.5	-
21-Jul-21	Johnny Darter	4.7	-	0.4	-
21-Jul-21	Johnny Darter	5.8	-	1.4	-
21-Jul-21	Johnny Darter	2.9	-	0.1	-
21-Jul-21	Johnny Darter	2.5	-	0.1	-
21-Jul-21	Johnny Darter	2.5	-	0.1	-
21-Jul-21	Johnny Darter	2.5	-	0.1	-
22-Jul-21	Johnny Darter	4.5	-	0.6	-
22-Jul-21	Johnny Darter	4.3	-	0.6	-
22-Jul-21	Johnny Darter	2.6	-	0.1	-
23-Jul-21	Johnny Darter	3.1	-	0.2	-
23-Jul-21	Johnny Darter	4.1	-	0.4	-
23-Jul-21	Johnny Darter	2.3	-	0.1	-
23-Jul-21	Johnny Darter	2.5	-	0.1	-
23-Jul-21	Johnny Darter	2.8	-	0.2	-
23-Jul-21	Johnny Darter	6.2	-	1.6	-
23-Jul-21	Johnny Darter	5.2	-	0.8	-
23-Jul-21	Johnny Darter	5.4	-	1	-
23-Jul-21	Johnny Darter	4.9	-	0.8	-
23-Jul-21	Johnny Darter	4.8	-	0.8	-
23-Jul-21	Johnny Darter	4.7	-	0.6	-
23-Jul-21	Johnny Darter	4.6	-	0.7	-
23-Jul-21	Johnny Darter	2.6	-	0.1	-
23-Jul-21	Johnny Darter	5.5	-	1.3	-
23-Jul-21	Johnny Darter	4.5	-	0.6	-
23-Jul-21	Johnny Darter	5	-	0.8	-
23-Jul-21	Johnny Darter	4.7	-	0.7	-
21-Jul-21	Northern Pike	35	37	308.1	-

Appendix Table A-3: Fish Data Measurements for Pinewood River Far-field - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
21-Jul-21	Northern Pike	34.9	32.7	273.2	-
21-Jul-21	Northern Pike	18.9	17.8	38.4	-
21-Jul-21	Northern Pike	15.3	14.4	21.5	-
21-Jul-21	Northern Pike	14.9	14	14.7	-
21-Jul-21	Northern Pike	14.3	13.3	16.4	-
21-Jul-21	Northern Pike	16.3	15.3	32.2	-
21-Jul-21	Northern Pike	15.2	14.3	21.4	-
21-Jul-21	Northern Pike	15	14.5	21.3	-
21-Jul-21	Northern Pike	15.2	14.3	19.4	-
21-Jul-21	Northern Pike	14.5	13.6	19.8	-
21-Jul-21	Northern Pike	14.5	13.5	20.1	-
21-Jul-21	Northern Pike	14.3	13.7	16.4	-
21-Jul-21	Northern Pike	31.1	29.1	171.2	-
21-Jul-21	Northern Pike	32.1	30.3	186.2	-
21-Jul-21	Northern Pike	32.6	30.5	186.5	-
21-Jul-21	Northern Pike	13.8	13	13.1	-
21-Jul-21	Northern Pike	12.5	11.8	9.5	-
21-Jul-21	Northern Pike	9.7	9.1	4.8	-
23-Jul-21	Northern Pike	16.7	15.6	25	-
23-Jul-21	Northern Pike	15.3	14.4	18.7	-
23-Jul-21	Northern Pike	14.9	14.1	19.2	-
23-Jul-21	Northern Pike	11.1	10.4	7.1	-
23-Jul-21	Northern Pike	15.1	14.3	19.4	-
23-Jul-21	Northern Pike	16.7	15.7	23.3	-
21-Jul-21	Pearl Dace	5.8	5.3	1.5	-
21-Jul-21	Pearl Dace	5.1	4.8	1	-
23-Jul-21	Pearl Dace	6.2	5.7	1.8	-
23-Jul-21	Pearl Dace	10.3	9.7	10	-
21-Jul-21	River Darter	6.8	-	2.4	-
22-Jul-21	River Darter	16.7	-	2	-
23-Jul-21	River Darter	6.3	-	1.8	-
23-Jul-21	River Darter	6.9	-	2.6	-
23-Jul-21	River Darter	6.8	-	2.4	-
23-Jul-21	River Darter	6.5	-	2	-
23-Jul-21	River Darter	6.6	-	2.3	-
23-Jul-21	River Darter	7.5	-	3.5	-
23-Jul-21	River Darter	7.2	-	2.9	-
23-Jul-21	River Darter	6.7	-	2.5	-
23-Jul-21	River Darter	7.9	-	4.3	-
23-Jul-21	River Darter	6.9	-	2.7	-
23-Jul-21	River Darter	6.8	-	2.9	-
23-Jul-21	River Darter	6.7	-	2.6	-

Appendix Table A-3: Fish Data Measurements for Pinewood River Far-field - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
23-Jul-21	River Darter	7.3	-	3.2	-
23-Jul-21	River Darter	6.5	-	2.1	-
23-Jul-21	River Darter	6.4	-	2.1	-
23-Jul-21	River Darter	6.6	-	2.1	-
23-Jul-21	Rock Bass	11.6	11.1	29.3	-
23-Jul-21	Rock Bass	10.2	9.8	20.3	-
23-Jul-21	Rock Bass	11.3	10.9	31	-
23-Jul-21	Rock Bass	11.5	11.1	30.5	-
21-Jul-21	Trout Perch	11.1	9.8	13.2	-
21-Jul-21	Trout Perch	7.7	6.9	3.6	-
21-Jul-21	Trout Perch	8	7.2	4.2	-
21-Jul-21	Trout Perch	7.5	6.6	3.7	-
21-Jul-21	Trout Perch	7.3	6.6	3.3	-
22-Jul-21	Trout Perch	8.7	7.8	5.5	-
22-Jul-21	Trout Perch	8.7	7.8	5.4	-
22-Jul-21	Trout Perch	8.9	8	6.1	-
23-Jul-21	Trout Perch	8.7	7.8	5.9	-
23-Jul-21	Trout Perch	8.2	7.3	4.7	-
23-Jul-21	Trout Perch	8.6	7.7	5.6	-
23-Jul-21	Trout Perch	7.9	7.2	4.1	-
23-Jul-21	Trout Perch	9.5	8.6	6.4	-
23-Jul-21	Trout Perch	7.3	6.5	3.1	-
23-Jul-21	Trout Perch	7	6.3	2.7	-
23-Jul-21	Trout Perch	7.7	6.8	3.5	-
23-Jul-21	Trout Perch	8.3	7.4	4.7	-
23-Jul-21	Trout Perch	7	6.1	3.1	-
23-Jul-21	Trout Perch	7.1	6.2	2.9	-
23-Jul-21	Trout Perch	3.7	3.2	0.3	-
21-Jul-21	White Sucker	11.3	10.7	15.7	-
21-Jul-21	White Sucker	12.3	11.6	19.6	-
21-Jul-21	White Sucker	10.4	9.8	11.7	-
21-Jul-21	White Sucker	31.7	29.7	418.1	-
22-Jul-21	White Sucker	11.2	10.6	12.7	-
22-Jul-21	White Sucker	12.9	12.2	21.1	-
22-Jul-21	White Sucker	12.7	12	17.6	-
23-Jul-21	White Sucker	12.3	11.6	18.6	-
23-Jul-21	White Sucker	14.5	13.4	30.5	-
23-Jul-21	White Sucker	11.9	11.1	17.3	-
23-Jul-21	White Sucker	11.9	11.3	18.1	-
23-Jul-21	White Sucker	12.8	12.2	21.4	-
23-Jul-21	White Sucker	12.9	12.3	24.2	-
23-Jul-21	White Sucker	13.2	12.5	24.7	-

Appendix Table A-3: Fish Data Measurements for Pinewood River Far-field - July 2021

Processing Date	Fish Species	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Abnormalities
23-Jul-21	White Sucker	12.5	11.8	19.6	-
23-Jul-21	White Sucker	12.1	11.3	17.7	-
23-Jul-21	White Sucker	11.3	10.7	15.3	-
23-Jul-21	White Sucker	13.3	12.5	22.1	-
23-Jul-21	White Sucker	11.8	11.1	15.3	-
23-Jul-21	White Sucker	12.9	12.1	21.6	-
23-Jul-21	White Sucker	13.3	12.6	23.3	-
23-Jul-21	White Sucker	11.5	10.8	15.7	-
23-Jul-21	White Sucker	12.9	12.1	20.3	-
23-Jul-21	White Sucker	14.5	13.8	26.1	-
23-Jul-21	White Sucker	9.3	8.7	7	-
23-Jul-21	White Sucker	19	17.7	69.9	-
23-Jul-21	White Sucker	17.4	16.4	55.1	-
23-Jul-21	White Sucker	13	12.3	22.7	-
23-Jul-21	White Sucker	11.3	10.6	15.1	-
23-Jul-21	White Sucker	13.4	12.7	26.7	-
23-Jul-21	White Sucker	12.5	11.7	21.6	-

Appendix Table A-4: Common Shiner Data Measurements for Pinewood River Reference - July 2021

Processing Date	Fish Species	Fish ID	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Age Structure Collected	Age	Mercury Concentration (mg/kg ww)	Abnormalities
25-Jul-21	Common Shiner	PRREF-GN-01	11.3	10.4	11.513	Otolith	5	0.0631	-
25-Jul-21	Common Shiner	PRREF-GN-02	10.7	9.8	6.747	Otolith	4	0.0581	-
26-Jul-21	Common Shiner	PRREF-EF-03	13.3	12.2	23.365	Otolith	4	0.1200	-
27-Jul-21	Common Shiner	PRREF-SN-04	8.1	7.6	4.696	Otolith	3	0.0604	-
27-Jul-21	Common Shiner	PRREF-SN-05	7.4	7	3.789	Otolith	3	0.0786	-
27-Jul-21	Common Shiner	PRREF-SN-06	7.7	7.3	4.018	Otolith	3	0.0624	-
27-Jul-21	Common Shiner	PRREF-SN-07	7.3	6.7	3.928	Otolith	3	0.0910	-
27-Jul-21	Common Shiner	PRREF-SN-08	7.7	6.8	4.186	Otolith	3	0.0724	-
27-Jul-21	Common Shiner	PRREF-SN-09	7.2	6.8	3.276	Otolith	3	0.0616	-
27-Jul-21	Common Shiner	PRREF-SN-10	8.5	7.7	5.653	Otolith	3	0.2030	-
27-Jul-21	Common Shiner	PRREF-SN-11	6.5	6.2	2.749	Otolith	2	0.0491	-
27-Jul-21	Common Shiner	PRREF-SN-12	8.2	7.7	4.952	Otolith	4	0.0869	-
27-Jul-21	Common Shiner	PRREF-SN-13	7.7	7.3	4.470	Otolith	3	0.0853	-
27-Jul-21	Common Shiner	PRREF-SN-14	7.7	7.3	4.677	Otolith	3	0.0709	-
27-Jul-21	Common Shiner	PRREF-SN-15	7.4	7	3.808	Otolith	3	0.0437	-
27-Jul-21	Common Shiner	PRREF-SN-16	7.4	7	3.567	Otolith	3	0.0553	-
27-Jul-21	Common Shiner	PRREF-SN-17	7.1	6.7	3.241	Otolith	3	0.0842	-
27-Jul-21	Common Shiner	PRREF-SN-18	7.5	7.2	3.877	Otolith	3	0.0868	-
27-Jul-21	Common Shiner	PRREF-SN-19	7.6	7.1	3.786	Otolith	3	0.0680	-
27-Jul-21	Common Shiner	PRREF-SN-20	7.5	7.2	4.173	Otolith	2	0.0691	-
27-Jul-21	Common Shiner	PRREF-SN-21	7.5	7.1	3.800	Otolith	4	0.0810	-
27-Jul-21	Common Shiner	PRREF-SN-22	7.8	7.5	4.446	Otolith	3	0.0672	-
27-Jul-21	Common Shiner	PRREF-SN-23	6.9	6.5	2.922	Otolith	2	0.0806	-
27-Jul-21	Common Shiner	PRREF-SN-24	6.9	6.6	3.038	Otolith	2	0.0432	-
27-Jul-21	Common Shiner	PRREF-SN-25	6.9	6.6	3.134	Otolith	3	0.0505	-
27-Jul-21	Common Shiner	PRREF-SN-26	7.1	6.7	3.403	Otolith	3	0.0748	-
27-Jul-21	Common Shiner	PRREF-SN-27	7.4	7	3.679	Otolith	4	0.0774	-
27-Jul-21	Common Shiner	PRREF-SN-28	7.1	6.7	3.004	Otolith	3	0.0551	-
27-Jul-21	Common Shiner	PRREF-SN-29	7	6.6	3.137	Otolith	4	0.0565	-
27-Jul-21	Common Shiner	PRREF-SN-30	7.3	6.8	3.311	Otolith	3	0.0497	-

Appendix Table A-4: Common Shiner Data Measurements for Pinewood River Reference - July 2021

Processing Date	Fish Species	Fish ID	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Age Structure Collected	Age	Mercury Concentration (mg/kg ww)	Abnormalities
27-Jul-21	Common Shiner	PRREF-SN-31	7.6	7.2	4.136	Otolith	4	0.0684	-
27-Jul-21	Common Shiner	PRREF-SN-32	7.3	6.8	3.622	Otolith	2	0.0517	-
27-Jul-21	Common Shiner	PRREF-SN-33	7.7	6.8	4.093	Otolith	4	0.0760	-
27-Jul-21	Common Shiner	PRREF-SN-34	12.7	11.7	22.309	Otolith	4	0.1430	-
27-Jul-21	Common Shiner	PRREF-SN-35	7.5	7.1	3.821	Otolith	3	0.0907	-
27-Jul-21	Common Shiner	PRREF-SN-36	7.7	7.1	4.016	Otolith	4	0.0785	-
27-Jul-21	Common Shiner	PRREF-SN-37	7	6.6	3.373	Otolith	3	0.0665	-
27-Jul-21	Common Shiner	PRREF-SN-38	8.1	7.7	4.668	Otolith	4	0.1120	-
27-Jul-21	Common Shiner	PRREF-SN-39	8.2	7.7	4.942	Otolith	5	0.0921	-
27-Jul-21	Common Shiner	PRREF-SN-40	8.5	8.1	5.501	Otolith	4	0.0669	-
27-Jul-21	Common Shiner	PRREF-SN-41	7.8	7.4	4.244	Otolith	3	0.1010	-
27-Jul-21	Common Shiner	PRREF-SN-42	7.4	7	3.847	Otolith	4	0.0749	-
27-Jul-21	Common Shiner	PRREF-SN-43	7	6.6	3.448	Otolith	3	0.0768	-
27-Jul-21	Common Shiner	PRREF-SN-44	8.1	7.6	4.776	Otolith	3	0.0755	-
27-Jul-21	Common Shiner	PRREF-SN-45	7.5	7.2	4.352	Otolith	3	0.0663	-
27-Jul-21	Common Shiner	PRREF-SN-46	7.7	7.3	4.555	Otolith	3	0.0632	-
27-Jul-21	Common Shiner	PRREF-SN-47	7.7	7.2	3.988	Otolith	3	0.0746	-
27-Jul-21	Common Shiner	PRREF-SN-48	7.7	7.3	4.463	Otolith	3	0.0782	-
27-Jul-21	Common Shiner	PRREF-SN-49	6.9	6.6	3.602	Otolith	4	0.0656	-
27-Jul-21	Common Shiner	PRREF-SN-50	7.8	7.5	4.061	Otolith	4	0.0825	-
Total Sample Size			50	50	50	-	50	50	-
Average			7.9	7.4	4.923	-	3	0.0762	-
Median			7.6	7.1	4.002	-	3	0.0735	-
Standard Deviation			1.33	1.18	3.915	-	0.70	0.0262	-
Standard Error			0.19	0.17	0.554	-	0.10	0.0037	-
Minimum			6.5	6.2	2.749	-	2	0.0432	-
Maximum			13.3	12.2	23.365	-	5	0.2030	-

Appendix Table A-5: Common Shiner Data Measurements for Pinewood River Near-field - July 2021

Processing Date	Fish Species	Fish ID	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Age Structure Collected	Age	Mercury Concentration (mg/kg ww)	Abnormalities
22-Jul-21	Common Shiner	PRNF-GN-01	11.2	10.4	14.729	Otolith	4	0.1320	-
22-Jul-21	Common Shiner	PRNF-GN-02	11.9	10.8	18.810	Otolith	5	0.1510	-
22-Jul-21	Common Shiner	PRNF-GN-03	11.8	10.8	18.299	Otolith	5	0.1330	-
22-Jul-21	Common Shiner	PRNF-GN-04	11.4	10.5	16.070	Otolith	4	0.0764	-
22-Jul-21	Common Shiner	PRNF-GN-05	10.9	10	13.407	Otolith	3	0.1180	-
22-Jul-21	Common Shiner	PRNF-GN-06	10.8	9.8	12.816	Otolith	3	0.2010	-
22-Jul-21	Common Shiner	PRNF-GN-07	11.3	10.4	14.597	Otolith	4	0.1360	-
22-Jul-21	Common Shiner	PRNF-GN-08	11.4	10.4	14.947	Otolith	4	0.0951	-
24-Jul-21	Common Shiner	PRNF-MT-09	12.2	11.3	18.041	Otolith	4	0.1380	-
26-Jul-21	Common Shiner	PRNF-SN-10	8.2	7.5	4.000	Otolith	3	0.1640	-
27-Jul-21	Common Shiner	PRNF-SN-11	9.9	9	8.969	Otolith	3	0.2360	-
27-Jul-21	Common Shiner	PRNF-SN-12	9.9	9.1	9.253	Otolith	3	0.1250	-
27-Jul-21	Common Shiner	PRNF-SN-13	8.5	7.7	5.489	Otolith	3	0.1350	-
27-Jul-21	Common Shiner	PRNF-SN-14	8.6	7.8	5.688	Otolith	3	0.1780	-
27-Jul-21	Common Shiner	PRNF-SN-15	9	8.3	6.086	Otolith	3	0.2150	-
27-Jul-21	Common Shiner	PRNF-SN-16	8.6	7.9	5.575	Otolith	3	0.1300	-
27-Jul-21	Common Shiner	PRNF-SN-17	8.7	7.9	5.424	Otolith	3	0.2010	-
27-Jul-21	Common Shiner	PRNF-SN-18	9	8.3	6.171	Otolith	4	0.2100	-
27-Jul-21	Common Shiner	PRNF-SN-19	9.8	8.9	8.358	Otolith	3	0.1400	-
27-Jul-21	Common Shiner	PRNF-SN-20	8.3	7.6	4.570	Otolith	3	0.1260	-
27-Jul-21	Common Shiner	PRNF-SN-21	9.1	8.3	6.377	Otolith	3	0.2050	-
27-Jul-21	Common Shiner	PRNF-SN-22	8.3	7.5	4.916	Otolith	3	0.1200	-
27-Jul-21	Common Shiner	PRNF-SN-23	7.9	7.1	4.080	Otolith	3	0.1570	-
27-Jul-21	Common Shiner	PRNF-SN-24	8.5	7.7	5.232	Otolith	4	0.1800	-
27-Jul-21	Common Shiner	PRNF-SN-25	8.2	7.4	4.830	Otolith	4	0.2130	-
27-Jul-21	Common Shiner	PRNF-SN-26	8.5	7.8	5.145	Otolith	3	0.1760	-
27-Jul-21	Common Shiner	PRNF-SN-27	8.2	7.5	4.436	Otolith	3	0.1570	-
27-Jul-21	Common Shiner	PRNF-SN-28	7.9	7.1	4.094	Otolith	3	0.1450	-
27-Jul-21	Common Shiner	PRNF-SN-29	8.6	7.7	5.160	Otolith	4	0.1660	-
27-Jul-21	Common Shiner	PRNF-SN-30	7.7	7.1	3.885	Otolith	3	0.1950	-

Appendix Table A-5: Common Shiner Data Measurements for Pinewood River Near-field - July 2021

22-Jul-21	Common Shiner	PRNF-GN-01	11.2	10.4	14.729	Otolith	4	0.1320	-
27-Jul-21	Common Shiner	PRNF-SN-31	7.6	6.9	3.697	Otolith	3	0.1860	-
27-Jul-21	Common Shiner	PRNF-SN-32	8.2	7.3	4.347	Otolith	3	0.1560	-
27-Jul-21	Common Shiner	PRNF-SN-33	7.8	7	3.450	Otolith	3	0.1900	-
27-Jul-21	Common Shiner	PRNF-SN-34	8.5	7.7	4.904	Otolith	3	0.1750	-
27-Jul-21	Common Shiner	PRNF-SN-35	8	7.3	4.198	Otolith	3	0.1370	-
27-Jul-21	Common Shiner	PRNF-SN-36	7.8	7.1	3.848	Otolith	3	0.1540	-
27-Jul-21	Common Shiner	PRNF-SN-37	8.5	7.7	5.016	Otolith	3	0.1450	-
27-Jul-21	Common Shiner	PRNF-SN-38	9.7	8.8	7.271	Otolith	3	0.1200	-
27-Jul-21	Common Shiner	PRNF-SN-39	11.5	10.6	15.297	Otolith	4	0.1400	-
27-Jul-21	Common Shiner	PRNF-SN-40	11.7	10.8	14.605	Otolith	4	0.1250	-
27-Jul-21	Common Shiner	PRNF-SN-41	10	9.2	9.505	Otolith	3	0.0941	-
27-Jul-21	Common Shiner	PRNF-SN-42	11.3	10.5	13.311	Otolith	4	0.0962	-
27-Jul-21	Common Shiner	PRNF-SN-43	11.8	10.8	14.947	Otolith	5	0.1570	-
27-Jul-21	Common Shiner	PRNF-SN-44	11.3	10.3	13.787	Otolith	4	0.1270	-
27-Jul-21	Common Shiner	PRNF-SN-45	9.9	9	7.957	Otolith	3	0.1210	-
27-Jul-21	Common Shiner	PRNF-GN-46	12	11.1	16.641	Otolith	4	0.1440	-
27-Jul-21	Common Shiner	PRNF-SN-47	10.3	9.4	9.173	Otolith	3	0.1190	-
27-Jul-21	Common Shiner	PRNF-SN-48	12.5	11.4	18.915	Otolith	5	0.1260	-
27-Jul-21	Common Shiner	PRNF-SN-49	9.5	8.7	7.892	Otolith	4	0.1610	-
27-Jul-21	Common Shiner	PRNF-SN-50	12.2	11.2	19.653	Otolith	4	0.1310	-
27-Jul-21	Common Shiner	-	8.4	7.6	4.700	-	-	-	-
27-Jul-21	Common Shiner	-	7.3	6.6	3.100	-	-	-	-
27-Jul-21	Common Shiner	-	7.2	6.6	2.900	-	-	-	-
27-Jul-21	Common Shiner	-	9.3	8.5	7.100	-	-	-	-
27-Jul-21	Common Shiner	-	12.2	11.1	16.700	-	-	-	-
27-Jul-21	Common Shiner	-	9.2	8.4	6.300	-	-	-	-
27-Jul-21	Common Shiner	-	10.3	9.5	9.600	-	-	-	-
27-Jul-21	Common Shiner	-	9.3	8.5	6.500	-	-	-	-
27-Jul-21	Common Shiner	-	8.8	8.1	4.900	-	-	-	-
27-Jul-21	Common Shiner	-	8.7	8	5.600	-	-	-	-
27-Jul-21	Common Shiner	-	8.3	7.6	4.700	-	-	-	-
27-Jul-21	Common Shiner	-	8.7	8	6.200	-	-	-	-

Appendix Table A-5: Common Shiner Data Measurements for Pinewood River Near-field - July 2021

22-Jul-21	Common Shiner	PRNF-GN-01	11.2	10.4	14.729	Otolith	4	0.1320	-
27-Jul-21	Common Shiner	-	9.7	8.8	7.600	-	-	-	-
27-Jul-21	Common Shiner	-	11	10	11.800	-	-	-	-
27-Jul-21	Common Shiner	-	10.4	9.5	9.600	-	-	-	-
27-Jul-21	Common Shiner	-	8.9	8.1	6.400	-	-	-	-
27-Jul-21	Common Shiner	-	9.2	8.3	6.000	-	-	-	-
27-Jul-21	Common Shiner	-	8.2	7.4	4.400	-	-	-	-
27-Jul-21	Common Shiner	-	9.1	8.3	6.200	-	-	-	-
27-Jul-21	Common Shiner	-	7.8	7.1	4.200	-	-	-	-
Total Sample Size			70	70	70	-	50	50	-
Average			9.5	8.7	8.462	-	3	0.1512	-
Median			9.1	8.3	6.250	-	3	0.1445	-
Standard Deviation			1.47	1.38	4.821	-	0.65	0.0351	-
Standard Error			0.18	0.16	0.576	-	0.09	0.0050	-
Minimum			7.2	6.6	2.900	-	3	0.0764	-
Maximum			12.5	11.4	19.653	-	5	0.2360	-

Appendix Table A-6: Common Shiner Data Measurements for Pinewood River Far-field - July 2021

Processing Date	Fish Species	Fish ID	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Age Structure Collected	Age	Mercury Concentration (mg/kg ww)	Abnormalities
20-Jul-21	Common Shiner	PRNF-GN-01	10.2	9.8	10.655	Otolith	4	0.0854	growth where caudal meets body, right side
23-Jul-21	Common Shiner	PRNF-GN-02	12.2	11.3	23.977	Otolith	5	0.0767	-
23-Jul-21	Common Shiner	PRNF-GN-03	13.1	12	27.474	Otolith	5	0.1220	-
23-Jul-21	Common Shiner	PRNF-GN-04	13.2	12.3	24.788	Otolith	5	0.0840	-
23-Jul-21	Common Shiner	PRNF-GN-05	11.4	10.4	16.464	Otolith	5	0.0914	-
23-Jul-21	Common Shiner	PRNF-GN-06	12.4	11.4	23.958	Otolith	3	0.1130	-
23-Jul-21	Common Shiner	PRNF-GN-07	11.5	10.5	18.567	Otolith	3	0.0849	-
23-Jul-21	Common Shiner	PRNF-GN-08	13	11.9	24.073	Otolith	5	0.0767	-
23-Jul-21	Common Shiner	PRNF-MT-09	11.7	10.6	16.067	Otolith	5	0.1240	-
23-Jul-21	Common Shiner	PRNF-SN-10	10.7	9.9	12.451	Otolith	3	0.1500	-
23-Jul-21	Common Shiner	PRNF-SN-11	13.5	12.3	26.179	Otolith	5	0.0909	-
Total Sample Size			11	11	11	-	11	11	-
Average			12.1	11.1	20.423	-	4	0.0999	-
Median			12.2	11.3	23.958	-	5	0.0909	-
Standard Deviation			1.08	0.93	5.809	-	0.92	0.0238	-
Standard Error			0.33	0.28	1.751	-	0.28	0.0072	-
Minimum			10.2	9.8	10.655	-	3	0.0767	-
Maximum			13.5	12.3	27.474	-	5	0.1500	-

Appendix Table A-7: Detailed Gill Net Data in Pinewood River - July 2021

Area	Gill Net ID	UTM (NAD 83, 15U)		Set Date	Lift Date	Set Time	Lift Time	Effort (Hours)	Total CPUE	Depth (m)	Net Length (ft)	Mesh Size (Inches)	Brown Bullhead			Central Mudminnow			Common Shiner			Creek Chub			Golden Shiner		
		North	East										Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE
Pinewood River Reference	REF-GN-01	5407685	430648	24-Jul-21	25-Jul-21	14:20	10:00	19.67	0.67	2.5	100	1, 2, 3	0	1	0.01	0	24	0.20	0	2	0.02	0	8	0.07	0	9	0.07
	REF-GN-02	5407653	430672	24-Jul-21	25-Jul-21	14:30	10:20	19.83		2.5	75	1															
	REF-GN-03	5407634	430875	24-Jul-21	25-Jul-21	14:40	10:40	20.00		1.5	150	1, 2, 3, 4															
	REF-GN-04	5407672	430940	24-Jul-21	25-Jul-21	14:50	11:00	20.17		1.5	75	1															
	REF-GN-05	5407698	430977	24-Jul-21	25-Jul-21	15:10	11:25	20.25		2.0	150	1, 2, 3, 4															
	REF-GN-06	5407710	430984	24-Jul-21	25-Jul-21	15:30	11:40	20.17		2.5	150	1, 2, 3, 4															
Total								120.08	0.67		700		0	1	0.01	0	24	0.20	0	2	0.02	0	8	0.07	0	9	0.07
Pinewood River Near-field	NF-GN-01	5408087	419884	21-Jul-21	22-Jul-21	13:00	10:15	21.75	0.28	2.0	75	1	0	5	0.23	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	NF-GN-02	5408119	419776	21-Jul-21	22-Jul-21	13:20	11:00	22.00	0.82	2.0	150	1, 2, 3, 4	0	0	0.00	0	0	0.00	0	2	0.09	0	0	0.00	0	4	0.18
	NF-GN-03	5408043	419720	21-Jul-21	22-Jul-21	13:40	11:20	21.33	0.52	2.0	150	1, 2, 3, 4	0	0	0.00	0	0	0.00	0	5	0.23	0	0	0.00	0	0	0.00
	NF-GN-04	5408120	419507	21-Jul-21	22-Jul-21	11:00	8:45	21.25	0.42	2.0	100	1, 2, 3	5	0	0.24	0	0	0.00	1	0	0.05	0	0	0.00	0	2	0.09
	NF-GN-05	5408095	419526	21-Jul-21	22-Jul-21	11:20	9:20	21.67	0.14	2.0	75	1	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	NF-GN-06	5408068	419565	21-Jul-21	22-Jul-21	12:30	9:50	21.67	0.55	2.0	150	1, 2, 3, 4	1	0	0.05	0	0	0.00	0	1	0.05	0	0	0.00	0	0	0.00
Total								129.67	0.46		700		6	5	0.08	0	0	0.00	1	8	0.07	0	0	0.00	0	6	0.05
Pinewood River Far-field	FF-GN-01	5407160	414897	20-Jul-21	21-Jul-21	13:30	8:30	19.00	0.47	1.25	100	1, 2, 3	0	1	0.05	0	0	0.00	0	4	0.21	0	0	0.00	0	0	0.00
	FF-GN-02	5407148	414907	20-Jul-21	21-Jul-21	13:50	8:40	18.83	0.32	0.75	75	1	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	FF-GN-03	5407058	414838	20-Jul-21	21-Jul-21	14:10	8:55	18.75	0.37	1.25	150	1, 2, 3, 4	0	0	0.00	0	0	0.00	0	4	0.21	0	0	0.00	0	0	0.00
	FF-GN-04	5405692	412957	20-Jul-21	21-Jul-21	15:00	9:15	18.25	0.16	1.00	75	1	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	FF-GN-05	5405681	412988	20-Jul-21	21-Jul-21	9:30	9:30	24.00	0.17	1.25	150	1, 2, 3, 4	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	1	0.04
	FF-GN-06	5405676	413026	20-Jul-21	21-Jul-21	14:20	9:45	19.42	0.26	1.50	150	1, 2, 3, 4	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
Total								118.25	0.29		700		0	1	0.01	0	0	0.00	0	8	0.07	0	0	0.00	0	1	0.01

Note: Catch per unit effort (CPUE) is calculated as the number of fish caught per gill net set

Appendix Table A-7: Detailed Gill Net Data in Pinewood River - July 2021

Area	Gill Net ID	UTM (NAD 83, 15U)		Set Date	Lift Date	Set Time	Lift Time	Effort (Hours)	Total CPUE	Depth (m)	Net Length (ft)	Mesh Size (Inches)	Golden Shiner			Northern Pike			Pearl Dace			Trout Perch			White Sucker			Total Fish
		North	East										Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	
Pinewood River Reference	REF-GN-01	5407685	430648	24-Jul-21	25-Jul-21	14:20	10:00	19.67	0.67	2.5	100	1, 2, 3	0	9	0.07	0	0	0.00	0	33	0.27	0	0	0.00	0	4	0.03	81
	REF-GN-02	5407653	430672	24-Jul-21	25-Jul-21	14:30	10:20	19.83		2.5	75	1																
	REF-GN-03	5407634	430875	24-Jul-21	25-Jul-21	14:40	10:40	20.00		1.5	150	1, 2, 3, 4																
	REF-GN-04	5407672	430940	24-Jul-21	25-Jul-21	14:50	11:00	20.17		1.5	75	1																
	REF-GN-05	5407698	430977	24-Jul-21	25-Jul-21	15:10	11:25	20.25		2.0	150	1, 2, 3, 4																
	REF-GN-06	5407710	430984	24-Jul-21	25-Jul-21	15:30	11:40	20.17		2.5	150	1, 2, 3, 4																
Total									120.08	0.67		700	0	9	0.07	0	0	0.00	0	33	0.27	0	0	0.00	0	4	0.03	81
Pinewood River Near-field	NF-GN-01	5408087	419884	21-Jul-21	22-Jul-21	13:00	10:15	21.75	0.28	2.0	75	1	0	0	0.00	0	1	0.05	0	0	0.00	0	0	0.00	0	0	0.00	6
	NF-GN-02	5408119	419776	21-Jul-21	22-Jul-21	13:20	11:00	22.00	0.82	2.0	150	1, 2, 3, 4	0	4	0.18	5	7	0.55	0	0	0.00	0	0	0.00	0	0	0.00	18
	NF-GN-03	5408043	419720	21-Jul-21	22-Jul-21	13:40	11:20	21.33	0.52	2.0	150	1, 2, 3, 4	0	0	0.00	0	1	0.05	0	0	0.00	0	0	0.00	0	5	0.23	11
	NF-GN-04	5408120	419507	21-Jul-21	22-Jul-21	11:00	8:45	21.25	0.42	2.0	100	1, 2, 3	0	2	0.09	0	1	0.05	0	0	0.00	0	0	0.00	0	0	0.00	9
	NF-GN-05	5408095	419526	21-Jul-21	22-Jul-21	11:20	9:20	21.67	0.14	2.0	75	1	0	0	0.00	0	1	0.05	0	0	0.00	0	0	0.00	2	0	0.09	3
	NF-GN-06	5408068	419565	21-Jul-21	22-Jul-21	12:30	9:50	21.67	0.55	2.0	150	1, 2, 3, 4	0	0	0.00	1	1	0.09	0	0	0.00	0	0	0.00	3	5	0.37	12
Total									129.67	0.46		700	0	6	0.05	6	12	0.14	0	0	0.00	0	0	0.00	5	10	0.12	59
Pinewood River Far-field	FF-GN-01	5407160	414897	20-Jul-21	21-Jul-21	13:30	8:30	19.00	0.47	1.25	100	1, 2, 3	0	0	0.00	0	4	0.21	0	0	0.00	0	0	0.00	0	0	0.00	9
	FF-GN-02	5407148	414907	20-Jul-21	21-Jul-21	13:50	8:40	18.83	0.32	0.75	75	1	0	0	0.00	0	3	0.16	0	0	0.00	0	1	0.05	2	0	0.11	6
	FF-GN-03	5407058	414838	20-Jul-21	21-Jul-21	14:10	8:55	18.75	0.37	1.25	150	1, 2, 3, 4	0	0	0.00	1	0	0.05	0	0	0.00	0	0	0.00	2	0	0.11	7
	FF-GN-04	5405692	412957	20-Jul-21	21-Jul-21	15:00	9:15	18.25	0.16	1.00	75	1	0	0	0.00	0	2	0.11	0	0	0.00	0	0	0.00	1	0	0.05	3
	FF-GN-05	5405681	412988	20-Jul-21	21-Jul-21	9:30	9:30	24.00	0.17	1.25	150	1, 2, 3, 4	0	1	0.04	0	3	0.13	0	0	0.00	0	0	0.00	0	0	0.00	4
	FF-GN-06	5405676	413026	20-Jul-21	21-Jul-21	14:20	9:45	19.42	0.26	1.50	150	1, 2, 3, 4	0	0	0.00	1	3	0.21	0	0	0.00	0	0	0.00	0	1	0.05	5
Total									118.25	0.29		700	0	1	0.01	2	15	0.14	0	0	0.00	0	1	0.01	5	1	0.05	34

Note: Catch per unit effort (CPUE) is calculated as the number of fish caught per gill net set

Appendix Table A-8: Detailed Electrofishing Data in Pinewood River - July 2021

Area	UTM (NAD 83, 15U)		Date	Pass	Effort (sec)	Total CPUE	Blackside Darter	Brassy Minnow	Brook Stickleback	Brown Bullhead	Central Mudminnow	Common Shiner	Creek Chub	Fathead Minnow	Finescale Dace
	North	East													
Pinewood River Reference	5407715	430664	26-Jul-21	Pass 1	4017	0.66	0	7	6	1	4	1	0	1	19
	Total				4017	0.66	0	7	6	1	4	1	0	1	19
Pinewood River Near-field	5408087	419450	24-Jul-21	Pass 1	1283	0.61	3	0	0	0	2	0	0	0	0
	5408049	419720	24-Jul-21	Pass 2	1011	0.00	0	0	0	0	0	0	0	0	0
	5408036	419444	24-Jul-21	Pass 3	1127	0.00	0	0	0	0	0	0	0	0	0
	Total				3421	0.23	3	0	0	0	2	0	0	0	0
Pinewood River Far-field	5407140	414859	23-Jul-21	Pass 1	1200	2.70	0	0	0	0	21	1	2	0	0
	5407092	415565	23-Jul-21	Pass 2	1138	0.53	0	0	0	0	1	1	2	0	1
	5405727	412873	23-Jul-21	Pass 3	1130	2.02	0	0	0	0	0	2	0	0	0
	Total				3468	1.76	0	0	0	0	22	4	4	0	1

Area	UTM (NAD 83, 15U)		Date	Pass	Effort (sec)	Total CPUE	Golden Shiner	Johnny Darter	Northern Pike	Pearl Dace	River Darter	Rock Bass	Trout Perch	White Sucker	Total Fish
	North	East													
Pinewood River Reference	5407715	430664	26-Jul-21	Pass 1	4017	0.66	0	0	0	5	0	0	0	0	44
	Total				4017	0.66	0	0	0	5	0	0	0	0	44
Pinewood River Near-field	5408087	419450	24-Jul-21	Pass 1	1283	0.61	0	1	0	0	0	0	0	7	13
	5408049	419720	24-Jul-21	Pass 2	1011	0.00	0	0	0	0	0	0	0	0	0
	5408036	419444	24-Jul-21	Pass 3	1127	0.00	0	0	0	0	0	0	0	0	0
	Total				3421	0.23	0	1	0	0	0	0	0	7	13
Pinewood River Far-field	5407140	414859	23-Jul-21	Pass 1	1200	2.70	0	4	3	0	5	0	0	18	54
	5407092	415565	23-Jul-21	Pass 2	1138	0.53	1	1	0	0	3	0	0	0	10
	5405727	412873	23-Jul-21	Pass 3	1130	2.02	0	7	2	1	8	4	8	6	38
	Total				3468	1.76	1	12	5	1	16	4	8	24	102

Note: Catch per unit effort (CPUE) is calculated as the number of fish caught per 60s of efishing effort

Appendix Table A-9: Detailed Seine Net Data in Pinewood River - July 2021

Area	Seine Net ID	UTM (NAD 83, 15U)		Date	Time	Area Seined (m2)	Total CPUE	Blackside Darter			Brook Stickleback			Brown Bullhead			Central Mudminnow			Common Shiner			Creek Chub			Fathead Minnow			Finescale Dace			Golden Shiner		
		North	East					Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE
Pinewood River Reference	REF-SN-01	5407705	430640	27-Jul-21	20:50	40	1.13	0	0	0.00	35	0	0.88	0	0	0.00	2	0	0.05	0	0	0.00	0	0	0.00	1	0	0.03	1	0	0.03	0	0	0.00
	REF-SN-02	5407709	430656	27-Jul-21	21:00	40	16.23	0	0	0.00	574	0	14.35	0	0	0.00	4	0	0.10	0	50	1.25	1	0	0.03	8	0	0.20	2	0	0.05	0	0	0.00
	REF-SN-03	5407652	430859	28-Jul-21	10:10	40	14.40	0	0	0.00	7	567	14.35	0	0	0.00	2	0	0.05	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	REF-SN-04	5407612	430797	28-Jul-21	13:40	40	0.55	0	0	0.00	14	0	0.35	0	0	0.00	7	0	0.18	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	REF-SN-05	5407630	430777	28-Jul-21	14:00	50	1.28	0	0	0.00	54	0	1.08	0	0	0.00	5	0	0.10	0	0	0.00	0	0	0.00	1	0	0.02	0	0	0.00	0	0	0.00
	REF-SN-06	5407612	430711	28-Jul-21	14:20	40	0.23	0	0	0.00	7	0	0.18	0	0	0.00	1	0	0.03	0	0	0.00	0	0	0.00	0	0	0.00	1	0	0.03	0	0	0.00
	REF-SN-07	5407670	430655	28-Jul-21	14:40	50	3.26	0	0	0.00	43	0	0.86	0	0	0.00	1	0	0.02	0	0	0.00	0	0	0.00	1	0	0.02	107	0	2.14	0	0	0.00
	REF-SN-08	5407693	430637	28-Jul-21	15:30	40	0.98	0	0	0.00	26	0	0.65	0	0	0.00	1	0	0.03	0	0	0.00	0	0	0.00	1	0	0.03	0	0	0.00	0	0	0.00
	REF-SN-09	5407712	430667	28-Jul-21	16:00	40	0.60	0	0	0.00	23	0	0.58	0	0	0.00	1	0	0.03	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
Total						380	4.19	0	0	0.00	783	567	3.55	0	0	0.00	24	0	0.06	0	50	0.13	1	0	0.00	12	0	0.03	111	0	0.29	0	0	0.00
Pinewood River Near-Field	NF-SN-01	5408042	419439	26-Jul-21	21:00	48	0.04	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	NF-SN-02	5408087	419449	26-Jul-21	21:10	48	0.06	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	3	0	0.06
	NF-SN-03	5408117	419481	26-Jul-21	21:20	40	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	NF-SN-04	5408115	419523	26-Jul-21	21:35	48	0.15	0	0	0.00	0	0	0.00	0	0	0.00	5	0	0.10	0	1	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	NF-SN-05	5408079	419596	27-Jul-21	13:40	60	0.75	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	21	0.35	0	0	0.00	0	0	0.00	0	0	0.00	11	0	0.18
	NF-SN-06	5408074	419655	27-Jul-21	14:20	48	1.50	1	0	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	9	0.19	0	0	0.00	0	0	0.00	0	0	0.00	39	0	0.81
	NF-SN-07	5408041	419646	27-Jul-21	15:00	48	2.27	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	39	0.81	1	0	0.02	0	0	0.00	0	0	0.00	8	0	0.17
	NF-SN-08	5408036	419720	27-Jul-21	16:00	72	0.60	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	NF-SN-09	5408109	419788	27-Jul-21	16:20	50	0.82	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
Total						462	0.70	1	0	0.00	0	0	0.00	0	0	0.00	5	0	0.01	0	70	0.15	1	0	0.00	0	0	0.00	0	0	0.00	61	0	0.13
Pinewood River Far-field	FF-SN-01	5407161	414889	20-Jul-21	16:30	90	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	2	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	FF-SN-02	5407150	414873	21-Jul-21	10:50	90	0.11	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	FF-SN-03	5407145	414868	21-Jul-21	12:30	90	0.07	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	FF-SN-04	5407144	414869	22-Jul-21	13:30	90	0.43	0	0	0.00	0	0	0.00	5	0	0.06	4	0	0.04	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	FF-SN-05	5407142	414861	22-Jul-21	13:00	100	0.09	0	0	0.00	0	0	0.00	2	0	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	FF-SN-06	5407116	414863	23-Jul-21	14:30	72	3.63	0	0	0.00	0	0	0.00	4	0	0.06	0	0	0.00	0	6	0.08	1	0	0.01	0	0	0.00	0	0	0.00	0	0	0.00
	FF-SN-07	5407077	414845	23-Jul-21	14:45	60	0.08	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	2	0	0.03	2	0	0.03
	FF-SN-08	5407077	414845	23-Jul-21	15:10	75	0.12	0	0	0.00	0	0	0.00	2	0	0.03	0	0	0.00	0	0	0.00	2	0	0.03	0	0	0.00	1	0	0.01	1	0	0.01
	FF-SN-09	5407077	414845	23-Jul-21	15:35	100	0.24	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
Total						767	0.48	0	0	0.00	0	0	0.00	13	0	0.02	4	0	0.01	0	8	0.01	3	0	0.00	0	0	0.00	3	0	0.00	3	0	0.00

iculated as the number of fish caught per area seined

Appendix Table A-9: Detailed Seine Net Data in Pinewood River - July 2021

Area	Seine Net ID	UTM		Date	Time	Area Seined (m2)	Total CPUE	Johnny Darter			Northern Pike			Pearl Dace			River Darter		Trout Perch		White Sucker		YOY Cyprinid			Total Fish
		North	East					Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	
Pinewood River Reference	REF-SN-01	5407705	430640	27-Jul-21	20:50	40	1.13	0	0	0.00	0	0	0.00	1	0	0.03	0	0	0.00	0	0	0.00	0	0	0.00	45
	REF-SN-02	5407709	430656	27-Jul-21	21:00	40	16.23	0	0	0.00	0	0	0.00	2	0	0.05	0	0	0.00	0	0	0.00	0	0	0.00	649
	REF-SN-03	5407652	430859	28-Jul-21	10:10	40	14.40	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	576
	REF-SN-04	5407612	430797	28-Jul-21	13:40	40	0.55	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	22
	REF-SN-05	5407630	430777	28-Jul-21	14:00	50	1.28	0	0	0.00	0	0	0.00	2	0	0.04	0	0	0.00	0	0	0.00	0	0	0.00	64
	REF-SN-06	5407612	430711	28-Jul-21	14:20	40	0.23	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	9
	REF-SN-07	5407670	430655	28-Jul-21	14:40	50	3.26	0	0	0.00	0	0	0.00	1	0	0.02	0	0	0.00	0	0	0.00	0	0	0.00	163
	REF-SN-08	5407693	430637	28-Jul-21	15:30	40	0.98	0	0	0.00	0	0	0.00	1	0	0.03	0	0	0.00	0	0	0.00	0	0	0.00	39
	REF-SN-09	5407712	430667	28-Jul-21	16:00	40	0.60	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	24
Total						380	4.19	0	0	0.00	0	0	0.00	7	0	0.02	0	0	0.00	0	0	0.00	36	0	0.09	1591
Pinewood River Near-Field	NF-SN-01	5408042	419439	26-Jul-21	21:00	48	0.04	2	0	0.04	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	2
	NF-SN-02	5408087	419449	26-Jul-21	21:10	48	0.06	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	3
	NF-SN-03	5408117	419481	26-Jul-21	21:20	40	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0
	NF-SN-04	5408115	419523	26-Jul-21	21:35	48	0.15	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	7
	NF-SN-05	5408079	419596	27-Jul-21	13:40	60	0.75	0	0	0.00	1	0	0.02	7	0	0.12	0	0	0.00	0	0	0.00	0	0	0.00	45
	NF-SN-06	5408074	419655	27-Jul-21	14:20	48	1.50	4	0	0.08	1	0	0.02	3	0	0.06	0	0	0.00	0	0	0.00	4	0	0.08	72
	NF-SN-07	5408041	419646	27-Jul-21	15:00	48	2.27	8	0	0.17	0	0	0.00	7	0	0.15	0	0	0.00	0	0	0.00	9	0	0.19	109
	NF-SN-08	5408036	419720	27-Jul-21	16:00	72	0.60	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	43
	NF-SN-09	5408109	419788	27-Jul-21	16:20	50	0.82	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	41
Total						462	0.70	14	0	0.03	2	0	0.00	17	0	0.04	0	0	0.00	0	0	0.00	13	0	0.03	322
Pinewood River Far-field	FF-SN-01	5407161	414889	20-Jul-21	16:30	90	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	2
	FF-SN-02	5407150	414873	21-Jul-21	10:50	90	0.11	2	0	0.02	2	0	0.02	2	0	0.02	1	0	0.01	3	0	0.03	0	0	0.00	10
	FF-SN-03	5407145	414868	21-Jul-21	12:30	90	0.07	5	0	0.06	0	0	0.00	0	0	0.00	0	0	0.00	1	0	0.01	0	0	0.00	6
	FF-SN-04	5407144	414869	22-Jul-21	13:30	90	0.43	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	39
	FF-SN-05	5407142	414861	22-Jul-21	13:00	100	0.09	3	0	0.03	0	0	0.00	0	0	0.00	0	0	0.00	3	0	0.03	0	0	0.00	9
	FF-SN-06	5407116	414863	23-Jul-21	14:30	72	3.63	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	261
	FF-SN-07	5407077	414845	23-Jul-21	14:45	60	0.08	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	5
	FF-SN-08	5407077	414845	23-Jul-21	15:10	75	0.12	0	0	0.00	1	0	0.01	1	0	0.01	0	0	0.00	0	0	0.00	0	0	0.00	9
	FF-SN-09	5407077	414845	23-Jul-21	15:35	100	0.24	5	0	0.05	0	0	0.00	0	0	0.00	0	0	0.00	4	0	0.04	0	0	0.00	24
Total						767	0.48	15	0	0.02	3	0	0.00	3	0	0.00	1	0	0.00	11	0	0.01	0	0	0.00	365

1 Calculated as the number of fish caught per area seined

Appendix Table A-10: Detailed Minnow Trap Data in Pinewood River - July 2021

Area	Minnow Trap ID	UTM (NAD 83, 15U)		Set Date	Lift Date	Set Time	Lift Time	Traps (#)	Effort (hours)	Total CPUE	Brassy Minnow			Brook Stickleback			Central Mudminnow			Common Shiner			Creek Chub			Finescale Dace		
		Catch	Mortality								CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE		
Pinewood River Reference	REF-MT-01	5407685	430648	24-Jul-21	26-Jul-21	12:30	13:00	3	145	1.36	0	7	0.01	0	4	0.01	0	27	0.04	0	1	0.00	0	0	0.00	58	794	1.16
	REF-MT-02	5407653	430672	24-Jul-21	26-Jul-21	12:40	13:20	3	146																			
	REF-MT-03	5407634	430875	24-Jul-21	26-Jul-21	12:50	13:50	3	147																			
	REF-MT-04	5407672	430940	24-Jul-21	26-Jul-21	13:00	14:00	3	147																			
	REF-MT-05	5407698	430977	24-Jul-21	26-Jul-21	13:20	14:30	3	147																			
	Total								15	733	1.36	0	7	0.01	0	4	0.01	0	27	0.04	0	1	0.00	0	0	0.00	58	794
Pinewood River Near-Field	NF-MT-01	5408081	419609	22-Jul-21	24-Jul-21	14:15	10:00	3	131	0.01	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	NF-MT-02	5408074	419606	22-Jul-21	24-Jul-21	14:20	10:10	3	132	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	NF-MT-03	5408089	419640	22-Jul-21	24-Jul-21	14:30	10:30	3	132	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	NF-MT-04	5408072	419582	22-Jul-21	24-Jul-21	14:40	10:40	3	132	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	2	0	0.02	0	0	0.00
	NF-MT-05	5408081	419582	22-Jul-21	24-Jul-21	14:50	11:10	3	133	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	1	0.01	0	0	0.00	1	0	0.01
	Total								15	660	0.01	0	0	0.00	0	0	0.00	0	0	0.00	0	1	0.00	2	0	0.00	1	0
Pinewood River Far-field	FF-MT-01	5407068	414838	20-Jul-21	22-Jul-21	13:00	14:00	3	147	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	FF-MT-02	5407068	414838	20-Jul-21	22-Jul-21	13:20	13:30	3	145	0.01	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	FF-MT-03	5407048	414839	20-Jul-21	22-Jul-21	13:40	14:20	3	146	0.04	0	0	0.00	0	0	0.00	4	0	0.03	0	1	0.01	0	0	0.00	0	0	0.00
	FF-MT-04	5407068	414838	20-Jul-21	22-Jul-21	14:00	14:40	3	146	0.01	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	FF-MT-05	5407077	414844	20-Jul-21	22-Jul-21	14:30	15:00	3	146	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00
	Total								15	729	0.01	0	0	0.00	0	0	0.00	4	0	0.01	0	1	0.00	0	0	0.00	0	0

Note: Catch per unit effort (CPUE) calculated as the number of fish caught per hour

Appendix Table A-10: Detailed Minnow Trap Data in Pinewood River - July 2021

Area	Minnow Trap ID	UTM (NAD 83, 15U)		Set Date	Lift Date	Set Time	Lift Time	Traps (#)	Effort (hours)	Total CPUE	Northern Pike			Pearl Dace			River darter			White Sucker			Total Fish
		North	East								Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	Catch	Mortality	CPUE	
Pinewood River Reference	REF-MT-01	5407685	430648	24-Jul-21	26-Jul-21	12:30	13:00	3	145	1.36													995
	REF-MT-02	5407653	430672	24-Jul-21	26-Jul-21	12:40	13:20	3	146														
	REF-MT-03	5407634	430875	24-Jul-21	26-Jul-21	12:50	13:50	3	147														
	REF-MT-04	5407672	430940	24-Jul-21	26-Jul-21	13:00	14:00	3	147														
	REF-MT-05	5407698	430977	24-Jul-21	26-Jul-21	13:20	14:30	3	147														
	Total							15	733	1.36	0	0	0.00	0	104	0.14	0	0	0.00	0	0	0.00	995
Pinewood River Near-Field	NF-MT-01	5408081	419609	22-Jul-21	24-Jul-21	14:15	10:00	3	131	0.01	1	0	0.01	0	0	0.00	0	0	0.00	0	0	0.00	1
	NF-MT-02	5408074	419606	22-Jul-21	24-Jul-21	14:20	10:10	3	132	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0
	NF-MT-03	5408089	419640	22-Jul-21	24-Jul-21	14:30	10:30	3	132	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0
	NF-MT-04	5408072	419582	22-Jul-21	24-Jul-21	14:40	10:40	3	132	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	2
	NF-MT-05	5408081	419582	22-Jul-21	24-Jul-21	14:50	11:10	3	133	0.02	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	2
	Total							15	660	0.01	1	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	5
Pinewood River Far-field	FF-MT-01	5407068	414838	20-Jul-21	22-Jul-21	13:00	14:00	3	147	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0
	FF-MT-02	5407068	414838	20-Jul-21	22-Jul-21	13:20	13:30	3	145	0.01	0	0	0.00	0	0	0.00	0	0	0.00	1	0	0.01	1
	FF-MT-03	5407048	414839	20-Jul-21	22-Jul-21	13:40	14:20	3	146	0.04	0	0	0.00	0	0	0.00	0	0	0.00	1	0	0.01	6
	FF-MT-04	5407068	414838	20-Jul-21	22-Jul-21	14:00	14:40	3	146	0.01	0	0	0.00	0	0	0.00	1	0	0.01	1	0	0.01	2
	FF-MT-05	5407077	414844	20-Jul-21	22-Jul-21	14:30	15:00	3	146	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0
	Total							15	729	0.01	0	0	0.00	0	0	0.00	1	0	0.00	3	0	0.00	9

Note: Catch per unit effort (CPUE) calculated as the number of fish caught per hour

Appendix Table A-11: Surface Water Concentrations of Select Analytes, RRM 2017 to 2021

Area	Date	Dissolved Mercury (mg/L)	Total Mercury (mg/L)	Total Methylmercury (mg/L)	Sulfate (SO4) (mg/L)	Hardness (mg/L)
1 - Teeple Culvert	7/26/2017	0.000004	0.000004	0.00000088	-	-
1 - Teeple Culvert	8/31/2017	0.000002	0.000004	0.00000046	-	-
1 - Teeple Culvert	9/29/2017	0.000001	0.000004	0.00000034	-	-
1 - Teeple Culvert	10/30/2017	0.000001	0.000002	0.00000032	-	-
1 - Teeple Culvert	5/10/2018	0.000014	0.000002	0.00000045	-	-
1 - Teeple Culvert	6/12/2018	0.000001	0.000006	0.0000003	-	-
1 - Teeple Culvert	7/17/2018	< 0.000001	0.000002	0.00000097	-	-
1 - Teeple Culvert	9/11/2018	0.000002	0.000002	0.00000021	-	-
1 - Teeple Culvert	10/16/2018	0.000004	0.000005	0.0000001	-	-
1 - Teeple Culvert	5/16/2019	< 0.000001	< 0.000001	0.00000044	-	-
1 - Teeple Culvert	6/11/2019	0.00003	0.000005	0.00000095	-	-
1 - Teeple Culvert	7/8/2019	< 0.000005	< 0.000005	0.00000169	-	-
1 - Teeple Culvert	8/13/2019	< 0.000005	< 0.000005	0.00000052	9	-
1 - Teeple Culvert	9/19/2019	< 0.000005	< 0.000005	0.0000004	-	-
1 - Teeple Culvert	10/8/2019	< 0.000005	0.00001	0.00000034	-	-
1 - Teeple Culvert	6/17/2020	< 0.00003	< 0.00003	0.000000792	-	-
1 - Teeple Culvert	7/7/2020	0.000005	< 0.00003	0.00000152	-	-
1 - Teeple Culvert	8/11/2020	< 0.00003	< 0.00003	0.000000659	13	-
1 - Teeple Culvert	9/15/2020	-	-	0.00000035	-	-
1 - Teeple Culvert	10/14/2020	< 0.00003	< 0.00003	0.000000106	18	-
1 - Teeple Culvert	5/11/2021	< 0.000005	< 0.000005	0.000000706	19.1	-
1 - Teeple Culvert	6/8/2021	0.0000204	0.0000055	0.00000241	-	-
1 - Teeple Culvert	10/20/2021	< 0.000005	< 0.00003	0.000000609	23.3	-
2 - SW20	7/26/2017	0.000004	0.000004	0.000001	2	-
2 - SW20	8/31/2017	< 0.000001	0.000002	0.00000065	1	-
2 - SW20	9/29/2017	< 0.000001	0.000004	0.00000019	15	-
2 - SW20	10/30/2017	0.000004	0.000002	0.00000019	8	111
2 - SW20	5/10/2018	0.000001	0.000004	0.00000024	8	-
2 - SW20	6/12/2018	0.000004	0.000006	0.00000169	3	149
2 - SW20	7/17/2018	< 0.000001	< 0.000001	0.00000047	1	191
2 - SW20	8/7/2018	< 0.000001	< 0.000001	0.00000021	1	175
2 - SW20	9/11/2018	< 0.000001	0.000002	0.00000024	5	211
2 - SW20	10/16/2018	0.000004	0.000007	0.00000017	25	176
2 - SW20	5/14/2019	< 0.000001	< 0.000005	0.00000042	9	113
2 - SW20	6/11/2019	< 0.000005	0.000005	0.00000129	4	135
2 - SW20	7/8/2019	< 0.000005	< 0.000005	0.00000136	1	166
2 - SW20	8/13/2019	< 0.000005	< 0.000005	0.00000157	0	185
2 - SW20	9/18/2019	< 0.000005	< 0.000005	0.0000004	4	139
2 - SW20	10/8/2019	< 0.000005	< 0.000005	0.00000025	4	110
2 - SW20	1/9/2020	< 0.00003	< 0.00003	-	5	158
2 - SW20	2/5/2020	< 0.00003	< 0.00003	-	6	178
2 - SW20	3/10/2020	< 0.00003	< 0.00003	-	8	179
2 - SW20	4/8/2020	< 0.00003	0.000005	-	3	68
2 - SW20	5/12/2020	< 0.00003	0.000005	-	4	123
2 - SW20	6/16/2020	< 0.00003	< 0.00003	0.000000648	1	125
2 - SW20	7/7/2020	< 0.00003	< 0.00003	0.00000131	2	166
2 - SW20	8/11/2020	< 0.00003	< 0.00003	0.000000396	1	149
2 - SW20	9/15/2020	< 0.00003	< 0.00003	0.000000176	3	185
2 - SW20	10/14/2020	< 0.00003	< 0.00003	0.000000357	7	186
2 - SW20	11/4/2020	< 0.00003	< 0.00003	-	10	162

Appendix Table A-11: Surface Water Concentrations of Select Analytes, RRM 2017 to 2021

Area	Date	Dissolved Mercury (mg/L)	Total Mercury (mg/L)	Total Methylmercury (mg/L)	Sulfate (SO4) (mg/L)	Hardness (mg/L)
2 - SW20	11/10/2020	< 0.00003	< 0.00003	-	8	162
2 - SW20	12/15/2020	< 0.00003	< 0.00003	-	6	164
2 - SW20	5/11/2021	< 0.00003	< 0.000005	0.000000258	8.6	146
2 - SW20	6/8/2021	< 0.000005	< 0.000005	0.000000929	1.9	184
2 - SW20	7/13/2021	< 0.000005	< 0.000005	0.000000542	0.7	185
2 - SW20	9/14/2021	< 0.000005	< 0.000005	0.000000151	3.35	185
2 - SW20	10/20/2021	< 0.000005	< 0.000005	0.000000591	9.75	-
3 - SW10	7/26/2017	< 0.000002	0.000008	0.00000052	1	-
3 - SW10	8/30/2017	< 0.000001	< 0.000001	0.00000019	2	-
3 - SW10	9/29/2017	< 0.000001	0.000004	0.00000029	4	-
3 - SW10	10/30/2017	0.000002	0.000004	0.0000003	6	130
3 - SW10	5/9/2018	< 0.000001	0.000008	0.00000044	6	109
3 - SW10	6/12/2018	0.000002	0.000004	0.00000032	2	145
3 - SW10	7/17/2018	0.000001	< 0.000001	0.00000057	2	214
3 - SW10	8/7/2018	< 0.000001	< 0.000001	0.00000022	2	241
3 - SW10	9/11/2018	< 0.000001	< 0.000001	0.00000014	5	268
3 - SW10	10/16/2018	0.000005	0.000008	0.00000017	21	174
3 - SW10	5/14/2019	< 0.000001	< 0.000001	0.00000067	6	103
3 - SW10	6/11/2019	< 0.000005	< 0.000005	0.00000119	3	132
3 - SW10	7/8/2019	< 0.000005	< 0.000005	0.00000122	1	185
3 - SW10	8/13/2019	< 0.000005	< 0.000005	0.00000037	1	231
3 - SW10	9/18/2019	< 0.000005	< 0.000005	0.00000061	5	133
3 - SW10	10/8/2019	< 0.000005	< 0.000005	0.00000028	5	107
3 - SW10	1/9/2020	< 0.00003	0.000005	-	5	176
3 - SW10	2/5/2020	< 0.00003	0.000005	-	5	190
3 - SW10	3/10/2020	< 0.00003	< 0.00003	-	8	203
3 - SW10	4/8/2020	< 0.00003	0.000005	-	3	76
3 - SW10	5/14/2020	< 0.00003	< 0.00003	-	4	113
3 - SW10	6/16/2020	< 0.00003	< 0.00003	0.000000727	1	128
3 - SW10	7/7/2020	< 0.00003	< 0.00003	0.000000829	1	148
3 - SW10	8/12/2020	< 0.00003	< 0.00003	0.000000298	2	169
3 - SW10	9/15/2020	< 0.00003	< 0.00003	0.000000174	2	199
3 - SW10	10/14/2020	< 0.00003	< 0.00003	0.00000019	1	174
3 - SW10	11/10/2020	< 0.00003	< 0.00003	-	10	162
3 - SW10	12/15/2020	< 0.00003	< 0.00003	-	8	195
3 - SW10	5/11/2021	< 0.000005	< 0.000005	0.000000353	6.75	144
3 - SW10	6/8/2021	< 0.00003	< 0.000005	0.000000744	3.15	183
3 - SW10	7/13/2021	< 0.000005	< 0.000005	0.000000289	2.65	224
3 - SW10	9/14/2021	< 0.000005	< 0.000005	0.00000014	13.3	304
3 - SW10	10/20/2021	< 0.000005	< 0.000005	0.000000687	7.95	-
4 - SW22A	7/26/2017	0.000004	0.000004	0.000004000	14	-
4 - SW22A	8/30/2017	0.000004	0.000004	0.000004000	3	-
4 - SW22A	9/29/2017	0.000002	0.000004	0.000004000	73	-
4 - SW22A	10/27/2017	0.000002	0.000002	0.000002000	36	-
4 - SW22A	5/9/2018	0.000001	0.000001	0.00000045	12	-
4 - SW22A	6/12/2018	0.000001	0.000002	0.00000083	16	210
4 - SW22A	7/17/2018	< 0.000001	< 0.000001	0.0000005	22	240
4 - SW22A	8/9/2018	< 0.000001	< 0.000001	-	9	238
4 - SW22A	9/11/2018	< 0.000001	< 0.000001	0.00000039	34	291
4 - SW22A	10/16/2018	0.000005	0.000005	0.00000023	51	239

Appendix Table A-11: Surface Water Concentrations of Select Analytes, RRM 2017 to 2021

Area	Date	Dissolved Mercury (mg/L)	Total Mercury (mg/L)	Total Methylmercury (mg/L)	Sulfate (SO4) (mg/L)	Hardness (mg/L)
4 - SW22A	5/15/2019	< 0.000001	< 0.000001	0.00000047	12	134
4 - SW22A	6/11/2019	< 0.000005	< 0.000005	0.0000005	13	151
4 - SW22A	7/8/2019	< 0.000005	< 0.000005	0.00000047	12	183
4 - SW22A	8/13/2019	< 0.000005	< 0.000005	0.00000078	5	216
4 - SW22A	9/19/2019	< 0.000005	< 0.000005	0.0000006	44	225
4 - SW22A	10/8/2019	< 0.000005	< 0.000005	0.00000035	19	140
4 - SW22A	1/9/2020	< 0.00003	< 0.00003	-	8	204
4 - SW22A	2/5/2020	< 0.00003	< 0.00003	-	5	198
4 - SW22A	3/11/2020	< 0.00003	< 0.00003	-	10	229
4 - SW22A	4/9/2020	< 0.00003	0.000005	-	5	95
4 - SW22A	5/13/2020	< 0.00003	0.000005	-	10	149
4 - SW22A	6/17/2020	0.000015	< 0.00003	0.00000192	8	166
4 - SW22A	7/10/2020	< 0.00003	< 0.00003	0.00000126	36	210
4 - SW22A	8/11/2020	< 0.00003	0.000005	0.000000785	17	180
4 - SW22A	9/15/2020	< 0.00003	< 0.00003	0.000000595	12	224
4 - SW22A	10/19/2020	< 0.00003	< 0.00003	0.000000508	286	330
4 - SW22A	11/4/2020	< 0.00003	< 0.00003	-	332	342
4 - SW22A	11/10/2020	< 0.00003	< 0.00003	-	345	330
4 - SW22A	12/16/2020	< 0.00003	< 0.00003	-	71	278
4 - SW22A	5/12/2021	< 0.000005	< 0.000005	0.000000209	45.6	206
4 - SW22A	6/8/2021	< 0.00003	< 0.00003	0.00000191	58.5	240
4 - SW22A	9/15/2021	< 0.000005	< 0.000005	0.000000356	223	390
4 - SW22A	10/20/2021	< 0.000005	< 0.000005	0.000000527	144	-
5 - SW03	7/26/2017	0.000002	0.000008	0.000000290	15	-
5 - SW03	8/29/2017	< 0.000001	0.000004	0.000000230	5	-
5 - SW03	9/29/2017	< 0.000001	0.000004	0.000000290	72	-
5 - SW03	10/27/2017	0.000002	0.000002	0.000000240	35	-
5 - SW03	5/9/2018	0.000001	0.000004	0.00000038	10	129
5 - SW03	6/12/2018	0.000002	0.000004	0.00000037	8	160
5 - SW03	7/17/2018	< 0.000001	0.000001	0.00000032	14	193
5 - SW03	8/7/2018	< 0.000001	0.000001	0.00000025	15	202
5 - SW03	9/11/2018	0.00001	0.000003	0.00000028	33	228
5 - SW03	10/16/2018	0.000004	0.000007	0.00000021	50	235
5 - SW03	5/15/2019	0.000001	0.000001	0.00000063	11	129
5 - SW03	6/11/2019	< 0.000005	0.000005	0.00000057	15	151
5 - SW03	7/8/2019	< 0.000005	< 0.000005	0.00000057	5	169
5 - SW03	8/13/2019	< 0.000005	< 0.000005	0.00000016	16	208
5 - SW03	9/18/2019	< 0.000005	< 0.000005	0.00000056	33	187
5 - SW03	10/8/2019	< 0.000005	< 0.000005	0.00000039	17	133
5 - SW03	1/9/2020	< 0.00003	< 0.00003	-	7	190
5 - SW03	2/4/2020	< 0.00003	0.000005	-	6	201
5 - SW03	3/10/2020	< 0.00003	0.000005	-	9	225
5 - SW03	4/7/2020	< 0.00003	< 0.00003	-	5	96
5 - SW03	5/12/2020	0.000005	0.000005	-	< 0.3	117
5 - SW03	6/17/2020	0.000005	0.000005	0.000000966	6	146
5 - SW03	7/7/2020	< 0.00003	< 0.00003	0.000000493	32	203
5 - SW03	8/11/2020	< 0.00003	< 0.00003	0.000000154	15	164
5 - SW03	9/15/2020	< 0.00003	< 0.00003	0.000000151	18	194
5 - SW03	10/14/2020	< 0.00003	< 0.00003	0.000000364	13	170
5 - SW03	11/10/2020	< 0.00003	< 0.00003	-	251	303

Appendix Table A-11: Surface Water Concentrations of Select Analytes, RRM 2017 to 2021

Area	Date	Dissolved Mercury (mg/L)	Total Mercury (mg/L)	Total Methylmercury (mg/L)	Sulfate (SO4) (mg/L)	Hardness (mg/L)
5 - SW03	12/15/2020	< 0.00003	< 0.00003	-	86	291
5 - SW03	5/11/2021	<0.000005	<0.000005	0.000000282	41.5	180
5 - SW03	6/8/2021	< 0.00003	< 0.00003	0.00000162	30.3	216
5 - SW03	7/13/2021	<0.000005	<0.000005	0.000000916	9.15	186
5 - SW03	8/10/2021	<0.000005	< 0.00003	0.000000406	14.1	187
5 - SW03	10/20/2021	< 0.000005	< 0.000005	0.000000595	86.3	-
6 - SW24	7/26/2017	-	-	0.000000370	-	-
6 - SW24	8/29/2017	-	-	0.000000270	-	-
6 - SW24	9/29/2017	-	-	0.000000350	-	-
6 - SW24	10/27/2017	-	-	0.000000370	-	-
6 - SW24	5/9/2018	< 0.000001	0.000004	0.00000034	7	-
6 - SW24	6/12/2018	0.000004	0.000006	0.0000006	4	210
6 - SW24	7/17/2018	0.000003	0.000007	0.00000038	3	240
6 - SW24	8/7/2018	< 0.000001	0.000003	0.00000057	3	238
6 - SW24	9/11/2018	0.000003	0.000006	0.00000066	6	291
6 - SW24	10/16/2018	0.000005	0.000007	0.00000017	29	239
6 - SW24	5/15/2019	< 0.000001	0.00001	0.00000047	8	134
6 - SW24	6/11/2019	0.00001	0.000005	0.00000075	7	151
6 - SW24	7/8/2019	< 0.000005	< 0.000005	0.00000053	2	183
6 - SW24	8/13/2019	< 0.000005	< 0.000005	0.00000053	2	216
6 - SW24	9/20/2019	< 0.000005	< 0.000005	0.00000052	13	225
6 - SW24	10/8/2019	< 0.000005	< 0.000005	0.00000044	8	140
6 - SW24	1/9/2020	< 0.00003	< 0.00003	-	4	170
6 - SW24	2/4/2020	< 0.00003	0.000005	-	4	180
6 - SW24	3/10/2020	< 0.00003	< 0.00003	-	7	216
6 - SW24	4/7/2020	< 0.00003	0.000005	-	4	87
6 - SW24	5/12/2020	< 0.00003	0.00001	-	85	168
6 - SW24	6/17/2020	0.000005	< 0.00003	0.000000995	3	116
6 - SW24	7/7/2020	0.000005	< 0.00003	0.000000693	10	155
6 - SW24	8/11/2020	< 0.00003	< 0.00003	0.000000166	109	230
6 - SW24	9/15/2020	0.000005	< 0.00003	0.000000471	3	139
6 - SW24	10/14/2020	< 0.00003	< 0.00003	0.000000326	275	261
6 - SW24	11/4/2020	< 0.00003	< 0.00003	-	343	313
6 - SW24	11/10/2020	< 0.00003	< 0.00003	-	312	296
6 - SW24	12/16/2020	< 0.00003	< 0.00003	-	51	224
6 - SW24	5/11/2021	< 0.000005	< 0.000005	0.000000415	16.7	131
6 - SW24	6/8/2021	< 0.000005	< 0.00003	0.000000726	13.1	179
6 - SW24	7/13/2021	< 0.000005	< 0.000005	0.00000088	8.4	214
6 - SW24	10/20/2021	< 0.000005	< 0.000005	0.000000555	156	-

Note: Shading denotes analyte concentrations below method detection limit, "-" denotes analyte not sampled .

Appendix Table A-12: Rainy River Mine Effluent Mercury and Sulphate Concentrations

Sample Date	Sulphate (mg/L)			Total Mercury (mg/L)			Dissolved Mercury (mg/L)		
	EDL1	EDL2	SP2	EDL1	EDL2	SP2	EDL1	EDL2	SP2
15-Apr-21	-	-	95.8	-	-	<0.000005	-	-	<0.000005
21-Apr-21	-	-	123	-	-	<0.000005	-	-	<0.000005
28-Apr-21	-	-	154	-	-	<0.000005	-	-	<0.000005
5-May-21	-	-	134	-	-	<0.000005	-	-	<0.000005
12-May-21	-	-	134	-	-	<0.000005	-	-	<0.000005
14-May-21	710	-	-	<0.000005	-	-	<0.000005	-	-
19-May-21	588	-	123	<0.000005	-	<0.000005	<0.000005	-	<0.000005
26-May-21	623	-	143	<0.000005	-	<0.000005	<0.000005	-	<0.000005
29-May-21	590	-	-	<0.000005	-	-	<0.000005	-	-
30-May-21	588	-	-	<0.000005	-	-	<0.000005	-	-
31-May-21	586	-	-	<0.000005	-	-	<0.000005	-	-
1-Jun-21	593	-	-	<0.000005	-	-	<0.000005	-	-
2-Jun-21	618	-	148	<0.000005	-	<0.000005	<0.000005	-	<0.000005
11-Jun-21	-	-	148	-	-	<0.000005	-	-	<0.000005
14-Jun-21	-	-	139	-	-	<0.000005	-	-	<0.000005
22-Sep-21	-	-	162	-	-	<0.000005	-	-	<0.000005
27-Sep-21	746	-	-	<0.000005	-	-	<0.000005	-	-
29-Sep-21	-	747	160	-	<0.000005	<0.000005	-	<0.000005	<0.000005
4-Oct-21	-	-	163	-	-	<0.000005	-	-	<0.000005
13-Oct-21	692	702	165	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
20-Oct-21	770	760	170	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
25-Oct-21	773	-	174	<0.000005	-	<0.000005	<0.000005	-	<0.000005
1-Nov-21	738	-	168	<0.000005	-	<0.000005	<0.000005	-	<0.000005
8-Nov-21	736	-	171	<0.000005	-	<0.000005	<0.000005	-	<0.000005
15-Nov-21	737	-	175	<0.000005	-	<0.000005	<0.000005	-	<0.000005

Note: "-" denotes no sample.