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

PINEWOOD RIVER ANNUAL TERMS OF REFERENCE AND BIOLOGICAL MONIOTIRNG REPORT (2022)

REPORT PREPARED FOR:

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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. The RRM is located within the Pinewood River watershed which flows past the mine, eventually draining into the Rainy River approximately 40 km downstream.

Operations at RRM presently include an open pit and underground mining with ore processed at the Rainy River Mill, located on site. The mine has an anticipated mine life of around 16 years (AMEC 2014). The mine came into commercial production in September 2017 and 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 Pinewood River Annual Monitoring Study

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

- water depth in both impounded and non-impounded habitat at four locations in the Pinewood River; (hereafter, Water Level Monitoring);.
- surface water quality including two reference and four possibly mine-influenced downstream locations (hereafter, Mercury and Sulphate Loadings Surface Water Assessment);
- the fish community (hereafter, Fish Community Survey); and,
- small-bodied fish mercury tissue concentrations (hereafter, Fish Tissue Analysis).

Conclusions

The current study provided the following conclusions:

- Water level loggers indicate that Area 1, 3, and 4 continue to exhibit seasonal and habitat type differences in water level fluctuations mirroring precipitation variations. Area 2 impoundment and non-impoundment water depths are higher than other Areas. There is no distinct pattern identified to suggest that impoundment and non-impounded areas are affected by mine-related activities. Beaver activity along the Pinewood River has contributed to the pooling of water along sections of the river and is a possible factor influencing water levels in this vicinity.
- In 2022, mining is likely not a major contributing factor to surface water concentrations of mercury in the Pinewood River. Total and dissolved mercury surface water concentrations across all sites and months were below detection limits and below both Ontario PWQO of 200 ng/L and CCME guidelines of 26 ng/L for dissolved mercury.
- In 2022, methylmercury concentrations at potential exposure sites continue to remain low and in most cases below the values observed at the reference locations. All concentrations were below CCME guidelines of 4 ng/L.
- Fish communities in the reference and exposure areas continue to be diverse with then (10) to 15 species being identified and with various age classes present. Density and dominant species varied between areas and between years.
- At all three sampling locations (Reference - PWREF, Near-field - PWNF, and Far -field - PWNF), Common Shiner (*Luxilus cornutus*) fish tissue mercury concentrations continue to remain below the consumption guideline value for sensitive populations (0.5 mg/kg, MECP 2015). PWREF and PWFF concentrations were below the working MECP SDB

guideline for the protection of fish-eating wildlife of 0.2 mg/kg and PWNF concentrations were at or near that guideline.

- Common Shiner fish tissue mercury concentrations were influenced by a combination of sample location, fork length and sample year. Despite being below the 0.5 mg/kg consumption guideline, PWNF has consistently higher mean tissue mercury concentrations than PWREF; its magnitude of difference (MOD) relative to PWREF is consistently above 25% based on multiple models (pairwise comparisons from a 2022-data ANOVA model and ANCOVA model and from a 2019–2022 ANCOVA model).

- The second species for tissue mercury concentration analysis, Central Mudminnow (*Umbra limi*), had nearly half the mean tissue mercury concentration of Common Shiner at the same sites but reflected and confirmed the same relative differences between PWNF and PWREF as Common Shiner.

Recommendations

The below are suggestions to modify or improve the program.

1) Assess the timing and frequency for the collection of surface water for mercury testing. total and dissolved mercury are typically less than their detection limits despite detections of methylmercury. A method with a lower detection should be investigated.

2) Continue to additionally sample Central Mudminnow for between-species comparisons across sites but increase the number of fish targeted to at least 10.

3) Further exploratory analysis of surface water constituent correlations and their correlations with fish tissue mercury concentrations may reveal drivers of differences between sites.

4) Investigate the feasibility of sampling sediment pore water for mercury constituents to develop a spatial model that describes site-and reach-scale variability in PWREF, PWNF, and PWFF sediments. Personal communications with RRM Environment Department Staff indicate the fragmented nature of sites from various causes such as beaver dams that may lead to fish affinity or movement restrictions based on natural barriers.

5) Continue to monitor and augment the study as necessary based on the mine established discharge practices.

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1.0 Introduction

1.1 Background Information

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 Objectives of the Current Report

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 based on precipitation rather than mine production with the mine being self-sufficient from a water recycling point of view. The location of the three 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).

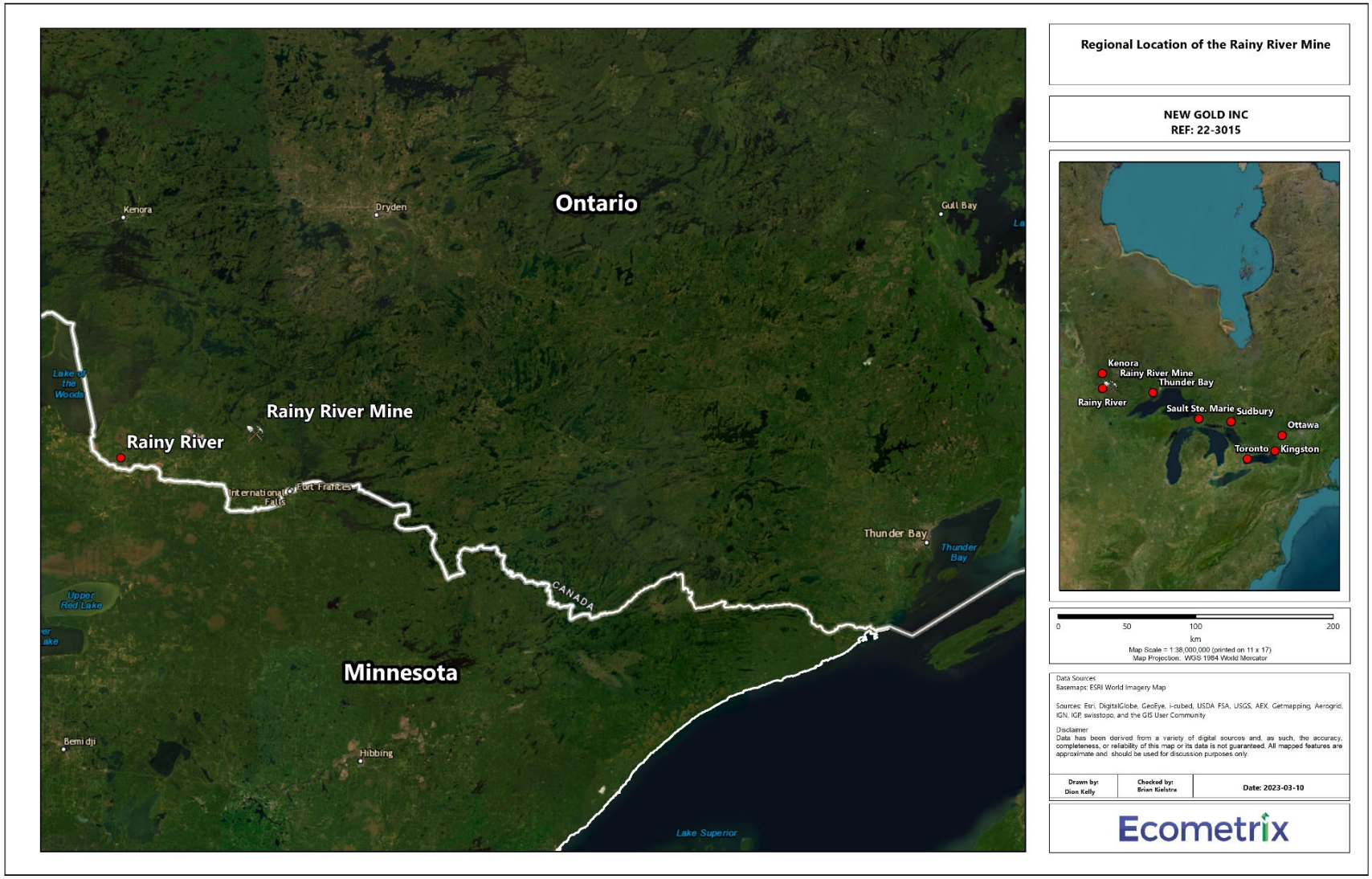

Figure 1-1: Regional location of the Rainy River Mine.

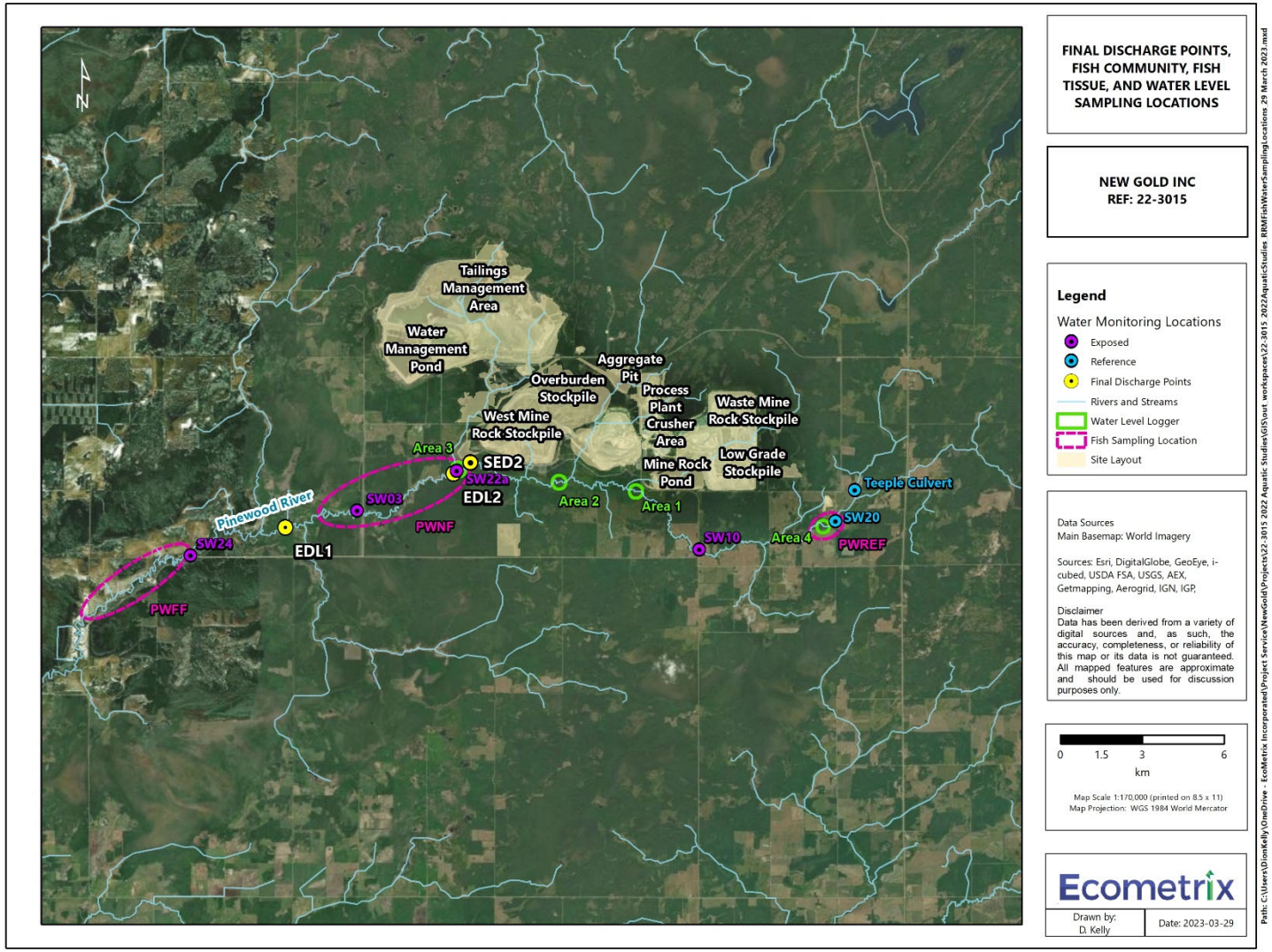

Figure 1-2: Water level monitoring, water quality monitoring, fish sampling locations, and other geographic reference points along the Pinewood River at Rainy River Mine.

2.0 General Approach to Pinewood River Annual Monitoring Program

The 2022 Pinewood Annual River Monitoring Program consisted of surveys aimed at evaluating potential effects associated with changes in flow of the Pinewood River and effluent discharge on the resident Pinewood River fish community. The four components were:

1. Water Level Monitoring;
2. Mercury and Sulphate Surface Water Assessment;
3. Fish Community Survey; and,
4. Fish Tissue Analysis.

The Water Level Monitoring and Mercury and Sulphate Surface Water Assessment components were completed from January to December 2022. To address changes to water level, two previously installed water level loggers were monitored in impoundment and non-impoundment locations within four areas along the Pinewood River (**Figure 1-2**). To address changes in Mercury and Sulphate concentrations, water samples were collected from four potential exposure stations and two upstream reference stations along the Pinewood River (**Figure 1-2**). Measurements were qualitatively compared across sites in 2022 and against the time series from previous reports.

The Fish Community Survey and Fish Tissue Analysis component sampling occurred over two field surveys, July 20 to July 28 and from August 31 to September 4, 2022, during the typical low water season as outlined in the Terms of Reference (TOR) (AMEC 2016). Three areas along the Pinewood River near the mine were sampled: two exposure areas 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. These areas were the same as those used in previous iterations of the monitoring program:

- the Reference area (PWREF) upstream of RRM.
- a Near-field area (PWNF), downstream of the EDL2 Loslo Creek discharge; and,
- a Far-field area (PWFF), downstream of the EDL1 discharge (**Figure 1-2**).

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: Summary of 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 (Richness), Life Cycle Usage (Length frequency histograms), Abundance (Catch Per Unit Effort), and Tissue Quality (Mercury concentrations)	Fish Sampling will be conducted annually during the summer for 5 years.	
	Tissue quality sample size per area: 50 adult Common Shiner	
	Minimum effort per area: • Minnow traps (600 traps hours) • Seine nets (9 individual, 15 m net hauls • Electrofishing (3,000 seconds) • Gill nets (6 standard gill net sets (50 m multiple mesh panels for 12 to 16 hrs per set.	

3.0 Water Level Monitoring

The following section outlines work completed and results of the Water Level Monitoring component. The key results are as follows:

- Impoundment and Non-impoundment habitats continue to show seasonal variability in water levels. Area 3 exhibits the greatest fluctuation in water levels.
- July and August 2022 saw the highest precipitation recorded over the past 5 years. This resulted in an uncharacteristic rise in water levels in all Areas during this summer period.
- Water levels in Areas 1, 3 and 4 generally decreased after August 2022 with minor fluctuations. Area 2 impoundment and non-impoundment water levels however gradually increased, with water depths, higher than the other Areas.
- There is no distinct pattern identified to suggest that impoundment and non-impounded areas are affected by mine-related activities.

Further details are outlined in **Sections 3.1–3.3** below.

3.1 Sample Collection

In 2017, eight Solinst 3001 LT Levelogger Edge M10 water level loggers were installed to monitor water levels in the Pinewood River. Pairs of loggers were installed in four areas with one logger installed in a narrow non-impounded area (Type 1 Habitat) and the other installed in an impounded area (Type 2 Habitat; AMEC 2018a). Loggers recorded water depth and temperature at 15-minute intervals. Loggers were retrieved and data were downloaded and provided to Ecometrix by the RRM Environment Department.

Data for Area 4 Type 1 Habitat were not available in 2022 due to site access issues

3.2 Data Analysis

Ecometrix exported raw data from logger download files using Solinst Levelogger Software. Data were screened for abnormal values. Levelogger sensor values were barometrically corrected and converted to units of pressure in metres of water (mH2O).

3.3 Results

Plots of non-impounded Type 1 Habitat reflected annual cycles and seasonal changes related to precipitation. January to March showed marginal decreases in water levels across all non-impoundment habitats. As precipitation gradually increased in April and May (monthly average precipitation of 4.6 mm and 4.2 mm respectively) there were substantial increases in the water levels; Area 1 peaked at approximately 1.9 m, Area 2 at approximately 2 m, and Area 3 at approximately 3 m (**Figure 3-1**). This followed the yearly trends with water level increases coinciding with spring freshet and Area 3 again showing the largest fluctuations in water level.

There was a decline in water levels across Areas 1 and 3 until July where an uncharacteristic increase in precipitation again contributed to increases in water levels; peaking at approximately 1.6 m and approximately 2.4 m for Areas 1 and 3 respectively. The last quarter of the year saw both Areas 1 and 3 having water levels between 1 and 1.5 m.

The latter half of the year saw water levels at the non-impoundment Area 2 generally increase and remain between 1.6 and 1.8m (**Figure 3-1 Table 3-1**). The relatively marginal fluctuations in water levels at Area 2 were also observed in previous years (Minnow, 2021). Beaver activity along the Pinewood River has contributed to the pooling of water along sections of the river and is possible a factor influencing water levels in this vicinity.

July and August in 2022 had the highest precipitation recorded in the last 5 years. No distinct pattern was identified to suggest the non-impounded areas are affected by mine-related activities.

The water levels within impoundment habitat mirrored the variability seen in the non-impoundment areas, fluctuating with seasonal patterns, and changes in precipitation. These areas were relatively shallower than the non- impoundment areas. Water levels were generally low in the first quarter of the year before increasing during the spring freshet; Area 1 peaked at approximately 1.8 m, Area 2 at approximately 2.6 m, Area 3 at approximately 2.5 m and Area 4 peaked at approximately 1.6 m during May 2022 (**Figure 3-1**). Water levels then decreased before rising again with the increased rainfall during July (Area 1 peaked at approximately 1.5 m, Area 2 at approximately 2.3 m, Area 3 at approximately 1.9 m, and Area 4 at approximately 1.8 m (**Figure 3-1**). The remainder of the year saw water levels in Areas 1, 3, and 4 averaging between 0.5 and 1 m. Water levels in Area 2 however averaged between 2.0 and 2.4 m.

Overall, the water level response in 2022 was similar to previous yearly increases during spring freshet and the 5 year high increased precipitation during June through August 2022. Area 3 continues to show the greatest fluctuation in water levels amongst both impoundment and non-impoundment areas, typically having lower flows during September to March than the other areas, and conversely having higher peak flows during April through June (**Figure 3-1**). Water depth patterns in the impounded areas do not indicate mine-related impacts on the flow regime in the Pinewood River.

Table 3-1: Water levelogger summary statistics by Habitat type and Area in 2022.

Habitat	Area	Mean	SD	CV	Min	Q25	Q50	Q75	Q95	Max
1 – Non-impounded	1	1.363	0.140	0.103	1.119	1.265	1.330	1.416	1.661	1.901
	2	1.625	0.159	0.098	1.291	1.487	1.657	1.765	1.818	2.117
	3	1.250	0.408	0.327	0.661	0.898	1.236	1.415	2.067	3.008
2- Impounded	1	1.040	0.164	0.157	0.842	0.933	0.980	1.092	1.395	1.801
	2	2.267	0.158	0.070	1.942	2.126	2.295	2.415	2.471	2.615
	3	0.772	0.413	0.534	0.200	0.420	0.742	0.945	1.608	2.551
	4	1.002	0.152	0.152	0.743	0.876	0.968	1.121	1.265	1.617

Note: SD is standard deviation, CV is coefficient of variation, Q represent quantiles (i.e., percentiles) Units except for CV in mH2O

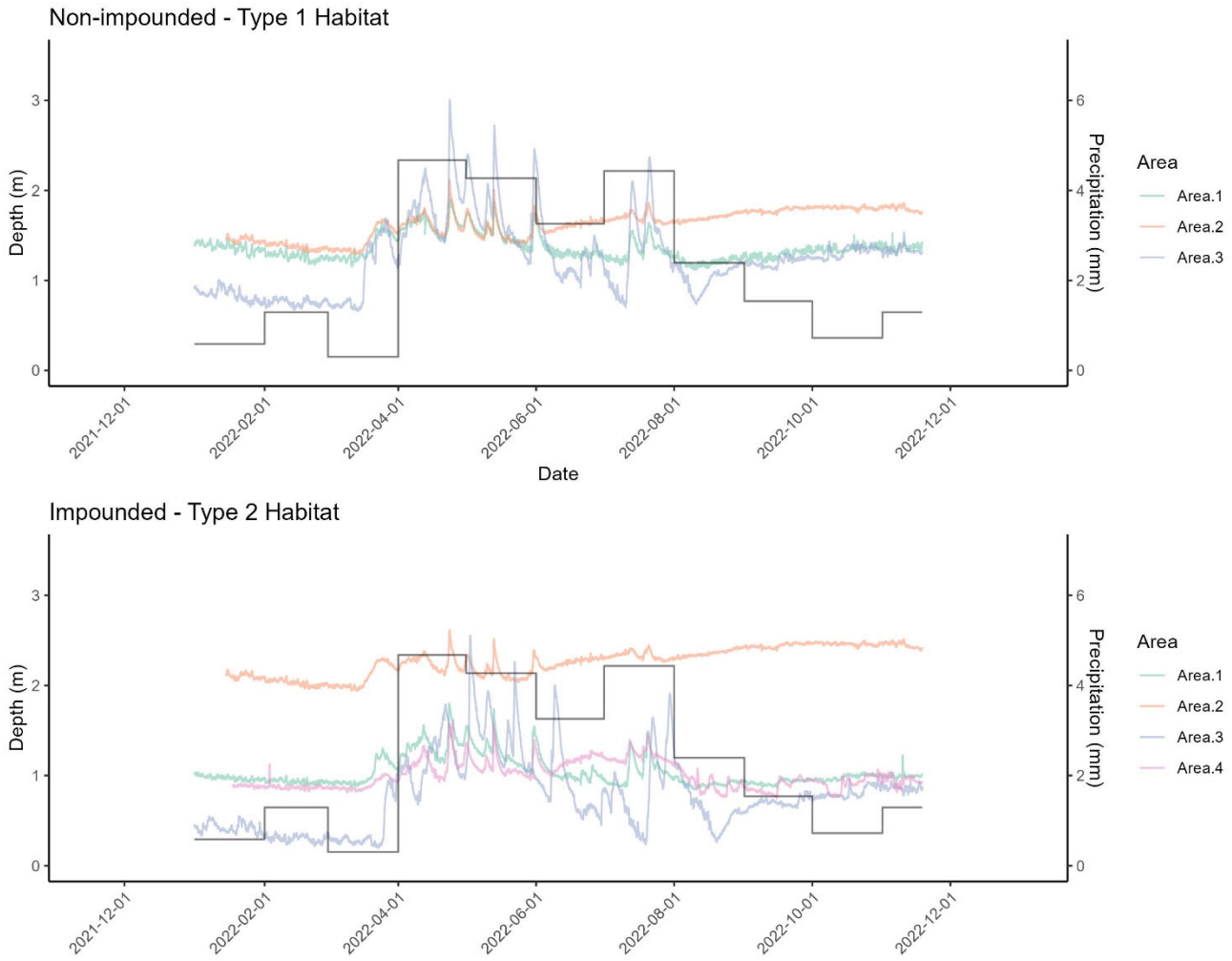

Figure 3-1: Water level logger data from the Pinewood River in Non-impounded Type 1 and Impounded Type 2 habitat types in 2022. Areas in Figure 1-2.

4.0 Mercury and Sulphate Surface Water Assessment

The following section outlines work completed and results of the Mercury and Sulphate Surface Water Assessment component. The key results are as follows:

- In 2022, total and dissolved mercury surface water concentrations across all sites and months were below detection limits and below both Provincial Water Quality Objectives for Ontario (PWQO) of 200 ng/L and CCME guidelines of 26 ng/L dissolved mercury;
- In 2022, methylmercury surface water concentrations were above detection limits, reference sites had, on average, higher concentrations than exposure sites, and all concentrations were below CCME guidelines of 4 ng/L; and,
- In 2022, total sulphate concentrations were all below the 309 mg/L total sulphate BCMECCS guideline at 148 mg/L hardness and generally below the most conservative guideline of 128 mg/L total sulphate used for 0 mg/L hardness.

Further details are outlined in **Sections 4.1–4.3** below.

4.1 Sample Collection

RRM Environmental Department staff collected the routine water quality samples for the Mercury and Sulphate Surface Water Assessment component 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). Sample locations in relation to the mine infrastructure are provided in **Figure 1-2** 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. Samples were kept in coolers with ice and transported 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 total methylmercury) and total sulphate.

4.2 Data Analysis

Each of the four water quality parameters (total mercury, dissolved mercury, methylmercury, and total sulphate) were evaluated graphically both within the 2022 sampling year and by comparing the mean values at each sampling locations for each parameter since the program began in 2017.

Concentrations reported were also compared to both PWQO (OMOEE, 1994) and the more recent BC Ministry of Environment & Climate Change Strategy water quality guidelines (BCMECCS 2019, 2021).

Following AMEC (2016), two-way Analysis of Variance (ANOVA) was undertaken to examine differences in means between reference (Teeple Culvert and SW20) and exposure (SW10, SW22A, SW03, and SW24) and across months. Only methylmercury and total sulphate models were completed because all values for total mercury and dissolved mercury were below detection limits (DL).

4.3 Results

Based on the surface water quality data, there is no indication mine-related increases in any mercury constituents in the Pinewood River in 2022.

In 2022, surface water concentrations of total and dissolved mercury at all sites were below detection limits of 5 ng/L and therefore below the Ontario PWQO of 200 ng/L and CCME guideline of 26 ng/L (**Figure 4-1**). Across years, mean concentrations are relatively stable (at or near detection limits and below guidelines) and any large changes in mean concentrations (e.g., 2020) appear to be driven by DL changes rather than site conditions (e.g., in 2020, many reported DL were 30 ng/L) (**Figure 4-2**).

In 2022, nearly all samples had detectable concentrations of methylmercury (DL = 0.02 ng/L) although all were below the CCME guideline of 4 ng/L (**Figure 4-1**). There were significant effects of Area (reference vs. exposure; F =29.9, p < 0.001) and Month (F = 6.6, p = 0.003) but no interactive effects based on the two-way ANOVA. Estimated mean reference concentration averaged over all months were 0.74 (0.58–0.89 95% CI) ng/L whereas mean exposure concentration was 0.37 (0.27–0.51 95% CI) ng/L. Exposure concentrations were estimated to be 48% lower than reference, on average. Across years, mean concentrations were also relatively stable (similar mean concentrations ± 1 SD) with mean concentrations below the CCME guidelines of 4 ng/L (**Figure 4-2**).

In 2022, all samples had detectable concentrations of total sulphate, but all samples were below the lowest conservative BCMECCS guideline of 128 mg/L total sulphate used for 0 mg/L hardness. For comparison, the guideline at 148 mg/L hardness is 309 mg/L total sulphate (mean hardness concentration across all samples for reference sites) (**Figure 4-1**). There was a significant main effect of Month (F = 2.25, p = 0.03) but not Area (p > 0.05) or their interaction (p > 0.05). The November sample was identified as having higher concentrations which was driven by two high measurements at SW03 and SW24 on November 12, 2022 (**Figure 4-1**). Apart from these instances, total sulphate concentrations in reference and exposure sites were, on average, lower than the previous two years with mean concentrations lower than the applicable guidelines and standards (**Figure 4-2**).

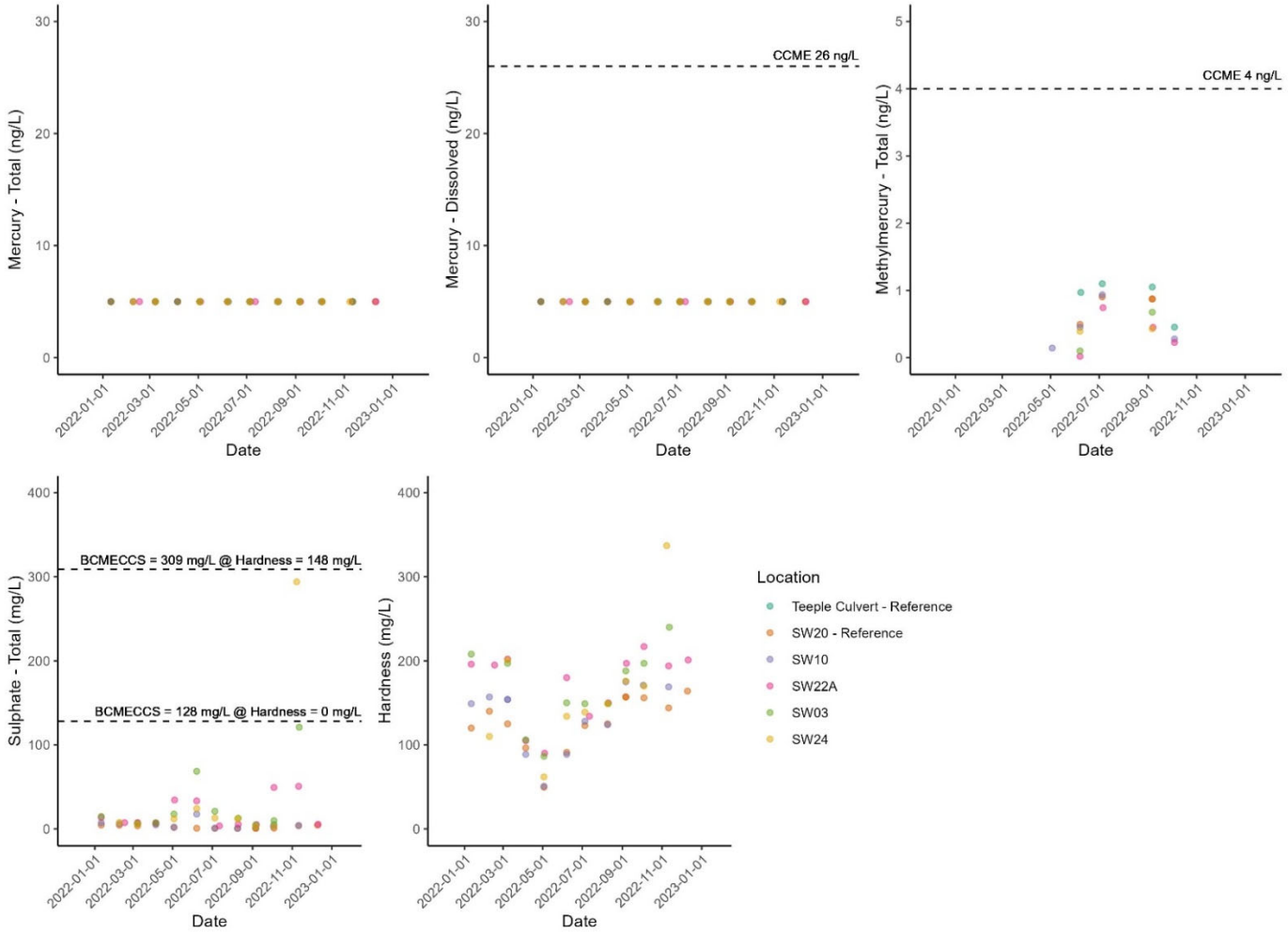

Figure 4-1: Water sample concentrations of Total Mercury, Dissolved Mercury, Methylmercury, Sulphate, and Hardness at surface water sampling locations, 2022

Note: CCME and BCMECCS guidelines presented for reference; the BCMECCS guideline for Sulphate is the most conservative level (Hardness = 0 mg/L). The Ontario PWQO for Dissolved Mercury is 200 ng/L. Locations are ordered from most upstream to most downstream.

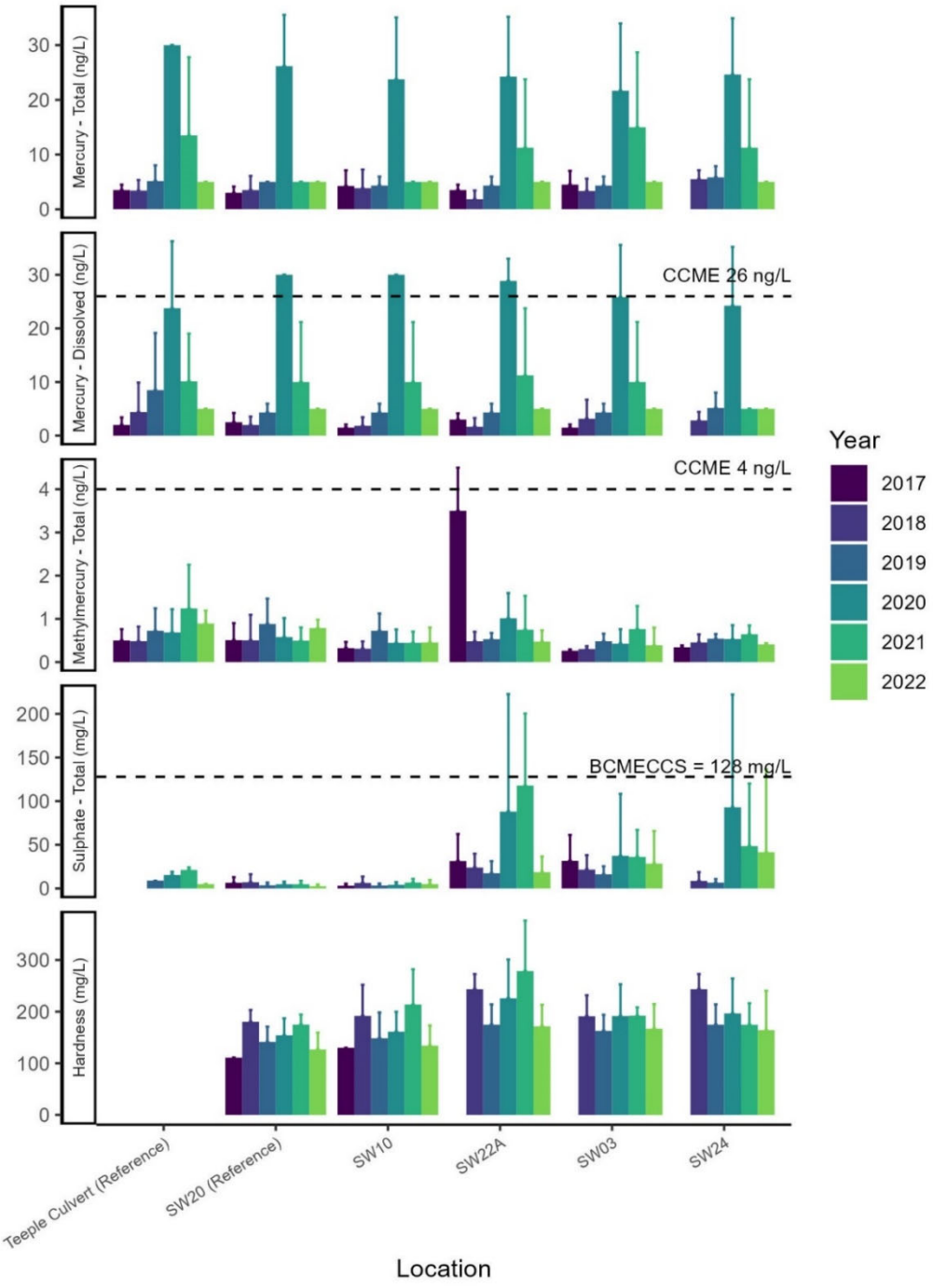

Figure 4-2: Mean water sample concentrations (error bars: + 1 Standard Deviation) Total Mercury, Dissolved Mercury, Methylmercury, Sulphate, and Hardness at surface water sampling locations, 2017 to 2022.

Note: CCME and BCMECCS guidelines presented for reference. Locations are ordered from most upstream to most downstream**.**

5.0 Fish Community Survey

The following section outlines work completed and results of the Fish Community Survey component. The key results are as follows:

- PWREF, PWNF, and PWFF had similar species compositions and species richness in 2022. PWREF had 13 species, PWNF had 10 species, and PWFF had 15 species not including the general category of Young-of-the-Year (YOY).
- Despite fish abundance being lower within PWNF and PWFF in 2022, this trend has been apparent since 2017. The relative difference to PWREF remains similar to previous years and through time.
- Length frequency histograms indicate that multiple age classes of a variety of species were captured in 2022 across all areas.

Further details are outlined in **Sections 5.1**–**5.3** below.

5.1 Sample Collection

The fish communities at Pinewood River reference (PWREF), near-field (PWNF), and far-field (PWFF) areas were surveyed 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. Seine nets, with a minimum area of 15 m^2, were hauled in each study area. At least nine seine nets were cast in each area. Minnow traps were baited with dry dog 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 from 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 and Central Mudminnow were retained for further processing.

5.2 Data Analysis

Following AMEC (2016), the catch per unit effort (CPUE) for each fishing method (electrofishing, gill netting, seine netting, and minnow trapping) were calculated per area. Species richness (number of individual species) per area were calculated to determine if species presence is maintained in each area. Length frequency distributions per species per area were graphed with the understanding that qualitative comparisons of results will show any large discrepancies in year classes.

5.3 Results

The fish community in PWREF included (listed in order of abundance) Pearl Dace (*Margariscus margarita*), Brook Stickleback (*Culaea inconstans*), Central Mudminnow, Common Shiner, Northern Redbelly Dace (*Chrosomus eos*), White Sucker (*Catostomus commersonii*) Creek Chub (*Semotilus atromaculatus*), Fathead Minnow (*Pimephales promelas*), Finescale Dace (*Chrosomus neogaeus*), Golden Shiner (*Notemigonus crysoleucas*), Northern Pike (*Esox lucius*), and Brassy Minnow (*Hybognathus hankinsoni*) (**Table 5-1**). Thirteen species were identified among the 1,175 individual fish captured (**Table 5-1**). The CPUE was 1.25 fish per hour of gill netting effort, 4.24 fish per 60 seconds of electrofishing effort, 74 fish per seine netting effort, and 0.15 fish per minnow trap hour (**Table 5-2** to **Table 5-5**). Length frequency histograms indicate that multiple age classes of a variety of species were captured in 2022 (**Figure A-1**).

The fish community identified in PWNF included (listed in order of abundance) Brown Bullhead (*Ameirurus nebulosus*), Common Shiner, Central Mudminnow, Northern Pike, White Sucker, Golden Shiner, Pearl Dace, Creek Chub, Brook Stickleback, and Fathead Minnow. There were 10 species identified among the 536 fish caught (**Table 5-1**). The CPUE for the various effort types were 0.17 fish per gill net hours, 0.49 fish per 60 seconds of electrofishing effort. 15.18 fish per seine netting effort, and 0.11 fish per minnow trap effort (**Table 5-2** to **Table 5-5**). Length frequency histograms indicate that multiple age classes of all species, including young of year fish for multiple species were captured in 2022 (**Figure A-2**)**.**

The fish community in PWFF included (listed in order of abundance) Common Shiner, Blackside Darter (*Percina maculata*), Central Mudminnow, Brown Bullhead, Brook Stickleback, Northern Pike, Rock Bass (*Ambloplites rupestris*), Creek Chub, Johnny Darter (*Etheostoma nigrum*), White Sucker, Fathead Minnow, Trout Perch (*Percopsis omiscomaycus*), Pearl Dace, Golden Shiner, and Walleye (*Sander vitreus*). There were 15 species identified among the 196 fish caught (**Table 5-1**). The CPUE at this site included 0.08 fish per gill net setting, 0.27 fish per 60 seconds electrofishing, 12.27 fish per seine net hauls, and 0.02 fish per minnow trap hours (**Table 5-2** to **Table 5-5**). Length frequency histograms indicate that multiple age classes of a variety of species were captured in 2022 (**Figure A-3**).

A total of 1,907 fish representing at least 15 species were captured during the 2022 Pinewood River fish community survey within the three areas (PWREF, PWNF, PWFF) (**Table 5-1**). 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.

Table 5-1: Total catch by species in the Pinewood River, 2022

Species	PWREF	PWNF	PWFF
Blackside Darter	0	0	8
Brassy Minnow	3	0	0
Brook Stickleback	211	1	5
Brown Bullhead	29	212	6
Central Mudminnow	86	50	6
Common Shiner	74	162	63
Creek Chub	21	2	3
Fathead Minnow	16	1	2
Finescale Dace	10	0	0
Golden Shiner	9	7	1
Johnny Darter	0	0	3
Northern Pike	5	11	5
Northern Redbelly Dace	64	0	0
Pearl Dace	282	2	1
Rock Bass	0	0	5
Trout Perch	0	0	2
Walleye	0	0	1
White Sucker	25	10	2
YOY	340	78	83
Total catch	**1175**	**536**	**196**
Richness (no YOY)	**13**	**10**	**15**

Table 5-2: Fish effort and catch summary for gill netting in the Pinewood River, 2022

Area	Gill Netting														
	Effort (hours)					Total catch					CPUE (#fish/hours)				
	2017	2019	2020	2021	2022	2017	2019	2020	2021	2022	2017	2019	2020	2021	2022
PWREF	81	117	114	120	107	16	476	153	81	134	0.2	4.1	1.3	0.7	1.25
PWNF	96	129	109	130	100	4	24	28	59	17	0.04	0.2	0.3	0.5	0.17
PWFF	-	77	102	118	120	-	6	18	34	0	-	0.1	0.2	0.3	0.08

Table 5-3: Fish effort and catch summary for electrofishing in the Pinewood River, 2022

Area	Electrofishing														
	Effort (seconds)					Total catch					CPUE (#fish/minute)				
	2017	2019	2020	2021	2022	2017	2019	2020	2021	2022	2017	2019	2020	2021	2022
PWREF	3030	3000	3003	4017	3141	57	185	119	44	222	1.1	3.7	2.4	0.7	4.24
PWNF	6108	5510	3325	3421	4193	10	85	113	13	34	0.1	0.9	2	0.2	0.49
PWFF	-	3002	3000	3468	3346	-	99	51	102	15	-	2	1	1.8	0.27

Table 5-4: Fish effort and catch summary for seine netting in the Pinewood River, 2022

Area	Seine Netting														
	Effort (hauls)					Total Catch					CPUE (#fish/haul)				
	2017	2019	2020	2021	2022	2017	2019	2020	2021	2022	2017	2019	2020	2021	2022
PWREF	9	9	9	9	9	201	1272	1335	1591	666	22.3	141.3	148.3	176.8	74.00
PWNF	9	16	12	9	17	19	325	897	322	258	2.1	20.3	74.8	5.8	15.18
PWNF	-	16	13	9	11	-	753	484	365	135	-	47.1	37.2	40.6	12.27

Table 5-5: Fish effort and catch summary for minnow trapping in the Pinewood River, 2022

Area	Minnow Trapping														
	Effort (hours)					Total Catch					CPUE (#fish/hour)				
	2017	2019	2020	2021	2022	2017	2019	2020	2021	2022	2017	2019	2020	2021	2022
PWREF	659	971	792	733	1054	360	57	124	995	153	0.5	0.1	0.2	1.36	0.15
PWNF	622	3480	701	660	2088	18	83	22	5	227	0.03	0.02	0.03	0.01	0.11
PWFF	-	1633	654	729	1833	-	14	3	9	40	-	0.01	0.005	0.01	0.02

6.0 Fish Tissue Analysis

The following section outlines work completed and results of the Fish Tissue Analysis component. Common Shiner was the primary target species for the analysis like previous reports. Common Shiner is typically found in the three study areas in sufficient density. Per the 2021 report recommendations, a secondary target of Central Mudminnow was used to assess bioaccumulation potential against Common Shiner for examining species-specific life history/niche bias associated with sampling a single species.

For reference, the MECP Standards Development Branch (SDB) working guideline for the protection of fish-eating wildlife is 0.2 mg/kg wet weight (wwt). Health Canada has also established a standard of 0.5 mg/kg 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.

The key results are as follows:

- In 2022, Common Shiner mean tissue mercury concentrations at all sites were below the consumption guidelines for sensitive populations of 0.5 mg/kg. PWREF and PWFF concentrations were below the working MECP SDB guideline for the protection of fish-eating wildlife of 0.2 mg/kg and PWNF concentrations were at or near that guideline.
- PWNF has consistently higher mean tissue mercury concentrations than PWREF; its Magnitude of Difference (MOD) relative to PWREF is consistently above 25% and has increased through time based on multiple lines of evidence (pairwise comparisons from a 2022-data ANOVA model and ANCOVA model and from a 2019–2022 ANCOVA model)
- Central Mudminnow had nearly half the mean tissue mercury concentration of Common Shiner at the same sites but reflected the same relative differences between PWNF and PWREF as Common Shiner.
- Further exploratory analysis of surface water constituent correlations and their correlations with fish tissue mercury concentrations may reveal drivers of differences between sites.

Further details are outlined in **Sections 6.1**–**6.3** below.

6.1 Sample Collection

During the fish community assessment up to 50 adult Common Shiner and five Central Mudminnow were targeted for tissue metals analysis per area. All retained fish were measured

for both fork and total length to the nearest millimetre using a fish measuring board. Weight was determined (to the nearest milligram) using an appropriately calibrated analytical balance.

The collected fish were processed. Each fish head containing the otoliths was placed in a labelled Whirl-Pak™ bag. These were collected for the purposes of age determination. The remainder of the body was placed in an appropriately, labeled Whirl-Pak™ bag for the purposes of tissue chemistry analysis. Both samples were kept frozen.

At the conclusion of the field collections tissue samples were submitted to Bureau Veritas (BV) in, a laboratory that specialized in tissue analysis along with a chain-of-custody (COC) record. Total mercury and moisture analyses 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.

6.2 Data Analysis

Following AMEC (2016), two-way ANOVA was first used to investigate the main effects of Area and Age and their interaction on tissue mercury concentrations. A statistically significant interaction ($p<0.1$) would indicate Area differences are dependent on Age. No significant interaction was found so mean tissue concentration estimates were generated for PWREF, PWNF, and PWFF using a no-interaction model. The magnitude of difference (MOD) between areas was calculated using these estimates. It was calculated as:

$$MOD = (Exposure - Reference)/Reference \times 100,$$

where PWNF and PWFF were substituted as *Exposure* depending on the model and PWREF was *Reference*, respectively. Differences in tissue mercury 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. This is analogous to CES found in MDMER technical guidance for other sublethal effects (EC, 2012).

A log-linear relationship is well established in the literature, where mercury tends to increase with body size (Tang et al., 2013). Statistical comparisons of mercury concentrations at common fish size (i.e., Fork Length) were examined between PWREF, PWNF, and PWFF like the 2021 report (Ecometrix, 2021a). This was achieved using Analysis of Covariance (ANCOVA) with log10-transformed wet weight tissue mercury concentrations as the response variable, Area as a factor variable (i.e., PWREF, PWNF, and PWFF), log10-transformed Fork Length as a covariate, and their interaction. MODs were calculated as above but at the minimum and maximum Fork Length values common across sites.

The linear relationships in the above ANCOVA analysis were compared with those in the 2021 report. The relationships varied between sites within the same year and varied between years within the same site. For example, the mercury-length relationship in PWREF was positive in

2021 but negative in 2022. These varied and potentially juxtaposed relationships make between-year interpretation difficult.

Therefore, a two-way ANCOVA of Area, Year, the Fork Length covariate, and their interactions was used to facilitate comparisons between sites within and across years using 2019–2021 data. Tissue mercury concentration estimates were generated for each Area:Year combination for a 6 cm Fork Length fish (the average minimum size across all sites and years), an 8 cm Fork Length fish (the average size across all sites and years), and a 12 cm Fork Length fish (the average maximum size across all sites and years). MODs were calculated using these estimates. Together, these pairwise comparisons provide a reasonable accounting of the last four years for identifying trends while the number of pairwise comparisons are relatively small; this analysis approach is in the spirit of the Before-After-Control-Impact and Generalized Additive Model analysis approaches identified in AMEC (2016).

Finally, an exploratory analysis was undertaken to examine correlations between fish tissue mercury concentrations and surface water chemistry. This was done using 2020–2021 data since tissue mercury concentrations in 2019 were generally outside of the range of the baseline (2012) and 2020–2021 data (**Figure 6-3**). Surface water stations were chosen as those immediately above PWREF, PWNF, and PWFF; these were SW20 (PWREF), SW22a (PWNF), and SW24 (PWFF). Surface water constituents were chosen to be representative of potential nutrient and mercury loading (**Table 6-4**). A Principal Component Analysis (PCA) was used to further examine constituent relationships across the study areas; PCA reduces many variables to newly derived variables that summarize the original information and allow for the investigation of patterns that might not be found by analyzing each variable separately (Quinn & Keough, 2002). Since PCA requires a complete *site* x *variable* matrix and since not all parameters were measured at each monitoring location, an optimal subset was found balancing the need for more sites and more parameters (**Table 6-4**). The final surface water constituents and PCA scores were aggregated to mean values per Area:Year combination (3 years x 3 areas) and correlated with their respective Area:Year mean Common Shiner tissue mercury concentrations using Spearman Rank Correlation tests.

For Central Mudminnow, the Total Length of fish was not sufficiently distributed within or between sites for an ANCOVA. There were also not sufficient Central Mudminnows caught in PWFF (n = 2; target was five). Instead, a subset of Common Shiners that fit within the minimum and maximum Total Lengths were compared to Central Mudminnow using ANOVA. A model that evaluated the main effects of species, area, and their interaction was run. If there was an interaction at $p < 0.1$, the concentration differed by species and that difference was dependent on the area. If there was no interaction but a significant effect of Species, then concentration differed by Species. If there was no interaction but a significant effect of Area, then the concentration was Area dependent.

6.3 Results

In 2022, Common Shiner mean tissue mercury concentrations at all sites were below the consumption guidelines for sensitive populations of 0.5 mg/kg (MECP 2015). PWREF and PWFF

concentrations were below the working MECP SDB guideline for the protection of fish-eating wildlife of 0.2 mg/kg and PWNF concentrations were at or near that guideline (**Table 6-1**).

When comparing areas in 2022 using ANOVA and ANCOVA, PWNF had consistently higher mean concentrations than PWREF with MODs greater than the 25% CES level suggested earlier. PWNF concentrations were 98% higher than PWREF based on the ANOVA model estimates, and 45% higher in smaller fish (6.4 cm) and 183% higher in larger fish (10.1 cm) based on the ANCOVA model estimates. PWFF MODs were more variable – concentrations were 25% higher than PWREF based on ANOVA model estimates, and 9% lower for smaller fish and 44% higher for larger fish based on ANCOVA model estimates (**Table 6-2**, **Figure 6-1** and **Figure 6-2**).

For the 2022 ANCOVA model, there was a significant Area by Fork Length interaction indicating that the log-linear relationship of tissue mercury concentration with Fork Length varied between sites ($F = 7.3$, $p < 0.001$) (

Table 6-2, **Figure 6-2**). The relationships also varied across years. For example, the mercury-length relationship in PWREF was positive in 2021 but negative in 2022 (Ecometrix, 2021a).

To better understand general patterns across sites and through time, the 2019–2022 ANCOVA model was used to generate mean concentration estimates for Area:Year combinations for 6 cm, 8 cm, and 12 cm Fork Length for calculating MODs. The model had significant Fork Length by Year ($F = 50.24$, $p < 0.0001$), Fork Length by Area ($F = 5.15$, $p = 0.006$), and Year by Area interactions ($F = 18.73$, $p < 0.001$) again confirming the variability in log-linear relationships by Year and Area and that Area differences are also dependant on Year. On average (2020-2022), PWNF was 120% greater than PWREF (range: 32–212%) for 6 cm fish, 78% greater for 8 cm fish (range: 34–101%), 79% greater for 12 cm fish (range: -31–264%). PWFF was 71% greater for 6 cm fish (range: -14–224%), 23% greater for 8 cm fish (range: -24–80) and 1% smaller (range: -31–264%). The PWNF is the most consistent relationship and is greater than PWREF for nearly all fish sizes and years; the MOD has also increased through time (

Table 6-3**, Figure 6-3**).

To better understand observed tissue concentrations as they relate to surface water concentrations, PCA was used as an exploratory tool to examine general patterns amongst surface water constituents. The first Principal Component explained 33% of the variation in chemistry and was most positively correlated with nitrate, nitrite, sulphate and total dissolved solids; samples with higher values of these constituents have more positive PC1 values. The second Principal Component explained 19% of the variation in chemistry and was most positively correlated with total and dissolved phosphorus. Surface water near PWREF (SW20) generally occupied a narrower range of conditions than PWNF and PWFF as indicated by the 95% confidence ellipse about the sites. This narrower range tended to have average values along PC1 and lower values along PC2 (i.e., lower nutrient concentrations). Surface water constituents were summarized to their mean values for Area:Year combinations and compared against Area:Year mean tissue mercury concentrations using Spearman Rank Correlations. Only dissolved phosphorus and dissolved organic carbon were correlated with tissue mercury

concentrations ($p < 0.1$). More explicit study of these relationships coupled with pore water sampling could reveal nutrient-mercury relationships at local or entire-reach scales.

For the comparison of Central Mudminnow with Common Shiner, five PWREF and four PWNF Central Mudminnow were compared against 37 PWREF and 43 PWNF Common Shiner, respectively. All fish had had lengths between 2.4 cm and 10.3 cm. The ANOVA results should be interpreted with caution because of the small Central Mudminnow sample size. There was a no interaction suggestive of Area-specific changes in the relationship between Common Shiner and Central Mudminnow. ($F = 1.41$, $p = 0.24$) However, this was a much smaller effect than the individual effects of area and species. Across species, the PWREF had nearly half the concentration of mercury than PWNF ($F = 34.17$, $p < 0.001$). Across areas, Central Mudminnow had nearly half the concentration of mercury ($F = 97.10$, $p < 0.001$) than Common Shiner. Across sites, given that fish are exposed to the same water, this difference may be explained by habitat exploitation or feeding. Both species are insectivores but Central Mudminnow tend to exploit benthic habitats whereas Common Shiner tend to exploit pelagic habitats (Eakins, 2023).

Table 6-1: Summary of Tissue Mercury Concentrations, Body Weight, Fork Length, and Ages of Common Shiners in the Upper Pinewood River during 2019, 2020, 2021, and 2022.

Mercury Concentration (mg/kg wwt)

Area	Minimum				Maximum				Mean					Median			
	2019	2020	2021	2022	2019	2020	2021	2022	2012	2019	2020	2021	2022	2019	2020	2021	2022
PWREF	-	0.027	0.043	0.052	-	0.167	0.203	0.249	0.12	-	0.084	0.076	0.109	-	0.084	0.074	0.102
PWNF	0.246	0.049	0.076	0.117	0.717	0.177	0.236	0.493	0.19	0.432	0.107	0.151	0.216	0.408	0.102	0.145	0.202
PWFF	0.084	0.038	0.076	0.066	0.382	0.139	0.15	0.567	0.14	0.198	0.056	0.099	0.14	0.198	0.051	0.091	0.125

Body Weight (g)

Area	Minimum				Maximum				Mean				Median			
	2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
PWREF	0.40	0.91	2.75	3.51	6.25	36.65	23.37	35.77	3.75	9.70	4.92	11.33	3.93	9.05	4.00	9.35
PWNF	2.61	0.59	3.45	0.94	26.96	22.27	19.65	13.64	11.99	6.31	9.16	4.03	11.18	4.28	6.82	2.89
PWFF	1.42	0.73	10.66	1.33	20.31	53.38	29.79	16.47	7.28	6.79	20.88	4.18	6.55	3.53	23.96	3.17

Fork Length (cm)

Area	Minimum				Maximum				Mean				Median			
	2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
PWREF	3.60	4.30	6.20	6.40	8.00	13.40	12.20	12.80	6.87	8.59	7.39	8.71	7.00	9.00	7.10	8.40
PWNF	6.00	4.00	6.90	4.60	12.90	11.60	11.40	10.10	9.37	7.22	8.85	6.73	9.70	6.95	8.50	6.35
PWFF	5.30	4.10	9.80	4.90	11.20	12.10	12.30	10.90	8.04	7.02	11.13	6.85	8.20	6.60	11.30	6.50

Age (years)

Area	Minimum			Maximum				Mean				Median				Mode			
	2019	2020	2021	2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
PWREF	1	1	2	3	5	5	4	1.54	2.48	3.27	2.42	2.00	3	3	2	2	3	3	2
PWNF	1	1	3	4	3	5	3	2.20	1.66	3.47	1.76	2.00	2	3	2	3	2	3	2
PWFF	1	1	3	3	3	5	3	2.02	1.82	4.36	1.68	2.00	2	5	2	2	2	5	1

Table 6-2: Results comparing tissue mercury concentrations (mg/kg wet weight) in Common Shiners from Pinewood River between PWREF, PWNF, and PWFF, 2022.

Model	Endpoint		Sample Size			Slopes Equal? Interaction Model		Areas Equal? Parallel Model		Magnitude of Difference (%)					
	Parameter	Covariate	PWREF	PWNF	PWFF	p	Equal?	P	Equal?	PWNF vs. PWREF		PWFF vs. PWREF		PWNF vs. PWFF	
Area-Age (TOR)	log_{10} Tissue Mercury	-	50	48	53	-	-	<0.001	No	98		25		58	
2022 Model[1]	log_{10} Tissue Mercury	log_{10} Fork Length	50	48	53	<0.001	No	-	-	Min	45	Min	-9	Min	58
										Max	183	Max	44	Max	96
2019–2022 Model	log_{10} Tissue Mercury	log_{10} Fork Length	149	198	163	<0.001	No			See **Table 6-3** for pairwise comparisons					

[1] Minimum and maximum Fork Length values were 6.4 cm and 10.1 cm (0.806 and 1.00 in log_{10} units), respectively, for Magnitude of Difference calculation.
[3]Adjusted means estimated at Fork Length 8.9 cm (0.951 in log_{10} units) for Magnitude of Difference calculation.

Table 6-3: Magnitude of difference results based on estimated concentrations at different fish sizes from 2019–2022 Model in Table 6-2.

Year	6 cm			8 cm			12 cm		
	PWNF vs PWREF	PWFF vs PWREF	PWNF vs. PWFF	PWNF vs PWREF	PWFF vs PWREF	PWNF vs. PWFF	PWNF vs PWREF	PWFF vs PWREF	PWNF vs. PWFF
2019	-	-	189	-	-	132	-	-	70
2020	115	4	107	34	-24	76	-31	-51	40
2021	212	224	-4	98	80	10	4	-21	33
2022	32	-14	54	101	14	76	264	70	113
Mean(2020-2022)	**119.7**	**71.3**	**52.3**	**77.7**	23.3	**54.0**	**79.0**	-0.7	**62.0**

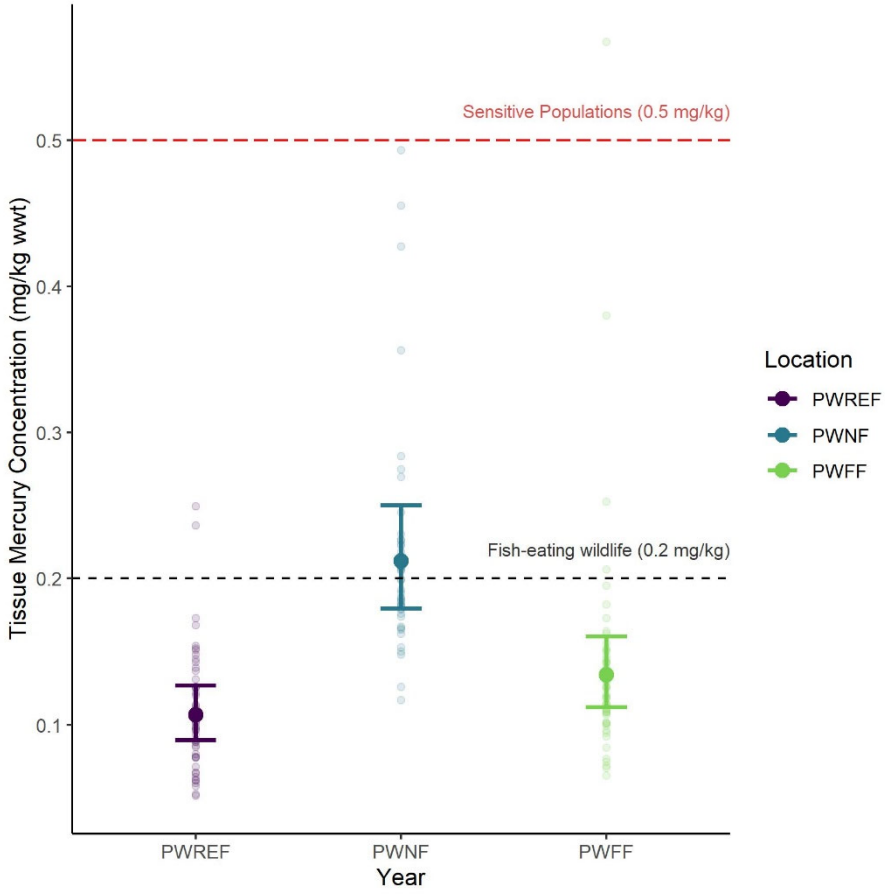

Figure 6-1: Estimated marginal mean tissue mercury concentrations and 95% confidence intervals for Common Shiner at PWREF, PWNF, and PWFF locations in 2022. Raw data has higher transparency.

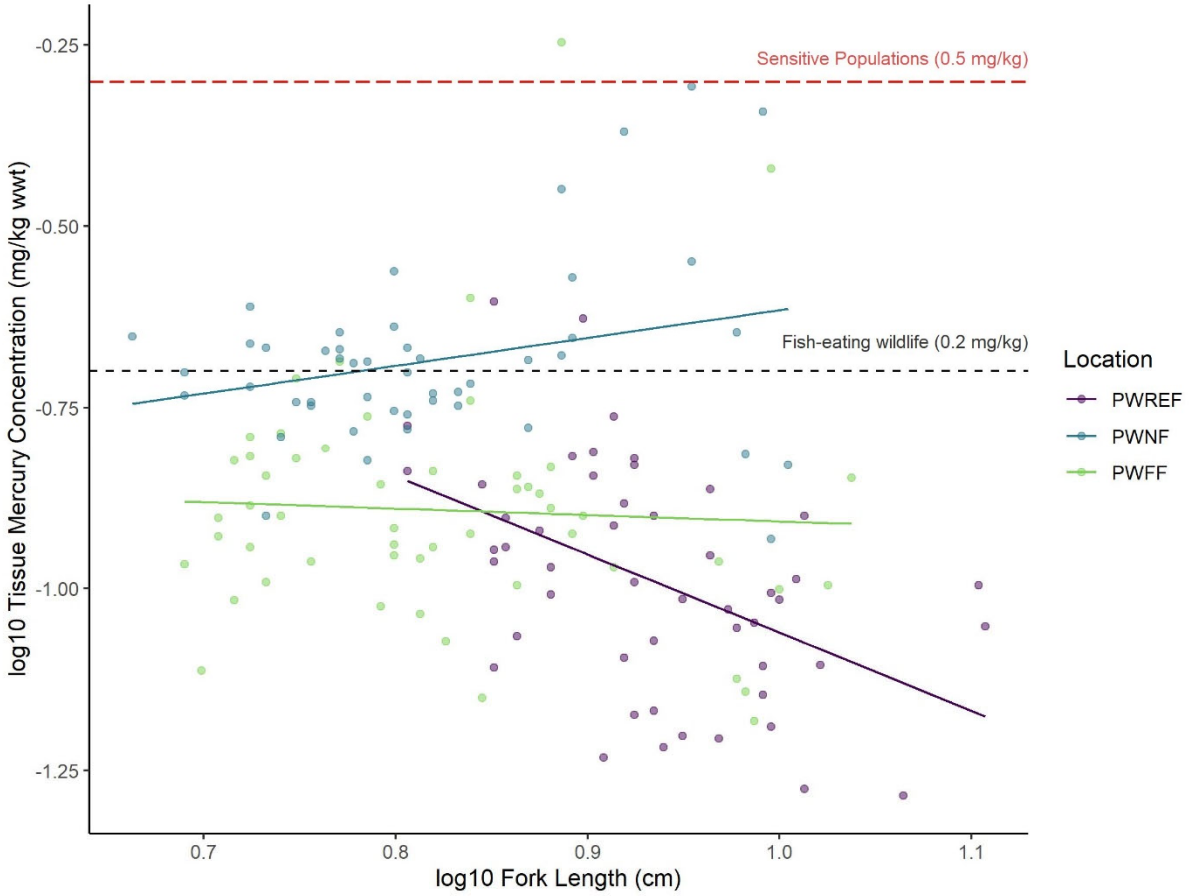

Figure 6-2: log10 Tissue Mercury concentrations at log10 Fork Length with predicted linear relationship by Location.

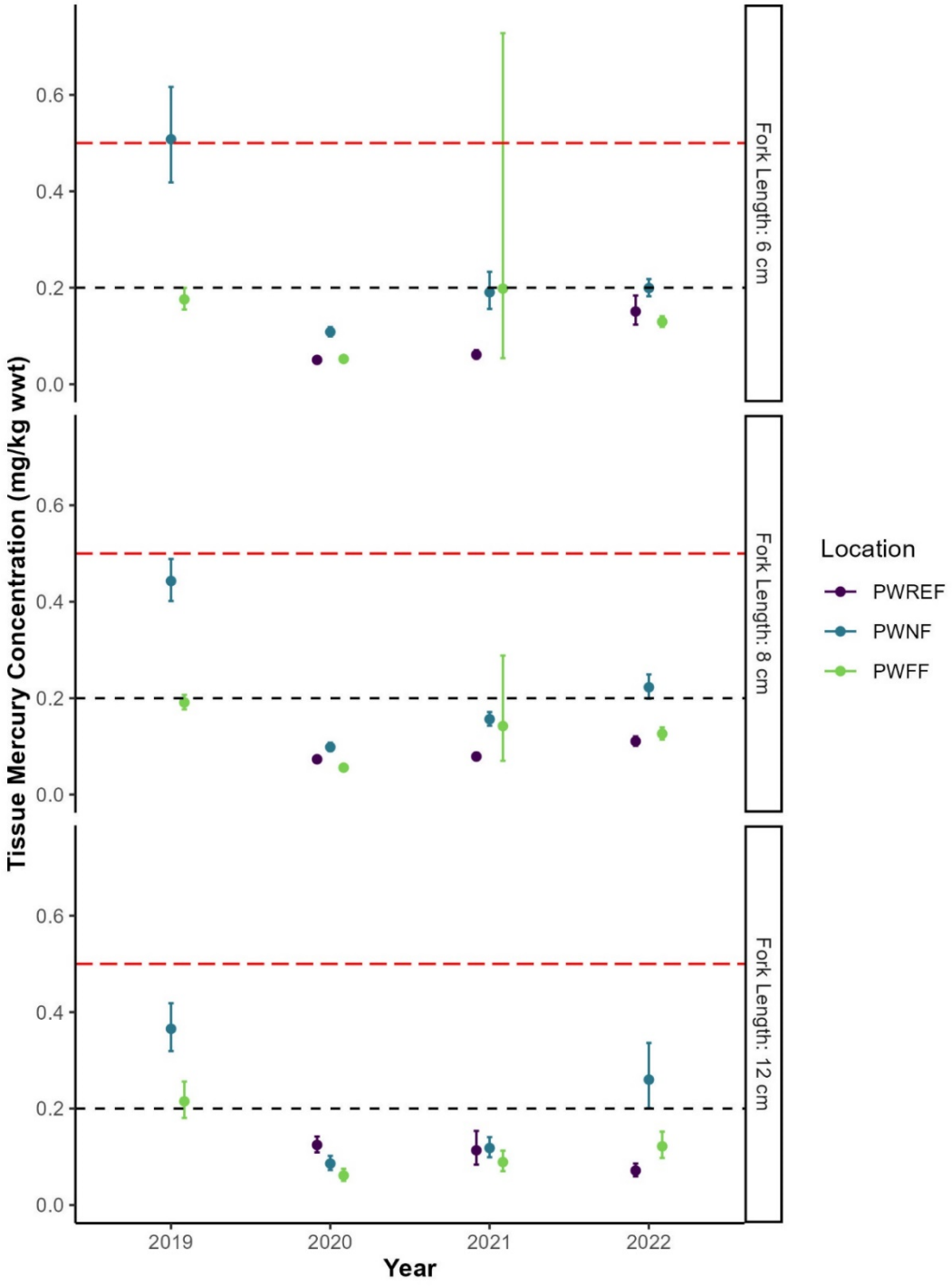

Figure 6-3: Estimated marginal mean tissue mercury concentrations for Common Shiner at PWREF, PWNF, and PWFF sites and years 2019–2022.

Table 6-4: Surface water constituent scores on PCA axes. Higher score indicates higher loading/correlation with a given axis. Based on 2020–2022 surface water data.

Surface Water Constituent	PC1 scores	PC2 scores
Ammonia, Total (as N)	0.555	0.694
Dissolved Organic Carbon	-0.878	0.616
Mercury (Hg)-Dissolved	-0.216	0.347
Mercury (Hg)-Total	0.218	0.278
Nitrate (as N)	1.376	0.340
Nitrite (as N)	1.294	0.466
pH	0.105	0.620
Phosphorus (P)-Dissolved	-0.818	1.172
Phosphorus (P)-Total	-0.866	1.191
Sulfate (SO4)	1.482	0.474
Total Dissolved Solids	1.310	0.630
Total Suspended Solids	-0.568	0.887
Total Kjeldal Nitrogen[1]	-	-
Field pH[1]	-	-
Methylmercury (as MeHg)-Total[1]	-	-

[1]**Note**: Constituent removed since its inclusion would result in a much-reduced dataset.

Table 6-5: Spearman's correlation results of mean surface water constituent value versus mean tissue mercury concentration in Common Shiner for each Area:Year combination, 2020–2022.

Surface Water Constituent	Spearman's ρ	p-value
Ammonia, Total (as N)	-0.400	0.286
Dissolved Organic Carbon	**-0.617**	**0.077**
Field pH	0.500	0.667
Mercury (Hg)-Dissolved	0.000	1.000
Mercury (Hg)-Total	-0.548	0.127
Methylmercury (as MeHg)-Total	-0.429	0.397
Nitrate (as N)	0.000	1.000
Nitrite (as N)	0.033	0.932
pH	0.267	0.488
Phosphorus (P)-Dissolved	**0.667**	**0.050**
Phosphorus (P)-Total	0.200	0.606
Sulfate (SO4)	-0.183	0.637
Total Dissolved Solids	-0.033	0.932
Total Kjeldahl Nitrogen	-0.483	0.187
Total Suspended Solids	-0.350	0.356
PC1	-0.167	0.668
PC2	-0.100	0.798

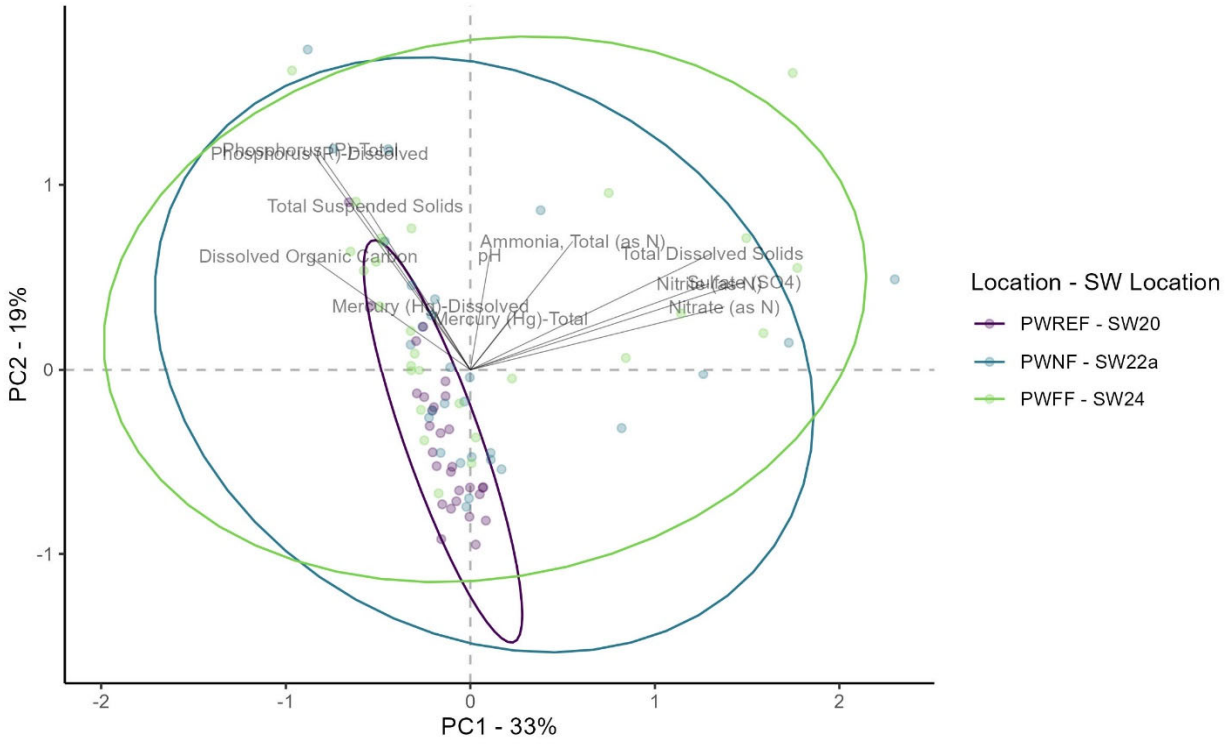

Figure 6-4: Principal component analysis results for select constituents at corresponding upstream stations near PWREF, PWNF, and PWFF. Constituents closer together are more correlated and samples closer together are more correlated. Based on 2020–2022 surface water data.

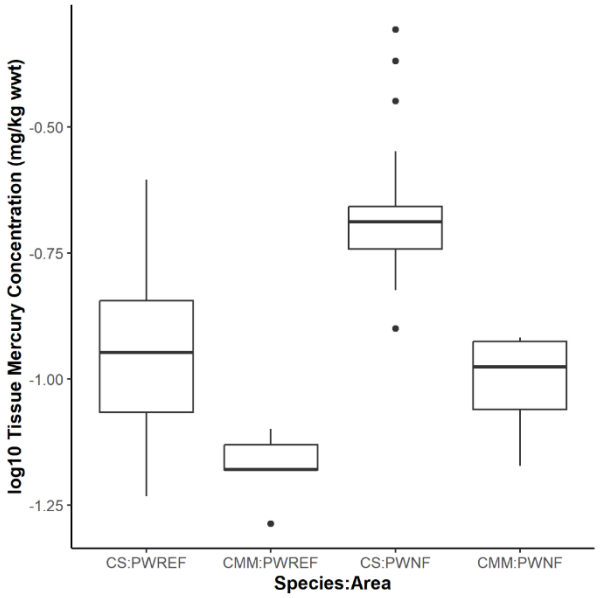

Figure 6-5 Whole Body Mercury Concentrations for Common Shiner (CS) and Central Mudminnow (CMM) Captured at Pinewood River Reference (PWREF) and Pinewood Near Field (PWNF) in 2022.

7.0 Conclusions and Recommendations

7.1 Conclusions

The current study provided the following conclusions:

- Water level loggers indicate that Area 1, 3, and 4 continue to exhibit seasonal and habitat type differences in water level fluctuations mirroring precipitation variations. Area 2 impoundment and non-impoundment water depths are higher than other Areas. There is no distinct pattern was identified to suggest that impoundment and non-impounded areas are affected by mine-related activities.

- In 2022, mining is likely not a major contributing factor to surface water concentrations of mercury in the Pinewood River. Total and dissolved mercury surface water concentrations across all sites and months were below detection limits and below both Ontario PWQO of 200 ng/L and CCME guidelines of 26 ng/L dissolved mercury.

- In 2022, methylmercury concentrations at potential exposure sites continue to remain low and in most cases below the values observed at the reference locations. All concentrations were below CCME guidelines of 4 ng/L.

- Fish communities in the reference and exposure areas continue to be diverse with 10 to 15 species being identified and with various age classes present. Density and dominant species varied between areas and between years.

- At all three sampling locations (Reference - PWREF, Near-field - PWNF, and Far -field - PWNF), Common Shiner fish tissue mercury concentrations continue to remain below the consumption guideline value for sensitive populations (0.5 mg/kg, MECP 2015) PWREF and PWFF concentrations were below the working MECP SDB guideline for the protection of fish-eating wildlife of 0.2 mg/kg and PWNF concentrations were at or near that guideline.

- Common Shiner fish tissue mercury concentrations were influenced by a combination of sample location, fork length and sample year. Despite being below the 0.5 mg/kg consumption guideline, PWNF has consistently higher mean tissue mercury concentrations than PWREF; its MOD relative to PWREF is consistently above 25% based on multiple models (pairwise comparisons from a 2022-data ANOVA model and ANCOVA model and from a 2019–2022 ANCOVA model).

- The second species for tissue mercury concentration analysis, Central Mudminnow, had nearly half the mean tissue mercury concentration of Common Shiner at the same sites but reflected and confirmed the same relative differences between PWNF and PWREF as Common Shiner.

7.2 Recommendations

The below are suggestions to modify or improve the program.

1) Assess the timing and frequency for the collection of surface water for mercury testing. Total and Dissolved Mercury are typically less than their detection limits despite detections of methylmercury. A method with a lower detection should be investigated.

2) Continue to additionally sample Central Mudminnow for between-species comparisons across sites but increase the number of fish targeted to at least 10.

3) Further exploratory analysis of surface water constituent correlations and their correlations with fish tissue mercury concentrations may reveal drivers of differences between sites.

4) Investigate the feasibility of sampling sediment pore water for mercury constituents in order to develop a spatial model that describes site- and reach-scale variability in PWREF, PWNF, and PWFF sediments. Personal communications with RRM Environment Department Staff indicate the fragmented nature of sites from various causes such as beaver dams may lead to fish affinity or movement restrictions based on natural barriers.

5) Continue to monitor and augment the study as necessary based on the mine established discharge practices.

8.0 References

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Appendix A - Detailed Data

Table A - 1: Surface Water Concentrations of Select Analytes, RRM 2017 to 2022. Since data collated from several sources, shaded areas are known <DL and were conservatively substituted as that value for analysis and plotting to align with other likely <DL data.

Area	Date	Dissolved Mercury (ng/L)	Total Mercury (ng/L)	Total Methylmercury (ng/L)	Sulphate (SO4) (mg/L)	Hardness (mg/L)
Teeple Culvert (Reference)	2017-07-26	4	4	0.88	-	-
Teeple Culvert (Reference)	2017-08-31	2	4	0.46	-	-
Teeple Culvert (Reference)	2017-09-29	1	4	0.34	-	-
Teeple Culvert (Reference)	2017-10-30	1	2	0.32	-	-
Teeple Culvert (Reference)	2018-05-10	14	2	0.45	-	-
Teeple Culvert (Reference)	2018-06-12	1	6	0.3	-	-
Teeple Culvert (Reference)	2018-07-17	1	2	0.97	-	-
Teeple Culvert (Reference)	2018-09-11	2	2	0.21	-	-
Teeple Culvert (Reference)	2018-10-16	4	5	0.1	-	-
Teeple Culvert (Reference)	2019-05-16	1	1	0.44	-	-
Teeple Culvert (Reference)	2019-06-11	30	5	0.95	-	-
Teeple Culvert (Reference)	2019-07-08	5	5	1.69	-	-
Teeple Culvert (Reference)	2019-08-13	5	5	0.52	9	-
Teeple Culvert (Reference)	2019-09-19	5	5	0.4	-	-
Teeple Culvert (Reference)	2019-10-08	5	10	0.34	-	-
Teeple Culvert (Reference)	2020-06-17	30	30	0.792	-	-

Area	Date	Dissolved Mercury (ng/L)	Total Mercury (ng/L)	Total Methylmercury (ng/L)	Sulphate (SO4) (mg/L)	Hardness (mg/L)
Teeple Culvert (Reference)	2020-07-07	5	30	1.52	-	-
Teeple Culvert (Reference)	2020-08-11	30	30	0.659	13	-
Teeple Culvert (Reference)	2020-09-15	-	-	0.35	-	-
Teeple Culvert (Reference)	2020-10-14	30	30	0.106	18	-
Teeple Culvert (Reference)	2021-05-11	5	5	0.706	19.1	-
Teeple Culvert (Reference)	2021-06-08	20.4	5.5	2.41	-	-
Teeple Culvert (Reference)	2021-10-20	5	30	0.609	23.3	-
Teeple Culvert (Reference)	2022-06-08	5	5	0.97	-	-
Teeple Culvert (Reference)	2022-07-05	5	5	1.1	-	-
Teeple Culvert (Reference)	2022-09-06	5	5	1.05	-	-
Teeple Culvert (Reference)	2022-10-04	5	5	0.455	5.09	-
SW20 (Reference)	2017-07-26	4	4	1	2	-
SW20 (Reference)	2017-08-31	1	2	0.65	1	-
SW20 (Reference)	2017-09-29	1	4	0.19	15	-
SW20 (Reference)	2017-10-30	4	2	0.19	8	111
SW20 (Reference)	2018-05-10	1	4	0.24	8	-
SW20 (Reference)	2018-06-12	4	6	1.69	3	149
SW20 (Reference)	2018-07-17	1	1	0.47	1	191
SW20 (Reference)	2018-08-07	1	1	0.21	1	175
SW20 (Reference)	2018-09-11	1	2	0.24	5	211
SW20 (Reference)	2018-10-16	4	7	0.17	25	176

Area	Date	Dissolved Mercury (ng/L)	Total Mercury (ng/L)	Total Methylmercury (ng/L)	Sulphate (SO4) (mg/L)	Hardness (mg/L)
SW20 (Reference)	2019-05-14	1	5	0.42	9	113
SW20 (Reference)	2019-06-11	5	5	1.29	4	135
SW20 (Reference)	2019-07-08	5	5	1.36	1	166
SW20 (Reference)	2019-08-13	5	5	1.57	0	185
SW20 (Reference)	2019-09-18	5	5	0.4	4	139
SW20 (Reference)	2019-10-08	5	5	0.25	4	110
SW20 (Reference)	2020-01-09	30	30	-	5	158
SW20 (Reference)	2020-02-05	30	30	-	6	178
SW20 (Reference)	2020-03-10	30	30	-	8	179
SW20 (Reference)	2020-04-08	30	5	-	3	68
SW20 (Reference)	2020-05-12	30	5	-	4	123
SW20 (Reference)	2020-06-16	30	30	0.648	1	125
SW20 (Reference)	2020-07-07	30	30	1.31	2	166
SW20 (Reference)	2020-08-11	30	30	0.396	1	149
SW20 (Reference)	2020-09-15	30	30	0.176	3	185
SW20 (Reference)	2020-10-14	30	30	0.357	7	186
SW20 (Reference)	2020-11-04	30	30	-	10	162
SW20 (Reference)	2020-11-10	30	30	-	8	162
SW20 (Reference)	2020-12-15	30	30	-	6	164
SW20 (Reference)	2021-05-11	30	5	0.258	8.6	146
SW20 (Reference)	2021-06-08	5	5	0.929	1.9	184
SW20 (Reference)	2021-07-13	5	5	0.542	0.7	185
SW20 (Reference)	2021-09-14	5	5	0.151	3.35	185
SW20 (Reference)	2021-10-20	5	5	0.591	9.75	-
SW20 (Reference)	2022-01-11	5	5	-	4.6	120
SW20 (Reference)	2022-02-08	5	5	-	4.5	140

Area	Date	Dissolved Mercury (ng/L)	Total Mercury (ng/L)	Total Methylmercury (ng/L)	Sulphate (SO4) (mg/L)	Hardness (mg/L)
SW20 (Reference)	2022-03-08	5	5	-	3.75	125
SW20 (Reference)	2022-04-05	5	5	-	6.45	96.4
SW20 (Reference)	2022-05-03	5	5	-	1.95	49.6
SW20 (Reference)	2022-06-07	5	5	0.495	0.85	91.2
SW20 (Reference)	2022-09-06	5	5	0.873	0.8	157
SW20 (Reference)	2022-07-05	5	5	0.904	0.75	123
SW20 (Reference)	2022-08-09	5	5	-	0.55	125
SW20 (Reference)	2022-09-06	5	5	0.873	0.8	157
SW20 (Reference)	2022-12-10	5	5	-	4.55	164
SW20 (Reference)	2022-10-04	5	5	-	1.00	156
SW20 (Reference)	2022-11-11	5	5	-	3.90	144
SW10	2017-07-26	2	8	0.52	1	-
SW10	2017-08-30	1	1	0.19	2	-
SW10	2017-09-29	1	4	0.29	4	-
SW10	2017-10-30	2	4	0.3	6	130
SW10	2018-05-09	1	8	0.44	6	109
SW10	2018-06-12	2	4	0.32	2	145
SW10	2018-07-17	1	1	0.57	2	214
SW10	2018-08-07	1	1	0.22	2	241
SW10	2018-09-11	1	1	0.14	5	268
SW10	2018-10-16	5	8	0.17	21	174
SW10	2019-05-14	1	1	0.67	6	103
SW10	2019-06-11	5	5	1.19	3	132
SW10	2019-07-08	5	5	1.22	1	185
SW10	2019-08-13	5	5	0.37	1	231
SW10	2019-09-18	5	5	0.61	5	133
SW10	2019-10-08	5	5	0.28	5	107
SW10	2020-01-09	30	5	-	5	176
SW10	2020-02-05	30	5	-	5	190
SW10	2020-03-10	30	30	-	8	203
SW10	2020-04-08	30	5	-	3	76

Area	Date	Dissolved Mercury (ng/L)	Total Mercury (ng/L)	Total Methylmercury (ng/L)	Sulphate (SO4) (mg/L)	Hardness (mg/L)
SW10	2020-05-14	30	30	-	4	113
SW10	2020-06-16	30	30	0.727	1	128
SW10	2020-07-07	30	30	0.829	1	148
SW10	2020-08-12	30	30	0.298	2	169
SW10	2020-09-15	30	30	0.174	2	199
SW10	2020-10-14	30	30	0.19	1	174
SW10	2020-11-10	30	30	-	10	162
SW10	2020-12-15	30	30	-	8	195
SW10	2021-05-11	5	5	0.353	6.75	144
SW10	2021-06-08	30	5	0.744	3.15	183
SW10	2021-07-13	5	5	0.289	2.65	224
SW10	2021-09-14	5	5	0.14	13.3	304
SW10	2021-10-20	5	5	0.687	7.95	-
SW10	2022-03-08	5	5	-	6.2	154
SW10	2022-01-11	5	5	-	7.25	149
SW10	2022-02-08	5	5	-	6.2	157
SW10	2022-03-08	5	5	-	6.2	154
SW10	2022-04-05	5	5	-	4.95	88.7
SW10	2022-05-03	5	5	0.143	2.00	50.8
SW10	2022-06-07	5	5	0.453	17.7	88.7
SW10	2022-07-05	5	5	0.935	0.90	128
SW10	2022-08-09	5	5	-	0.75	124
SW10	2022-09-06	5	5	-	2.10	175
SW10	2022-10-04	-	-	0.278	-	-
SW10	2022-10-03	5	5	-	3.05	171
SW10	2022-11-11	5	5	-	4.05	169
SW22A	7-26-2017	4	4	4	14	-
SW22A	8-30-2017	4	4	4	3	-
SW22A	9-29-2017	2	4	4	73	-
SW22A	10-27-2017	2	2	2	36	-
SW22A	2018-05-09	1	1	0.45	12	-
SW22A	2018-06-12	1	2	0.83	16	210
SW22A	2018-07-17	1	1	0.5	22	240
SW22A	2018-08-09	1	1	-	9	238

Area	Date	Dissolved Mercury (ng/L)	Total Mercury (ng/L)	Total Methylmercury (ng/L)	Sulphate (SO4) (mg/L)	Hardness (mg/L)
SW22A	2018-09-11	1	1	0.39	34	291
SW22A	2018-10-16	5	5	0.23	51	239
SW22A	2019-05-15	1	1	0.47	12	134
SW22A	2019-06-11	5	5	0.5	13	151
SW22A	2019-07-08	5	5	0.47	12	183
SW22A	2019-08-13	5	5	0.78	5	216
SW22A	2019-09-19	5	5	0.6	44	225
SW22A	2019-10-08	5	5	0.35	19	140
SW22A	2020-01-09	30	30	-	8	204
SW22A	2020-02-05	30	30	-	5	198
SW22A	2020-03-11	30	30	-	10	229
SW22A	2020-04-09	30	5	-	5	95
SW22A	2020-05-13	30	5	-	10	149
SW22A	2020-06-17	15	30	1.92	8	166
SW22A	2020-07-10	30	30	1.26	36	210
SW22A	2020-08-11	30	5	0.785	17	180
SW22A	2020-09-15	30	30	0.595	12	224
SW22A	2020-10-19	30	30	0.508	286	330
SW22A	2020-11-04	30	30	-	332	342
SW22A	2020-11-10	30	30	-	345	330
SW22A	2020-12-16	30	30	-	71	278
SW22A	2021-05-12	5	5	0.209	45.6	206
SW22A	2021-06-08	30	30	1.91	58.5	240
SW22A	2021-09-15	5	5	0.356	223	390
SW22A	2021-10-20	5	5	0.527	144	-
SW22A	2022-01-11	5	5	-	13.6	196
SW22A	2022-02-16	5	5	-	7.45	195
SW22A	2022-03-08	5	5	-	7.75	202
SW22A	2022-04-05	5	5	-	7.05	105
SW22A	2022-05-04	5	5	-	34.4	4:48
SW22A	2022-06-07	5	5	0.02	33.4	180
SW22A	2022-07-06	5	5	0.743	-	-
SW22A	2022-07-12	5	5	-	3.64	134
SW22A	2022-08-10	5	5	-	5.5000000	150.0000000

Area	Date	Dissolved Mercury (ng/L)	Total Mercury (ng/L)	Total Methylmercury (ng/L)	Sulphate (SO4) (mg/L)	Hardness (mg/L)
SW22A	2022-09-07	5	5	0.451	5.20	197
SW22A	2022-10-04	5	5	0.226	49.3	217
SW22A	2022-11-11	5	5	-	50.7	194
SW22A	2022-12-11	5	5	-	5.45	201
SW03	7-26-2017	2	8	0.29	15	-
SW03	8-29-2017	1	4	0.23	5	-
SW03	9-29-2017	1	4	0.29	72	-
SW03	10-27-2017	2	2	0.24	35	-
SW03	2018-05-09	1	4	0.38	10	129
SW03	2018-06-12	2	4	0.37	8	160
SW03	2018-07-17	1	1	0.32	14	193
SW03	2018-08-07	1	1	0.25	15	202
SW03	2018-09-11	10	3	0.28	33	228
SW03	2018-10-16	4	7	0.21	50	235
SW03	2019-05-15	1	1	0.63	11	129
SW03	2019-06-11	5	5	0.57	15	151
SW03	2019-07-08	5	5	0.57	5	169
SW03	2019-08-13	5	5	0.16	16	208
SW03	2019-09-18	5	5	0.56	33	187
SW03	2019-10-08	5	5	0.39	17	133
SW03	2020-01-09	30	30	-	7	190
SW03	2020-02-04	30	5	-	6	201
SW03	2020-03-10	30	5	-	9	225
SW03	2020-04-07	30	30	-	5	96
SW03	2020-05-12	5	5	-	0.3	117
SW03	2020-06-17	5	5	0.966	6	146
SW03	2020-07-07	30	30	0.493	32	203
SW03	2020-08-11	30	30	0.154	15	164
SW03	2020-09-15	30	30	0.151	18	194
SW03	2020-10-14	30	30	0.364	13	170
SW03	2020-11-10	30	30	-	251	303
SW03	2020-12-15	30	30	-	86	291
SW03	2021-05-11	5	5	0.282	41.5	180
SW03	2021-06-08	30	30	1.62	30.3	216

Area	Date	Dissolved Mercury (ng/L)	Total Mercury (ng/L)	Total Methylmercury (ng/L)	Sulphate (SO4) (mg/L)	Hardness (mg/L)
SW03	2021-07-13	5	5	0.916	9.15	186
SW03	2021-08-10	5	30	0.406	14.1	187
SW03	2021-10-20	5	5	0.595	86.3	-
SW03	2022-03-08	5	5	-	6.65	197
SW03	2022-01-11	5	5	-	14.9	208
SW03	2022-04-05	5	5	-	7.40	106
SW03	2022-05-03	5	5	-	17.7	86.4
SW03	2022-06-07	5	5	0.101	68.6	150
SW03	2022-07-05	5	5	-	21.0	149
SW03	2022-08-10	5	5	-	12.8	149
SW03	2022-09-06	5	5	0.676	4.85	188
SW03	2022-10-04	5	5	-	9.90	197
SW03	2022-11-12	5	5	-	121	240
SW24	7-26-2017	-	-	0.37	-	-
SW24	8-29-2017	-	-	0.27	-	-
SW24	9-29-2017	-	-	0.35	-	-
SW24	10-27-2017	-	-	0.37	-	-
SW24	2018-05-09	1	4	0.34	7	-
SW24	2018-06-12	4	6	0.6	4	210
SW24	2018-07-17	3	7	0.38	3	240
SW24	2018-08-07	1	3	0.57	3	238
SW24	2018-09-11	3	6	0.66	6	291
SW24	2018-10-16	5	7	0.17	29	239
SW24	2019-05-15	1	10	0.47	8	134
SW24	2019-06-11	10	5	0.75	7	151
SW24	2019-07-08	5	5	0.53	2	183
SW24	2019-08-13	5	5	0.53	2	216
SW24	2019-09-20	5	5	0.52	13	225
SW24	2019-10-08	5	5	0.44	8	140
SW24	2020-01-09	30	30	-	4	170
SW24	2020-02-04	30	5	-	4	180
SW24	2020-03-10	30	30	-	7	216
SW24	2020-04-07	30	5	-	4	87
SW24	2020-05-12	30	10	-	85	168

Area	Date	Dissolved Mercury (ng/L)	Total Mercury (ng/L)	Total Methylmercury (ng/L)	Sulphate (SO4) (mg/L)	Hardness (mg/L)
SW24	2020-06-17	5	30	0.995	3	116
SW24	2020-07-07	5	30	0.693	10	155
SW24	2020-08-11	30	30	0.166	109	230
SW24	2020-09-15	5	30	0.471	3	139
SW24	2020-10-14	30	30	0.326	275	261
SW24	2020-11-04	30	30	-	343	313
SW24	2020-11-10	30	30	-	312	296
SW24	2020-12-16	30	30	-	51	224
SW24	2021-05-11	5	5	0.415	16.7	131
SW24	2021-06-08	5	30	0.726	13.1	179
SW24	2021-07-13	5	5	0.88	8.4	214
SW24	2021-10-20	5	5	0.555	156	-
SW24	08-Feb-22	5	5	-	7.75	110
SW24	08-Mar-22	5	5	-	5.7	201
SW24	03-May-22	5	5	-	12	61.9
SW24	07-Jun-22	5	5	0.392	24.2	134
SW24	5-Jul-2022	5	5	-	13	139
SW24	06-Sep-22	5	5	0.43	2.55	176
SW24	09-Aug-22	5	5	-	12	149
SW24	04-Oct-22	5	5	-	3.1	170
SW24	08-Nov-22	5	5	-	294	337

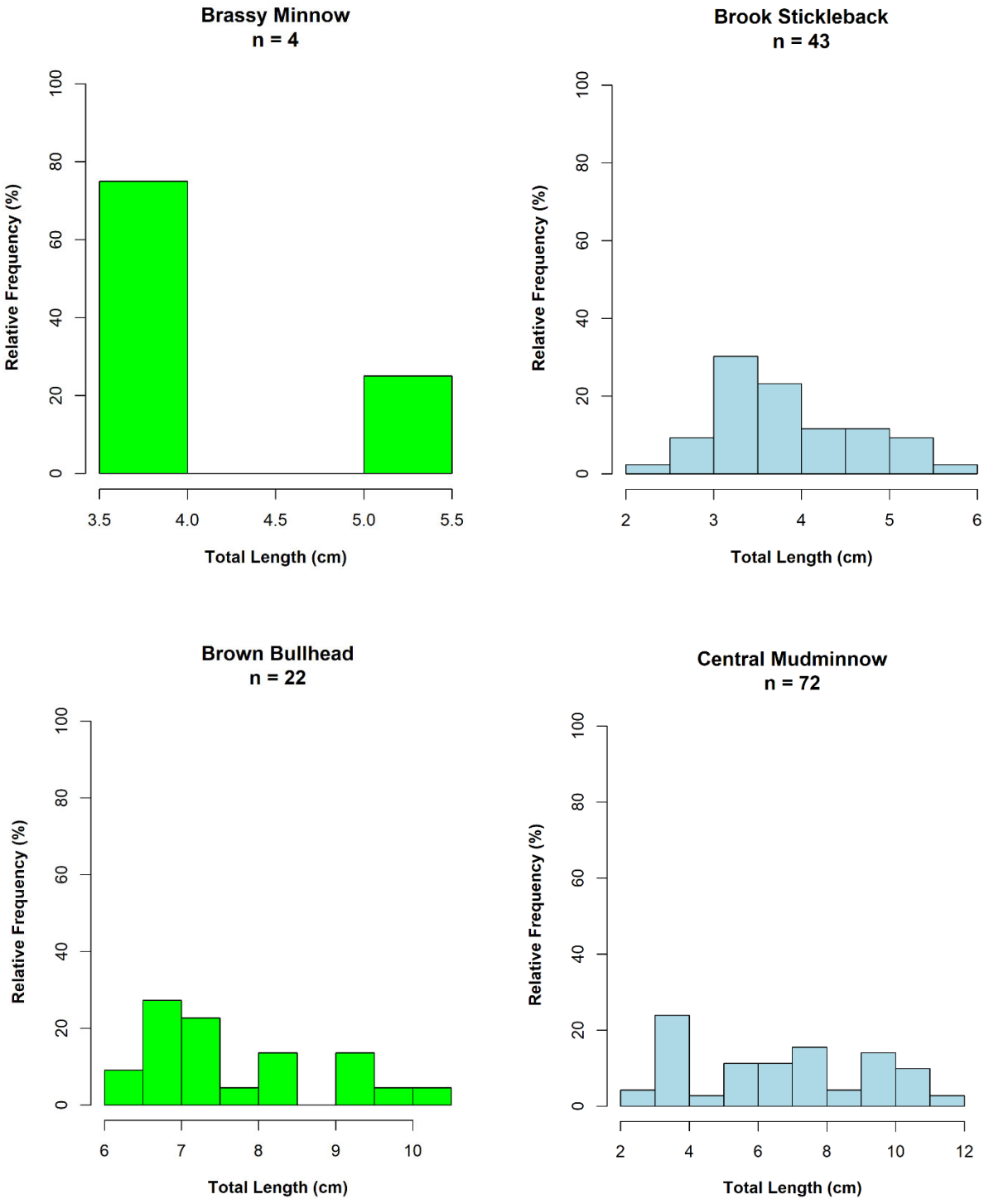

Figure A - 1: Length-frequency distributions for fish collected at PWREF, 2022

Note: Finescale Dace (n=4) was not plotted due to low capture numbers.

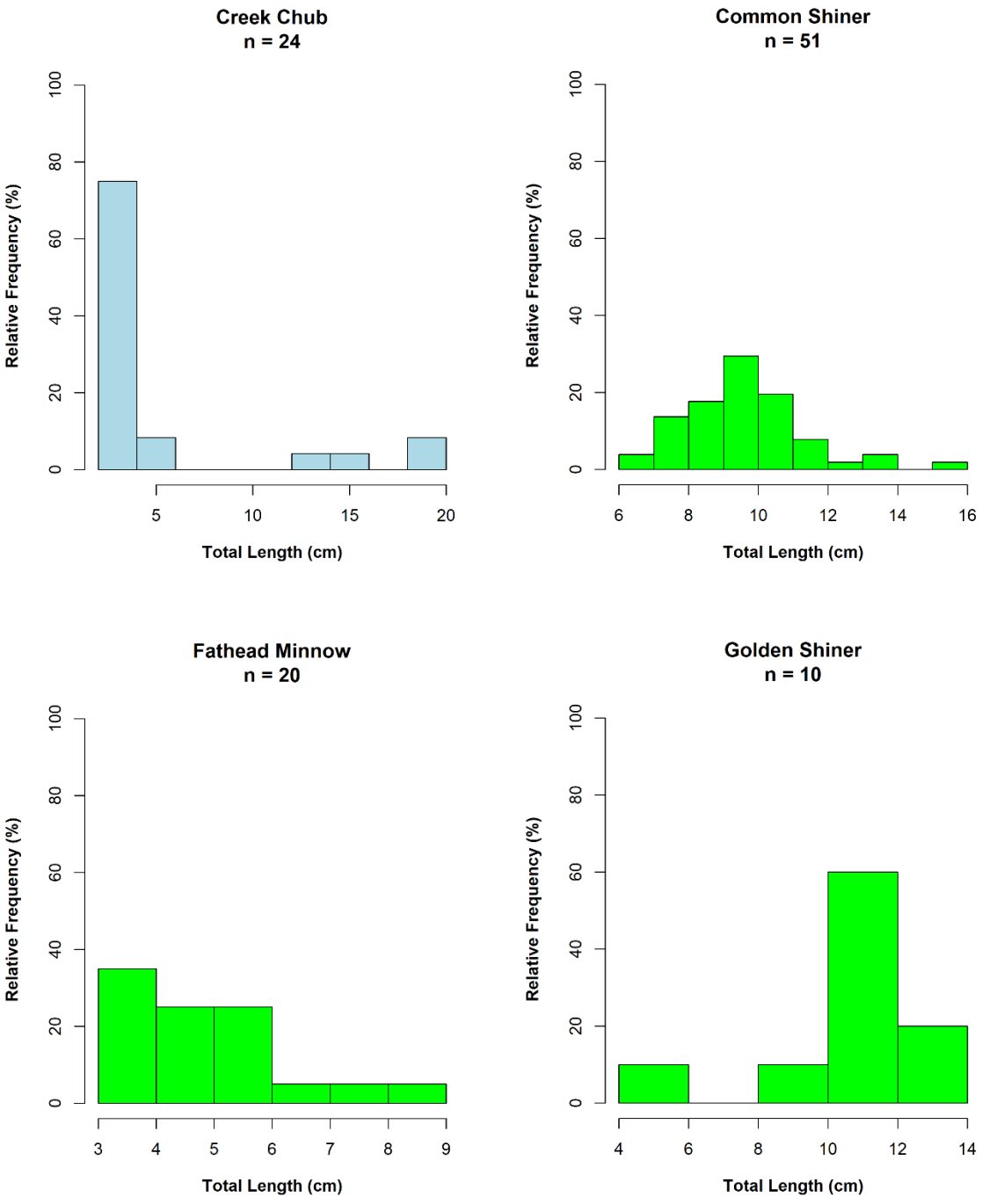

Figure A-1: Length-frequency distributions for fish collected at PWREF, 2022

Note: Finescale Dace (n=4) was not plotted due to low capture numbers.

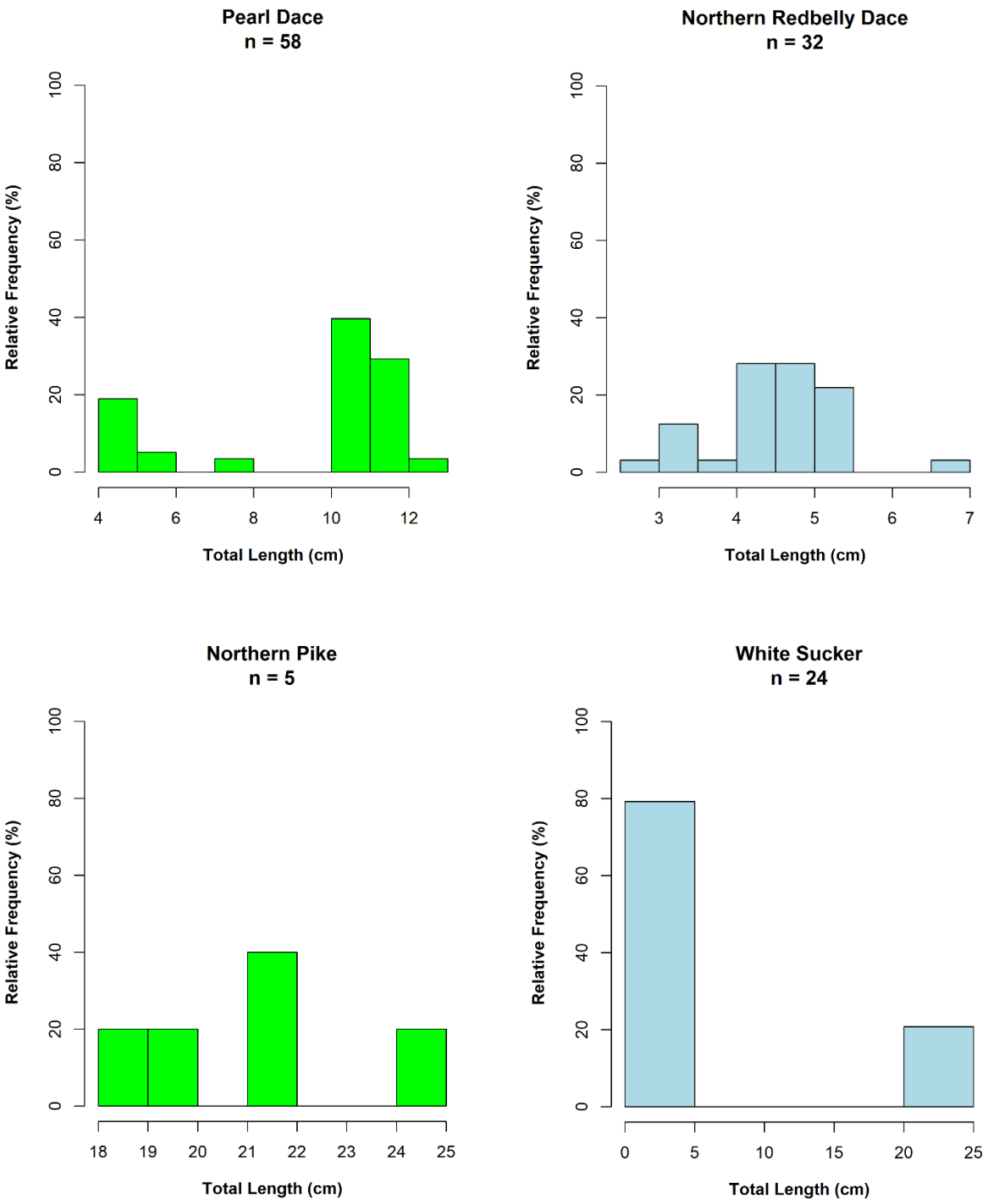

Figure A-1: Length-frequency distributions for fish collected at PWREF, 2022

Note: Finescale Dace (n=4) was not plotted due to low capture numbers.

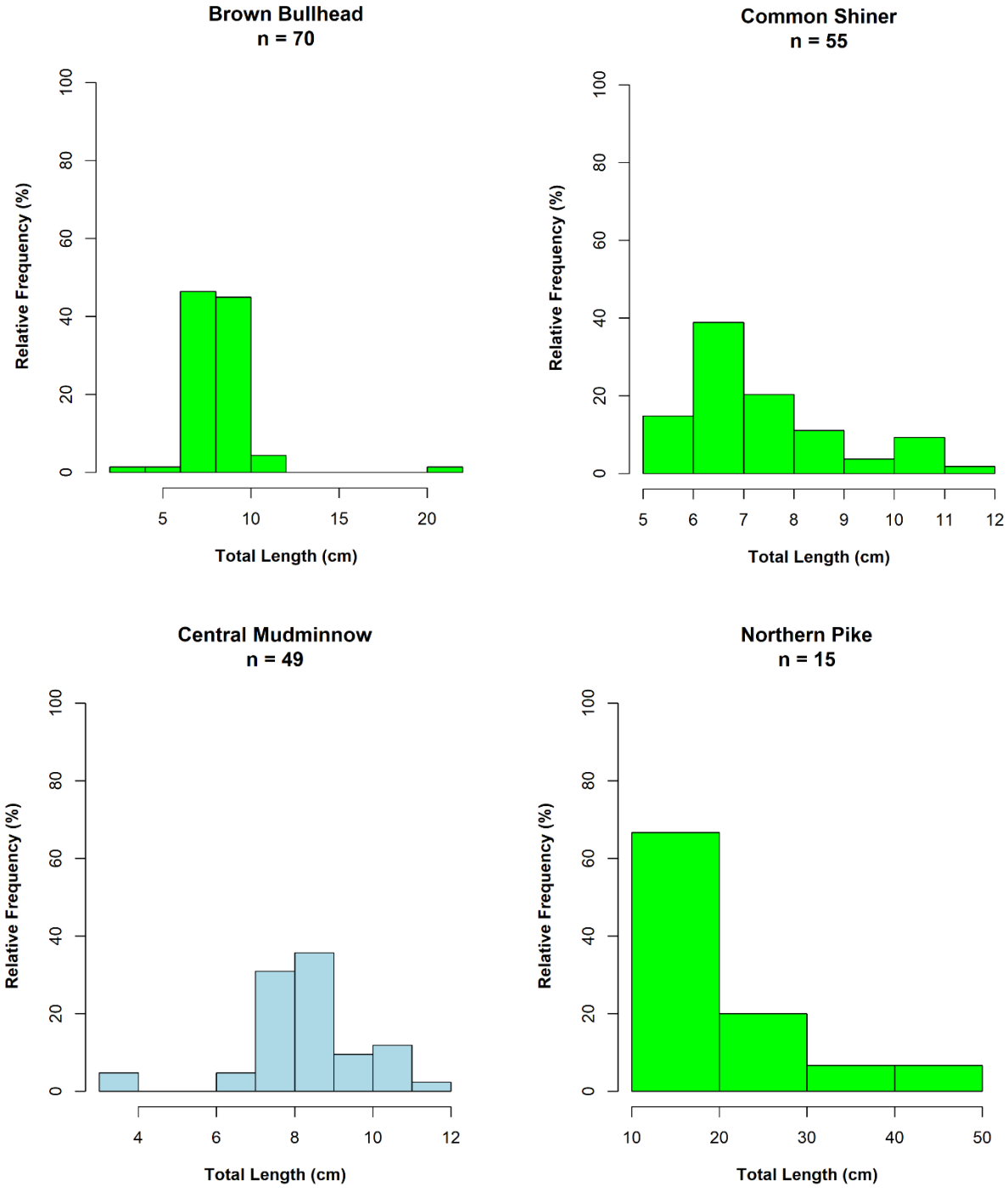

Figure A - 2: Length-frequency distributions for fish collected at PWNF, 2022

Note: Creek Chub (n=2), Fathead Minnow (n=1), and Golden Shiner (n=3) were not plotted due to low capture numbers

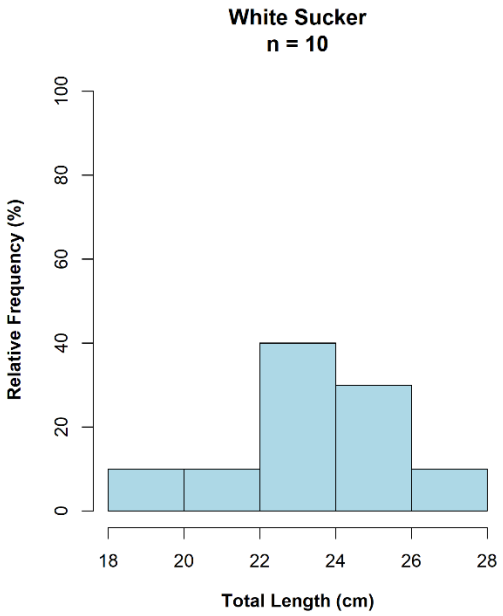

Figure A - 2: Length-frequency distributions for fish collected at PWNF, 2022

Note: Creek Chub (n=2), Fathead Minnow (n=1), and Golden Shiner (n=3) were not plotted due to low capture numbers

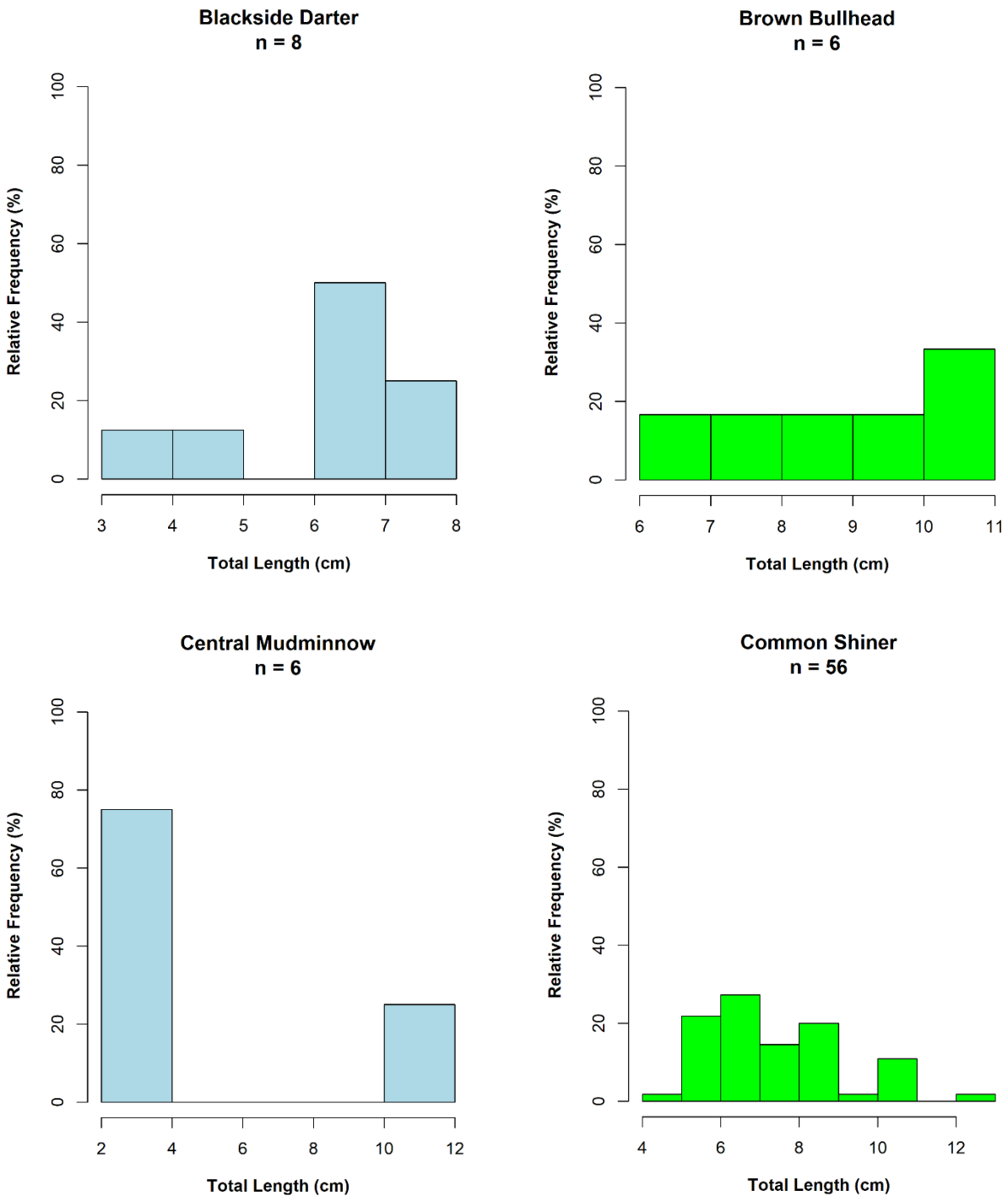

Figure A - 3: Length-frequency distributions for fish collected at PWFF, 2022

Note: Creek Chub (n=3), Fathead Minnow (n=2), Golden Shiner (n=1), Johnny Darter (n=3), Pearl Dace (n=1), Trout Perch (n=2) Walleye (n=1) and White Sucker (n= 2) were not plotted due to low capture numbers.

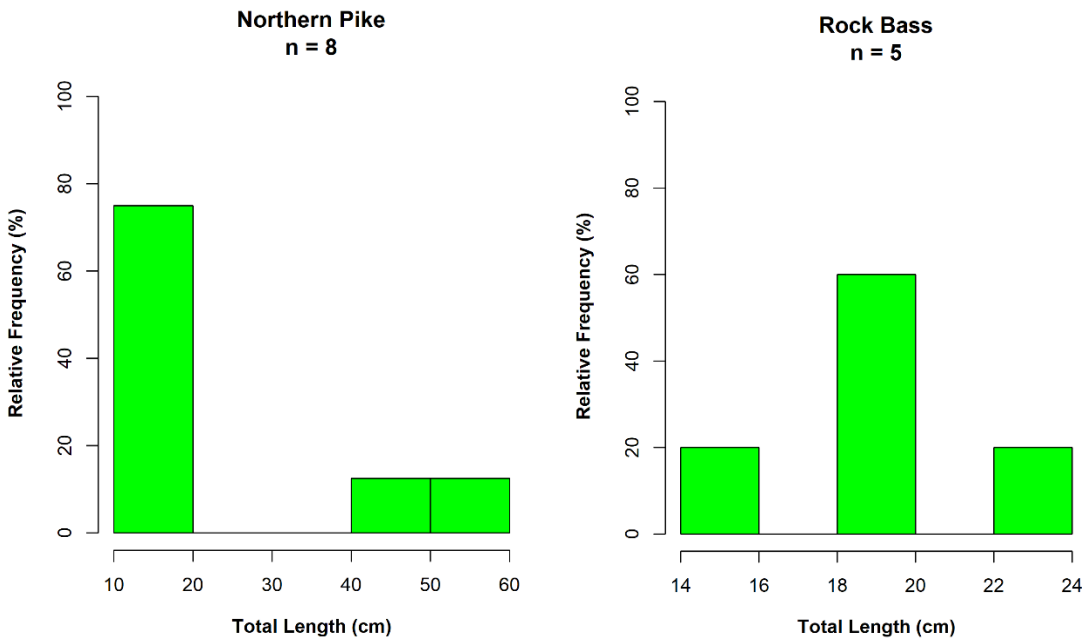

Figure A - 3: Length-frequency distributions for fish collected at PWFF, 2022

Note: Creek Chub (n=3), Fathead Minnow (n=2), Golden Shiner (n=1), Johnny Darter (n=3), Pearl Dace (n=1), Trout Perch (n=2), Walleye (n=1) and White Sucker (n= 2) were not plotted due to low capture numbers.

Table A - 2: Detailed electrofishing data in Pinewood River - July 2022

Location	GearID	Northings (NAD 83, 15U)	Eastings (NAD 83, 15U)	Date	Effort (sec)	CPUE	Depth (m)	Central Mudminnow	Central Mudminnow YOY	Brook Stickleback	Brook Stickleback YOY	Finescale Dace	Northern Redbelly Dace	Fathead Minnow	Fathead Minnow YOY	Creek Chub	Creek Chub YOY	Brassy Minnow	Brown Bullhead	White Sucker	Common Shiner	Pearl Dace	Golden Shiner	Johnny Darter	Blackside Darter	Northern Pike	Trout Perch	Rock Bass	Walleye	YOY	Total Fish
Pinewood River Near Field	PRNFEF-01	5408021	419687	25-Jul-22	1024	0.70	0-1	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
	PRNFEF-02	5408091	419712	25-Jul-22	1524	0.51	0-1	9	0	0	0	0	0	1	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	13
	PRNFEF-03	540882	419576	25-Jul-22	1645	0.33	0-1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	9
				Total	**4193**			**28**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**1**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**34**
Pinewood River Far Field	PRFFEF-01	5407114	414884	26-Jul-22	1224	0.20	0-1.0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	4
	PRFFEF-02	5407155	414884	26-Jul-22	1025	0.47	0-1.0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	1	3	0	0	0	0	0	8
	PRFFEF-03	5407058	415499	27-Jul-22	1097	0.16	0-1.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3
				Total	**3346**			**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**2**	**3**	**2**	**0**	**0**	**0**	**0**	**15**
Pinewood River Reference	PRREFEF-01	5407719	430991	27-Jul-22	1031	5.30	0-1.0	14	0	24	0	0	9	1	0	11	0	0	0	12	0	0	0	0	0	0	0	0	0	20	91
	PRREFEF-02	5407671	430946	27-Jul-22	1013	5.09	0-0.5	13	21	6	0	0	12	11	0	6	0	3	0	6	0	0	0	0	0	0	0	0	0	8	86
	PRREFEF-03	5407633	430856	27-Jul-22	1097	2.46	0-1.0	8	0	0	0	0	32	1	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	1	45
				Total	**3141**			**35**	**21**	**30**	**0**	**0**	**53**	**13**	**0**	**19**	**0**	**3**	**0**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**29**	**222**

Table A - 3: Detailed gill net data in Pinewood River - July 2022

Location	GearID	Northings (NAD 83, 15U)	Eastings (NAD 83, 15U)	Date	Set Time	Effort (hrs)	CPUE	Central Mudminnow	Central Mudminnow YOY	Brook Stickleback	Brook Stickleback YOY	Finescale Dace	Northern Redbelly Dace	Fathead Minnow	Fathead Minnow YOY	Creek Chub	Creek Chub YOY	Brassy Minnow	Brown Bullhead	White Sucker	Common Shiner	Pearl Dace	Golden Shiner	Johnny Darter	Blackside Darter	Northern Pike	Trout Perch	Rock Bass	Walleye	YOY	Total Fish
Pinewood River Near Field	PRNFGN01	5408093	419853	24-Jul-22	16:45	16.25	0.12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
	PRNFGN02	5408094	419819	24-Jul-22	16:50	16.33	0.49	2	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1	0	0	2	0	0	0	0	8
	PRNFGN03	5408115	419777	24-Jul-22	17:00	16.25	0.12	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
	PRNFGN04	5408095	419697	24-Jul-22	17:10	16.92	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRNFGN05	5408037	419716	24-Jul-22	17:15	17.00	0.24	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	4
	PRNFGNO6	5408056	419644	24-Jul-22	17:20	17.58	0.06	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
				Total		**100.3**		**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**2**	**3**	**2**	**0**	**1**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**17**
Pinewood River Far Field	PRFFGN-01	5407106	414853	19-Jul-22	13:10	19.34	0.16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
	PRFFGN-02	5407048	414839	19-Jul-22	13:25	19.66	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	PRFFGN-03	5406952	414845	19-Jul-22	13:35	19.5	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	PRFFGN-04	5405690	412978	19-Jul-22	14:35	20.25	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	PRFFGN-05	5405703	412937	19-Jul-22	14:45	20.42	0.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
	PRFFGN-06	5405738	412889	20-Jul-22	14:55	20.78	0.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
				Total		**120**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**3**	**0**	**5**	**1**	**0**	**10**
Pinewood River Reference	PRREFGN1	5407709	430639	25-Jul-22	16:40	18.417	0.65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	2	0	0	3	0	0	0	0	12
	PRREFGN2	5407643	430698	25-Jul-22	16:55	18.583	0.81	0	0	0	0	0	0	0	0	0	0	0	0	4	0	10	0	0	0	1	0	0	0	0	15
	PRREFGN3	5407621	430797	25-Jul-22	17:00	18.833	0.96	3	0	2	0	0	2	0	0	0	0	0	0	1	0	8	1	0	0	1	0	0	0	0	18
	PRREFGN4	5407658	430898	25-Jul-22	17:10	17.333	0.98	0	4	0	0	0	0	0	0	1	0	0	0	0	1	11	0	0	0	0	0	0	0	0	17
	PRREFGN5	5407694	430978	25-Jul-22	17:15	17.25	0.87	2	0	0	0	0	0	0	0	0	0	0	0	0	1	10	0	0	0	0	0	0	0	2	15
	PRREFGN6	5407737	430993	25-Jul-22	17:20	16.917	1.42	1	0	1	0	0	0	0	0	0	0	0	0	0	8	14	0	0	0	0	0	0	0	0	24
				Total		**107.3**		**6**	**4**	**3**	**0**	**0**	**2**	**0**	**0**	**1**	**0**	**0**	**0**	**5**	**10**	**60**	**3**	**0**	**0**	**5**	**0**	**0**	**0**	**2**	**101**

Table A - 4: Detailed seine net in Pinewood River - July 2022

Location	GearID	Northings (NAD 83, 15U)	Eastings (NAD 83, 15U)	Date	Effort (m^2)	CPUE	Central Mudminnow	Central Mudminnow	Brook Stickleback	Brook Stickleback YOY	Finescale Dace	Northern Redbelly Dace	Fathead Minnow	Fathead Minnow YOY	Creek Chub	Creek Chub YOY	Brassy Minnow	Brown Bullhead	White Sucker	Common Shiner	Pearl Dace	Golden Shiner	Johnny Darter	Blackside Darter	Northern Pike	YOY	Total Fish
Pinewood River Near Field	PRNFSN01	5408091	419600	24-Jul-22	15	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRNFSN02	5408064	419655	24-Jul-22	16.5	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRNFSN03	5408022	419683	24-Jul-22	20	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRNFSN04	5408112	419879	25-Jul-22	15	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRNFSN05	5408156	420301	25-Jul-22	15	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRNFSN06	5408103	420361	25-Jul-22	**120**	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total				**201.5**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table A - 5: Detailed minnow trap data in Pinewood River - July 2022

Location	GearID	Northings (NAD 83, 15U)	Eastings (NAD 83, 15U)	Set Date	Set Time	Lift Date	Lift Time	Set Days	Hours	Trap (No.)	Total Effort	CPUE	Depth (m)	Central Mudminnow	Central Mudminnow YOY	Brook Stickleback	Brook Stickleback YOY	Finescale Dace	Northern Redbelly Dace	Fathead Minnow	Fathead Minnow YOY	Creek Chub	Creek Chub YOY	Brassy Minnow	Brown Bullhead	White Sucker	Common Shiner	Pearl Dace	Golden Shiner	Johnny Darter	Blackside Darter	Northern Pike	YOY	Total Fish
Pinewood River Near Field	PRNFMT-01	5408127	419588	20-Jul-22	14:20	23-Jul-22	16:00	3	2.67	3	224.01	0.031	1.5	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	7
	PRNFMT-02	5408126	419495	20-Jul-22	14:30	23-Jul-22	16:25	3	1.92	3	221.75	0.018	2	1	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	4
	PRNFMT-03	5408114	419452	20-Jul-22	14:40	23-Jul-22	16:25	3	1.75	3	221.25	0.032	0.5	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	7
	PRNFMT-04	5408113	419537	20-Jul-22	14:50	23-Jul-22	15:55	3	1.08	3	219.24	0.041	2	2	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	9
	PRNFMT-05	5408080	419580	20-Jul-22	14:55	23-Jul-22	15:40	3	0.75	3	218.25	0.027		0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	6
	PRNFMT-06	5408011	419702	24-Jul-22	15:40	26-Jul-22	8:55	2	17.25	3	195.75	0.026	1	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	5
	PRNFMT-07	5408057	419712	24-Jul-22	15:50	26-Jul-22	9:00	2	17.10	3	195.30	0.189	1.5	0	0	0	0	0	0	0	0	0	0	0	37	0	0	0	0	0	0	0	37
	PRNFMT-08	5408099	419719	24-Jul-22	16:00	25-Jul-22	9:15	1	17.25	3	51.75	2.744	1	2	0	0	0	0	0	0	0	0	0	0	140	0	0	0	0	0	0	0	142
	PRNFMT-09	5408105	419800	24-Jul-22	16:30	25-Jul-22	9:30	1	17.00	3	51.00	0.118	1.5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
	PRNFMT-10	5408106	419857	24-Jul-22	16:40	25-Jul-22	9:45	1	6.25	3	18.75	0.107		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
										Total	**1617.05**			**17**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**205**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**225**
Pinewood River Far Field	PRFFMT-01	5407163	414909	19-Jul-22	12:55	21-Jul-22	7:55	1	19.00	3	129.00	0.000	0-1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRFFMT-02	5407049	414834	19-Jul-22	13:20	21-Jul-22	8:00	1	18.67	2	85.34	0.000		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRFFMT-03	5407011	414854	19-Jul-22	13:30	21-Jul-22	8:10	1	18.67	3	128.01	0.000		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRFFMT-04	5405688	412951	19-Jul-22	14:40	21-Jul-22	9:00	1	18.33	3	126.99	0.000		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRFFMT-05	5405730	412873	19-Jul-22	15:00	21-Jul-22	9:10	1	18.17	2	84.34	0.000	1.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRFFMT-06	5407142	414908	26-Jul-22	11:55	27-Jul-22	14:20	1	3.42	5	137.10	0.029		0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	4
	PRFFMT-07	5407104	414853	26-Jul-22	12:00	27-Jul-22	14:30	1	2.50	5	132.50	0.015		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	2
	PRFFMT-08	5406971	414858	26-Jul-22	12:10	27-Jul-22	14:40	1	2.50	5	132.50	0.000		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRFFMT-09	5409654	414811	26-Jul-22	12:20	27-Jul-22	14:50	1	2.50	5	132.50	0.038		2	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	5
	PRFFMT-10	5406988	414761	26-Jul-22	12:25	27-Jul-22	15:05	1	2.75	5	133.75	0.209	1.5	0	0	5	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	20	28
	PRFFMT-11	-	-	26-Jul-22	12:35	27-Jul-22	15:15	1	2.67	5	133.35	0.000	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
										Total	**1355.38**			**2**	**0**	**5**	**0**	**0**	**0**	**2**	**0**	**1**	**0**	**0**	**5**	**0**	**2**	**0**	**0**	**0**	**0**	**2**	**20**	**39**
Pinewood River Reference	PRREFMT1	5407623	430957	25-Jul-22	16:10	26-Jul-22	13:00	1	21.83	4	87.33	0.000	1-2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRREFMT2	5407683	4309689	25-Jul-22	16:25	26-Jul-22	13:00	1	21.58	5	107.92	0.269	1.0-1.7	7	0	4	0	0	2	0	0	0	0	0	0	0	9	0	0	0	0	0	7	29
	PRREFMT3	5407692	430976	25-Jul-22	16:20	26-Jul-22	12:45	1	20.42	4	81.67	0.576	0.7-1.5	3	0	1	0	0	2	0	0	0	0	0	4	0	33	2	0	0	0	0	2	47
	PRREFMT4	5407714	430982	25-Jul-22	16:30	26-Jul-22	12:40	1	20.17	5	100.83	0.159		2	0	0	0	0	5	0	0	0	0	0	3	0	4	0	0	0	0	0	2	16
	PRREFMT5	5407716	430998	25-Jul-22	16:30	26-Jul-22	11:20	1	18.83	5	94.17	0.106		2	0	5	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	10
	PRREFMT6	5407716	430998	25-Jul-22	16:35	26-Jul-22	10:50	1	18.25	5	91.25	0.186		1	0	3	0	0	0	3	0	0	0	0	4	0	6	0	0	0	0	0	0	17
	PRREFMT5B (07)	5407716	430998	26-Jul-22	13:10	27-Jul-22	8:00	1	18.83	3	56.50	0.000		0	1	6	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
										Total	**1182.83**			**15**	**1**	**19**	**0**	**1**	**9**	**3**	**0**	**0**	**0**	**0**	**18**	**0**	**52**	**2**	**0**	**0**	**0**	**0**	**11**	**131**

Table A - 6: Detailed seine net data in Pinewood River - August/September 2022

Location	GearID	Northings (NAD 83, 15U)	Eastings (NAD 83, 15U)	Set Date	Lift Date	Total Effort	CPUE	Depth (m)	Central Mudminnow	Central Mudminnow YOY	Brook Stickleback	Brook Stickleback YOY	Finescale Dace	Northern Redbelly Dace	Fathead Minnow	Fathead Minnow YOY	Creek Chub	Creek Chub YOY	Brassy Minnow	Brown Bullhead	White Sucker	Common Shiner	Pearl Dace	Golden Shiner	Johnny Darter	Blackside Darter	Northern Pike	Trout Perch	YOY	Total Fish
Pinewood River Reference	PRREFSN01	5407613	430729	01-Sep-22	01-Sep-22	16.5	0.48	0 - 1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8
	PRREFSN02	5407624	430782	01-Sep-22	01-Sep-22	15	7.40	0 - 1.2	0	0	31	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	111
	PRREFSN03	5407622	430822	01-Sep-22	01-Sep-22	18	4.06	0 - 1.2	0	0	20	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	73
	PRREFSN04	5407629	430863	01-Sep-22	01-Sep-22	16.5	2.24	0 - 1.2	0	0	26	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	37
	PRREFSN05	5407692	430968	02-Sep-22	02-Sep-22	15	18.27	0 - 1.2	0	0	8	0	2	0	0	0	1	0	0	3	0	4	161	0	0	0	0	0	95	274
	PRREFSN06	5407651	430914	02-Sep-22	02-Sep-22	16.5	1.76	0 - 1	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	29
	PRREFSN07	5407606	430807	02-Sep-22	02-Sep-22	16.5	5.82	0 - 1	0	0	41	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	27	96
	PRREFSN08	5407604	430718	02-Sep-22	02-Sep-22	16.5	1.70	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	11	28
	PRREFSN09	5407617	430706	02-Sep-22	02-Sep-22	20	0.50	0 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	9	10
					Total	**150.5**			**0**	**0**	**157**	**0**	**9**	**0**	**0**	**0**	**1**	**0**	**0**	**3**	**0**	**4**	**199**	**0**	**0**	**0**	**0**	**0**	**293**	**666**
Pinewood River Near Field	PRNFSN01	5408087	419441	30-Aug-22	30-Aug-22	32	0.06	0 - 0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
	PRNFSN02	5408109	419480	30-Aug-22	30-Aug-22	36	0.08	0 - 1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3
	PRNFSN03	5408107	419782	30-Aug-22	30-Aug-22	24	0.63	0 - 1	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	15
	PRNFSN04	5408030	419719	30-Aug-22	30-Aug-22	24	0.42	0-1	0	0	0	0	0	0	0	0	1	0	0	0	0	7	0	0	0	0	2	0	0	10
	PRNFSN05	5408118	419499	30-Aug-22	30-Aug-22	30	0.07	0 - 0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
	PRNFSN06	5408103	419530	30-Aug-22	30-Aug-22	24	0.50	0 - 0.75	0	0	0	0	0	0	0	0	0	0	0	2	0	9	0	1	0	0	0	0	0	12
	PRNFSN07	5408107	419465	31-Aug-22	31-Aug-22	24	1.54	0 -1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	32	37
	PRNFSN08	5408072	419545	31-Aug-22	31-Aug-22	32	0.75	0 - 1	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	3	0	0	0	0	8	24
	PRNFSN09	5408073	415880	31-Aug-22	31-Aug-22	20	1.10	0 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	1	0	0	0	0	7	22
	PRNFSN10	5408074	419569	03-Sep-22	03-Sep-22	16.5	1.58	0 - 0.75	1	0	0	0	0	0	0	0	0	0	0	1	0	6	1	0	0	0	0	0	17	26
	PRNFSN11	5408121	419515	03-Sep-22	03-Sep-22	80	1.31	0 - 1.3	0	0	1	0	0	0	0	0	0	0	0	0	5	84	1	0	0	0	0	0	14	105
					Total	**342.5**			**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**3**	**5**	**160**	**2**	**5**	**0**	**0**	**2**	**0**	**78**	**258**
Pinewood River Far Field	PRFFSN01	5407161	418930	01-Sep-22	01-Sep-22	32	0.13	0 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
	PRFFSN02	5407042	414672	31-Aug-22	31-Aug-22	24	1.21	0 - 0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	19	29
	PRFFSN03	5406993	414597	31-Aug-22	31-Aug-22	21	0.71	0 - 0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	15
	PRFFSN04	5406974	414686	31-Aug-22	31-Aug-22	33	0.03	0 - 0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	PRFFSN05	5406939	414728	31-Aug-22	31-Aug-22	24	0.25	0 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	6
	PRFFSN06	5406995	414724	31-Aug-22	31-Aug-22	22.5	0.40	0 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	3	9
	PRFFSN07	5407020	414847	31-Aug-22	31-Aug-22	22	0.55	0 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	2	8	0	0	0	1	0	0	1	12
	PRFFSN08	5407059	414839	01-Sep-22	01-Sep-22	50	0.40	0 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	1	0	1	7	20
	PRFFSN09	5407118	414856	01-Sep-22	01-Sep-22	27.5	0.04	0 -0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
	PRFFSN10	5406960	414848	02-Sep-22	02-Sep-22	48	0.46	0 - 1	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	1	0	0	1	7	22
	PRFFSN11	5406949	414835	02-Sep-22	02-Sep-22	16.5	0.97	0 - 1	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	1	0	0	5	16
					Total	**320.5**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**60**	**1**	**0**	**1**	**5**	**1**	**2**	**63**	**135**

Table A - 7: Detailed minnow trap data in Pinewood River - August/September 2022

Location	GearID	Northings (NAD 83, 15U)	Eastings (NAD 83, 15U)	Set Date	Set Time	Lift Date	Lift Time	Traps (No.)	Total Effort (hrs)	CPUE	Depth (m)	Central Mudminnow	Central Mudminnow YOY	Brook Stickleback	Brook Stickleback YOY	Finescale Dace	Northern Redbelly Dace	Fathead Minnow	Fathead Minnow YOY	Creek Chub	Creek Chub YOY	Brassy Minnow	Brown Bullhead	White Sucker	Common Shiner	Pearl Dace	Golden Shiner	Johnny Darter	Blackside Darter	Northern Pike	Trout Perch	YOY	Total Fish
Pinewood River Reference	PRREFMT01	5407713	431002	01-Sep-22	8:15:00 AM	02-Sep-22	8:15:00 AM	3	144	0.01	0-2	0	0	8	0	0	0	0	0	0	0	0	0	0	0	5	6	0	0	0	0	1	20
	PRREFMT02	5407652	430905	01-Sep-22	8:30:00 AM	02-Sep-22	10:50:00 AM	3	145	0.00	0-1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRREFMT03	5407616	430761	01-Sep-22	8:45:00 AM	02-Sep-22	10:55:00 AM	3	145.25	0.00	0-1.5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
						Total			**434.25**			0	0	8	0	0	0	0	0	0	0	0	1	0	0	5	6	0	0	0	0	1	21
Pinewood River Near Field	PRNFMT01	5408079	419426	30-Aug-22	9:50:00 AM	31-Aug-22	4:01:00 PM	3	156.55	0.00	0 - 0.6	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
	PRNFMT02	5408108	419535	30-Aug-22	10:45:00 AM	31-Aug-22	3:54:00 PM	3	159.45	0.00	0 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRNFMT03	5408105	419882	30-Aug-22	11:58:00 AM	31-Aug-22	3:30:00 PM	3	154.6	0.00	0 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
						Total			**470.6**			0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Pinewood River Far Field	PRFFMT01	5407150	414906	31-Aug-22	9:10:00 AM	01-Sep-22	2:00:00 PM	3	158.5	0.00	0 - 0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	PRFFMT02	5407151	414868	31-Aug-22	9:15:00 AM	01-Sep-22	2:30:00 PM	3	159.75	0.00	0 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PRFFMT03	5407042	414835	31-Aug-22	9:20:00 AM	01-Sep-22	2:35:00 PM	3	159.75	0.00	0 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
						Total			**478**			0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1

Table A - 8: Fish measurements for PWREF

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
27-Jul-22	Brassy Minnow	BM	3.7	3.4	0.3	
27-Jul-22	Brassy Minnow	BM	3.7	3.4	0.4	
27-Jul-22	Brassy Minnow	BM	3.6	3.3	0.3	
27-Jul-22	Brassy Minnow	BM	5.2	4.8	1.6	
27-Jul-22	Brook Stickleback	BSB	2.9	-	0.2	
27-Jul-22	Brook Stickleback	BSB	3.9	-	0.6	
27-Jul-22	Brook Stickleback	BSB	3.5	-	0.4	
27-Jul-22	Brook Stickleback	BSB	3.8	-	0.6	
27-Jul-22	Brook Stickleback	BSB	4.6	-	0.9	
27-Jul-22	Brook Stickleback	BSB	3.7	-	0.5	
27-Jul-22	Brook Stickleback	BSB	3.6	-	0.3	
27-Jul-22	Brook Stickleback	BSB	3.4	-	0.4	
27-Jul-22	Brook Stickleback	BSB	3.2	-	0.3	
27-Jul-22	Brook Stickleback	BSB	3.6	-	0.4	
27-Jul-22	Brook Stickleback	BSB	3.5	-	0.4	
27-Jul-22	Brook Stickleback	BSB	3.1	-	0.2	
27-Jul-22	Brook Stickleback	BSB	3.9	-	0.5	
27-Jul-22	Brook Stickleback	BSB	3.4	-	0.4	
27-Jul-22	Brook Stickleback	BSB	3.3	-	0.5	
27-Jul-22	Brook Stickleback	BSB	3.3	-	0.3	
27-Jul-22	Brook Stickleback	BSB	2.9	-	0.1	
27-Jul-22	Brook Stickleback	BSB	2.9	-	0.2	
27-Jul-22	Brook Stickleback	BSB	3.3	-	0.3	
27-Jul-22	Brook Stickleback	BSB	3.9	-	0.5	
26-Jul-22	Brook Stickleback	BSB9	4.1	-	0.7	
26-Jul-22	Brook Stickleback	BSB10	5.3	-	1.6	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
26-Jul-22	Brook Stickleback	BSB1	2.0	-	0.2	M
26-Jul-22	Brook Stickleback	BSB11	4.7	-	1.1	
26-Jul-22	Brook Stickleback	BSB12	5.3	-	1.4	
26-Jul-22	Brook Stickleback	BSB13	4.8	-	0.8	
26-Jul-22	Brook Stickleback	BSB14	4.8	-	1.1	
26-Jul-22	Brook Stickleback	BBH22	3.2	-	0.3	
26-Jul-22	Brook Stickleback	BSB04	3.6	-	0.1	
26-Jul-22	Brook Stickleback	BSB5	4.8	-	1.3	
26-Jul-22	Brook Stickleback	BSB6	4.3	-	1.0	
26-Jul-22	Brook Stickleback	BSB7	5.7	-	1.9	
26-Jul-22	Brook Stickleback	BSB8	4.5	-	1.1	
26-Jul-22	Brook Stickleback	BSB2	5.2	-	1.7	
26-Jul-22	Brook Stickleback	BSB3	4.5	-	1.0	
26-Jul-22	Brook Stickleback	BSB1	5.4	-	1.9	
01-Sep-22	Brook Stickleback	BSB	3.5	-	-	
01-Sep-22	Brook Stickleback	BSB	3.3	-	-	
01-Sep-22	Brook Stickleback	BSB	3.8	-	-	
01-Sep-22	Brook Stickleback	BSB	4.1	-	-	
02-Sep-22	Brook Stickleback	BSB	3.6	-	0.477	
02-Sep-22	Brook Stickleback	BSB	3.2	-	0.281	
02-Sep-22	Brook Stickleback	BSB	2.9	-	0.210	
02-Sep-22	Brown Bullhead	BBH	8.3	-	7.796	
26-Jul-22	Brown Bullhead	BBH10	9.4	9.2	10.9	
26-Jul-22	Brown Bullhead	BBH11	7.1	6.9	5.2	
26-Jul-22	Brown Bullhead	BBH12	6.8	6.6	4.7	
26-Jul-22	Brown Bullhead	BBH13	7.4	7.6	5.6	
26-Jul-22	Brown Bullhead	BBH7	10.2	10.0	15.9	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
26-Jul-22	Brown Bullhead	BBH08	9.9	9.7	10.3	
26-Jul-22	Brown Bullhead	BBH09	7.0	6.8	5.1	Black Spot
26-Jul-22	Brown Bullhead	BBH5	7.4	7.2	6.6	
26-Jul-22	Brown Bullhead	BBH6	6.6	6.4	4.0	
26-Jul-22	Brown Bullhead	BSB4	8	7.8	7.0	
26-Jul-22	Brown Bullhead	BB1	7.0	-	5.5	
26-Jul-22	Brown Bullhead	BB2	6.5	6.3	3.9	
26-Jul-22	Brown Bullhead	BB3	6.4	6.2	4.6	U/S Culvert Continued
27-Jul-22	Brown Bullhead	BBH	7.0	6.8	4.8	
27-Jul-22	Brown Bullhead	BBH	6.7	6.6	3.9	
27-Jul-22	Brown Bullhead	BBH	7.1	6.9	4.9	
27-Jul-22	Brown Bullhead	BBH	9.1	8.8	10.3	
27-Jul-22	Brown Bullhead	BBH	7.3	7.1	5.0	
02-Sep-22	Brown Bullhead	BBH	9.3	-	10.213	
02-Sep-22	Brown Bullhead	BBH	8.5	-	8.493	
02-Sep-22	Brown Bullhead	BBH	8.3	-	7.735	
01-Sep-22	Central Mud Minnow	CM34	9.4	-	9.736	
01-Sep-22	Central Mud Minnow	CMM35	4.2	-	-	
01-Sep-22	Central Mud Minnow	CMM36	5.0	-	-	
01-Sep-22	Central Mud Minnow	CMM37	9.8	-	10.721	
01-Sep-22	Central Mud Minnow	CMM38	3.5	-	0.459	
01-Sep-22	Central Mud Minnow	CMM39	3.5	-	0.549	
01-Sep-22	Central Mud Minnow	CMM40	3.6	-	0.550	
01-Sep-22	Central Mud Minnow	CMM41	3.8	-	0.603	
02-Sep-22	Central Mud Minnow	CMM47	5.6	-	2.011	
02-Sep-22	Central Mud Minnow		8.3	-	6.562	
02-Sep-22	Central Mud Minnow		9.8	-	10.471	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
02-Sep-22	Central Mud Minnow		7.6	-	5.343	
02-Sep-22	Central Mud Minnow		6.3	-	2.856	
02-Sep-22	Central Mud Minnow		6.2	-	2.686	
27-Jul-22	Central Mudminnow	CMM1	10.9	-	14.703	
27-Jul-22	Central Mudminnow	CMM16	6.4	-	3.155	
27-Jul-22	Central Mudminnow	CMM17	9.2	-	9.870	
27-Jul-22	Central Mudminnow	CMM	3.2	-	0.3	
27-Jul-22	Central Mudminnow	CMM	3.4	-	0.5	
27-Jul-22	Central Mudminnow	CMM	3.3	-	0.3	
27-Jul-22	Central Mudminnow	CMM	6.0	-	2.7	
27-Jul-22	Central Mudminnow	CMM	6.3	-	2.7	
27-Jul-22	Central Mudminnow	CMM	3.6	-	0.5	
27-Jul-22	Central Mudminnow	CMM	3.8	-	1.3	
27-Jul-22	Central Mudminnow	CMM	5.8	-	2.3	
27-Jul-22	Central Mudminnow	CMM	3.1	-	0.3	
27-Jul-22	Central Mudminnow	CMM	2.8	-	0.3	
27-Jul-22	Central Mudminnow	CMM	3.1	-	0.4	Dead
27-Jul-22	Central Mudminnow	CMM18	9.3	-	9.221	
27-Jul-22	Central Mudminnow	CMM19	7.8	-	5.195	
27-Jul-22	Central Mudminnow	CMM20	7.4	-	5.135	
27-Jul-22	Central Mudminnow	CMM21	8.0	-	6.719	
27-Jul-22	Central Mudminnow	CMM22	8.6	-	6.602	
27-Jul-22	Central Mudminnow	CMM23	7.3	-	5.171	
27-Jul-22	Central Mudminnow	CMM24	6.9	-	4.028	
27-Jul-22	Central Mudminnow	CMM	3.4	-	0.4	
27-Jul-22	Central Mudminnow	CMM	6.3	-	3.1	
27-Jul-22	Central Mudminnow	CMM	3.4	-	0.4	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
27-Jul-22	Central Mudminnow	CMM	3.2	-	0.2	
27-Jul-22	Central Mudminnow	CMM	2.7	-	0.2	
27-Jul-22	Central Mudminnow	CMM	3.4	-	0.5	
27-Jul-22	Central Mudminnow	CMM25	6.3	-	2.473	
27-Jul-22	Central Mudminnow	CMM26	6.7	-	3.2	
27-Jul-22	Central Mudminnow	CMM27	7.6	-	4.4	
27-Jul-22	Central Mudminnow	CMM28	7.1	-	3.9	
27-Jul-22	Central Mudminnow	CMM29	7.1	-	4.4	
27-Jul-22	Central Mudminnow	CMM30	7.1	-	3.9	
27-Jul-22	Central Mudminnow	CMM31	9.1	-	8.3	
26-Jul-22	Central Mudminnow	CMM5	5.9	-	2.6	
26-Jul-22	Central Mudminnow	CMM6	6.0	-	2.8	
26-Jul-22	Central Mudminnow	CCM7	5.7	-	2.1	
26-Jul-22	Central Mudminnow	CMM1	3.1	-	0.3	M
26-Jul-22	Central Mudminnow	CMM1	10.3	-	14.031	length-estimate
26-Jul-22	Central Mudminnow	CMM2	10.5	-	15.950	
26-Jul-22	Central Mudminnow	CMM3	10.1	-	12.893	
26-Jul-22	Central Mudminnow	CMM4	10.7	-	16.159	
26-Jul-22	Central Mudminnow	CMM5	11.0	-	14.680	
26-Jul-22	Central Mudminnow	CMM6	7.2	-	4.036	
26-Jul-22	Central Mudminnow	CMM7	9.1	-	8.799	
26-Jul-22	Central Mudminnow	CMM8	9.3	-	9.127	
26-Jul-22	Central Mudminnow	CMM9	11.6	-	17.207	
26-Jul-22	Central Mudminnow	CMM10	11.2	-	16.452	
26-Jul-22	Central Mudminnow	CMM11	10.0	-	16.258	
26-Jul-22	Central Mudminnow	CMM12	8.7	-	7.309	
26-Jul-22	Central Mudminnow	CMM13	9.8	-	10.651	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
26-Jul-22	Central Mudminnow	CMM14	7.1	-	3.696	
26-Jul-22	Central Mudminnow	CMM15	10.1	-	12.839	
26-Jul-22	Central Mudminnow	CMM8	5.4	-	2.0	
26-Jul-22	Central Mudminnow	CMM03	2.4	-	0.3	
26-Jul-22	Central Mudminnow	CMM04	5.7	-	2.5	
26-Jul-22	Central Mudminnow	CMM2	3.6	-	0.5	U/S of culvert
26-Jul-22	Common Shiner	CS21	10.8	9.9	15.645	
26-Jul-22	Common Shiner	CS22	10.9	9.9	17.157	
26-Jul-22	Common Shiner	CS23	10.6	9.7	14.769	
26-Jul-22	Common Shiner	CS24	9.8	8.9	12.465	
26-Jul-22	Common Shiner	CS25	10.7	9.8	14.484	
26-Jul-22	Common Shiner	CS26	9.7	8.9	10.735	
26-Jul-22	Common Shiner	CS27	10.2	9.3	13.291	
26-Jul-22	Common Shiner	CS28	8.3	7.6	5.692	
26-Jul-22	Common Shiner	CS01	12.4	11.6	25.561	balanced check
26-Jul-22	Common Shiner	CS02	13.7	12.8	35.319	
26-Jul-22	Common Shiner	CS03	14.0	12.7	35.773	
26-Jul-22	Common Shiner	CS04	10.3	9.4	12.777	
26-Jul-22	Common Shiner	CS05	10.5	9.8	15.153	
26-Jul-22	Common Shiner	CS06	10.9	10.0	15.160	
26-Jul-22	Common Shiner	CS07	9.4	8.6	8.864	
26-Jul-22	Common Shiner	CS08	9.2	8.4	9.200	
26-Jul-22	Common Shiner	CS09	11.2	10.2	16.911	
26-Jul-22	Common Shiner	CS10	11.3	10.5	22.658	
26-Jul-22	Common Shiner	CS11	8.9	8.1	7.982	
26-Jul-22	Common Shiner	CS12	9.8	8.7	10.022	
26-Jul-22	Common Shiner	CS13	9.1	8.2	9.018	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
26-Jul-22	Common Shiner	CS14	11.2	10.3	18.076	
26-Jul-22	Common Shiner	CS15	11.3	10.3	17.092	
26-Jul-22	Common Shiner	CS16	10.0	9.2	11.916	
26-Jul-22	Common Shiner	CS17	9.6	8.6	9.980	
26-Jul-22	Common Shiner	CS18	9.3	8.4	8.105	
26-Jul-22	Common Shiner	CS19	9.1	8.3	8.571	
26-Jul-22	Common Shiner	CS20	8.4	7.6	7.098	
26-Jul-22	Common Shiner	CS29	10.1	9.2	12.927	page 13 - need to figure out effort number
26-Jul-22	Common Shiner	CS30	9.3	8.6	10.133	
26-Jul-22	Common Shiner	CS31	7.9	7.2	5.494	
26-Jul-22	Common Shiner	CS32	8.9	8.0	7.452	
26-Jul-22	Common Shiner	CS33	9.3	8.4	9.504	
26-Jul-22	Common Shiner	CS34	8.6	7.8	6.389	
26-Jul-22	Common Shiner	CS35	9.2	8.4	9.767	
26-Jul-22	Common Shiner	CS36	8.7	8.0	7.562	
26-Jul-22	Common Shiner	CS37	7.8	7.1	5.693	
26-Jul-22	Common Shiner	CS38	7.9	7.1	6.023	
26-Jul-22	Common Shiner	CS39	7.9	7.1	5.693	
26-Jul-22	Common Shiner	CS40	7.8	7.1	5.803	
26-Jul-22	Common Shiner	CS41	7.8	7.0	4.834	
26-Jul-22	Common Shiner	CS42	8.0	7.3	5.296	
26-Jul-22	Common Shiner	CS43	7.0	6.4	3.511	
26-Jul-22	Common Shiner	CS44	6.9	6.4	3.658	
26-Jul-22	Common Shiner	CS45	10.2	9.5	11.838	
26-Jul-22	Common Shiner	CS46	8.3	7.5	6.438	
26-Jul-22	Common Shiner	CS47	9.1	8.3	8.123	
26-Jul-22	Common Shiner	CS48	8.6	7.9	7.376	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
26-Jul-22	Common Shiner	CS49	9.1	8.2	8.093	Blackspot
26-Jul-22	Common Shiner	CS50	8.1	7.2	5.200	
02-Sep-22	Common Shiner	CS	15.1	13.8	38.227	
27-Jul-22	Creek Chub	CC	4.6	4.4	0.6	Dead
27-Jul-22	Creek Chub	CC	3.7	3.5	0.4	
27-Jul-22	Creek Chub	CC	3.7	3.4	0.4	
27-Jul-22	Creek Chub	CC	3.6	3.3	0.5	
27-Jul-22	Creek Chub	CC	3.6	3.4	0.5	
27-Jul-22	Creek Chub	CC	3.0	2.8	0.2	
27-Jul-22	Creek Chub	CC	3.0	2.8	0.2	
27-Jul-22	Creek Chub	CC	3.0	2.8	0.2	
27-Jul-22	Creek Chub	CC	3.1	2.9	0.3	
27-Jul-22	Creek Chub	CC	3.1	2.9	0.2	
27-Jul-22	Creek Chub	CC	3.0	2.8	0.3	Dead
27-Jul-22	Creek Chub	CC	3.4	3.2	0.1	
27-Jul-22	Creek Chub	CC	4.8	4.4	1.3	Dead
27-Jul-22	Creek Chub	CC	3.4	3.2	0.3	
27-Jul-22	Creek Chub	CC	3.0	2.8	0.2	
27-Jul-22	Creek Chub	CC	2.6	2.8	0.2	
27-Jul-22	Creek Chub	CC	3.5	3.2	0.3	
27-Jul-22	Creek Chub	CC	3.0	2.8	0.2	
27-Jul-22	Creek Chub	CC	3.4	3.1	0.3	
27-Jul-22	Creek Chub	CC	14.0	13.3	30.7	
27-Jul-22	Creek Chub	CC	15.7	14.8	40.8	
27-Jul-22	Creek Chub	CC	3.9	3.6	0.6	
26-Jul-22	Creek Chub	CC1	19.4	18.4	93.8	M
02-Sep-22	Creek Chub	CC	18.3	17.8	60.000	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
27-Jul-22	Fathead Minnow	FHM	5.6	5.2	1.7	
27-Jul-22	Fathead Minnow	FMH	3.8	3.5	0.5	
27-Jul-22	Fathead Minnow	FMH	4.5	4.3	1.0	
27-Jul-22	Fathead Minnow	FMH	3.7	3.4	0.4	Dead
27-Jul-22	Fathead Minnow	FMH	3.3	3.1	0.3	
27-Jul-22	Fathead Minnow	FHM	3.4	3.1	0.4	
27-Jul-22	Fathead Minnow	FHM	4.3	3.9	0.9	Blackspot
27-Jul-22	Fathead Minnow	FHM	3.4	3.1	0.4	
27-Jul-22	Fathead Minnow	FHM	3.7	3.4	0.5	
27-Jul-22	Fathead Minnow	FHM	6.2	5.7	2.5	
27-Jul-22	Fathead Minnow	FHM	4.3	4.0	0.7	
27-Jul-22	Fathead Minnow	FHM	6.0	5.6	1.8	
27-Jul-22	Fathead Minnow	FHM	3.8	3.5	0.5	
27-Jul-22	Fathead Minnow	FHM	5.2	4.8	1.8	
27-Jul-22	Fathead Minnow	FHM	4.9	4.0	1.5	
27-Jul-22	Fathead Minnow	FHM	4.3	4.0	0.8	
27-Jul-22	Fathead Minnow	FHM	5.4	5.0	1.6	
26-Jul-22	Fathead Minnow	FHM3	8.1	7.5	7.3	
26-Jul-22	Fathead Minnow	FHM1	5.9	5.7	2.5	
26-Jul-22	Fathead Minnow	FHM2	7.4	7.0	5.1	Black Spot
26-Jul-22	Finescale Dace	FSD01	6.4	6.1	2.3	
01-Sep-22	Finescale Dace	FSD	4.5	4.2	-	
02-Sep-22	Finescale Dace	FSD1	4.1	3.8	0.586	
02-Sep-22	Finescale Dace	FSD2	4.2	3.9	0.584	
26-Jul-22	Golden Shiner	GS01	10.1	9.2	12.0	I
26-Jul-22	Golden Shiner	GS02	10.0	9.0	13.3	M
26-Jul-22	Golden Shiner	GS03	11.2	10.2	16.2	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
26-Jul-22	Golden Shiner	GS1	5.7	5.1	1.8	
02-Sep-22	Golden Shiner	GS	13.8	12.6	26.850	Dead
02-Sep-22	Golden Shiner	GS	13.0	2.2	24.616	Dead
02-Sep-22	Golden Shiner	GS	12.0	11.0	17.086	Dead
02-Sep-22	Golden Shiner	GS	10.9	10.0	13.330	Dead
02-Sep-22	Golden Shiner	GS	10.2	8.9	10.487	Dead
02-Sep-22	Golden Shiner	GS	10.3	9.4	9.440	Dead
26-Jul-22	Northern Pike	NP01	19.4	18.4	53.1	M
26-Jul-22	Northern Pike	NP02	24.1	22.8	105.6	M
26-Jul-22	Northern Pike	NP03	21.3	20.2	79.0	Blackspot
26-Jul-22	Northern Pike	NP04	21.8	20.5	79.6	Black Spot
26-Jul-22	Northern Pike	NP05	18.9	18.0	44.0	
27-Jul-22	Northern Redbelly Dace	NRBD	4.5	4.2	0.4	
27-Jul-22	Northern Redbelly Dace	NRBD	4.3	3.9	0.8	
27-Jul-22	Northern Redbelly Dace	NRBD	4.1	3.8	0.6	
27-Jul-22	Northern Redbelly Dace	NRBD	3.3	3.2	0.3	
27-Jul-22	Northern Redbelly Dace	NRBD	6.7	6.2	2.4	
27-Jul-22	Northern Redbelly Dace	NRBD	4.9	4.7	1.2	
27-Jul-22	Northern Redbelly Dace	NRBD	4.4	4.2	0.6	
27-Jul-22	Northern Redbelly Dace	NRBD	4.2	3.9	0.8	
27-Jul-22	Northern Redbelly Dace	NRBD	4.7	4.4	0.8	
27-Jul-22	Northern Redbelly Dace	NRBD	4.7	4.5	1.1	
27-Jul-22	Northern Redbelly Dace	NRBD	3.9	3.6	0.7	
27-Jul-22	Northern Redbelly Dace	NRBD	4.5	4.2	1.0	
27-Jul-22	Northern Redbelly Dace	NRBD	4.3	4.0	0.7	
27-Jul-22	Northern Redbelly Dace	NRBD	4.8	4.4	0.9	
27-Jul-22	Northern Redbelly Dace	NRBD	4.7	4.4	0.9	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
27-Jul-22	Northern Redbelly Dace	NRBD	4.4	4.0	0.7	
27-Jul-22	Northern Redbelly Dace	NRBD	3.4	3.2	0.5	
27-Jul-22	Northern Redbelly Dace	NRBD	2.9	2.7	0.2	
27-Jul-22	Northern Redbelly Dace	NRBD	3.2	2.9	0.3	
27-Jul-22	Northern Redbelly Dace	NRBD	3.2	2.8	0.2	
27-Jul-22	Northern Redbelly Dace	NRBD	4.7	4.5	0.7	
26-Jul-22	Northern Redbelly Dace	NRBD01	5.5	5.1	1.5	
26-Jul-22	Northern Redbelly Dace	NRBD02	5.4	5.0	1.4	
26-Jul-22	Northern Redbelly Dace	NRBD08	4.6	4.4	1.0	
26-Jul-22	Northern Redbelly Dace	NRBD09	4.9	4.6	1.2	
26-Jul-22	Northern Redbelly Dace	NRBD23	5.2	4.7	1.5	
26-Jul-22	Northern Redbelly Dace	NRBD24	5.3	4.8	2.0	
26-Jul-22	Northern Redbelly Dace	NRBD03	5.3	5.0	1.6	
26-Jul-22	Northern Redbelly Dace	NRBD04	4.9	4.6	1.5	
26-Jul-22	Northern Redbelly Dace	NRBD05	5.5	5.1	1.9	
26-Jul-22	Northern Redbelly Dace	NRBD06	4.4	4.4	1.3	
26-Jul-22	Northern Redbelly Dace	NRBD07	5.4	5.0	1.4	
26-Jul-22	Pearl Dace	PD36	11.1	10.4	18.0	Dead(M)
26-Jul-22	Pearl Dace	PD37	11.4	10.8	15.8	Dead(M)
26-Jul-22	Pearl Dace	PD38	12.3	11.7	2.3	M
26-Jul-22	Pearl Dace	PD39	11.3	10.8	19.3	M
26-Jul-22	Pearl Dace	PD40	11.7	11.1	19.0	Alive
26-Jul-22	Pearl Dace	PD41	10.5	9.8	13.1	Alive
26-Jul-22	Pearl Dace	PD43	12.2	11.5	21.1	M
26-Jul-22	Pearl Dace	PD25	10.9	9.3	12.9	Alive
26-Jul-22	Pearl Dace	PD26	10.2	9.5	13.0	Alive
26-Jul-22	Pearl Dace	PD27	10.4	9.8	15.0	Alive

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
26-Jul-22	Pearl Dace	PD28	11.2	10.6	17.5	Alive
26-Jul-22	Pearl Dace	PD29	10.5	9.9	13.4	M
26-Jul-22	Pearl Dace	PD30	11.1	10.3	18.9	M
26-Jul-22	Pearl Dace	PD31	10.5	9.8	14.2	M
26-Jul-22	Pearl Dace	PD32	10.4	9.9	14.6	M
26-Jul-22	Pearl Dace	PD33	10.7	10.1	14.3	Alive
26-Jul-22	Pearl Dace	PD34	11.4	10.8	17.8	M
26-Jul-22	Pearl Dace	PD35	10.7	10.1	14.9	Alive
26-Jul-22	Pearl Dace	PD15	11.0	10.3	17.4	Alive
26-Jul-22	Pearl Dace	PD16	10.1	9.9	13.3	Alive
26-Jul-22	Pearl Dace	PD17	11.7	10.9	16.5	Alive
26-Jul-22	Pearl Dace	PD18	10.7	10.1	14.2	Alive
26-Jul-22	Pearl Dace	PD19	10.9	10.3	15.4	Alive
26-Jul-22	Pearl Dace	PD20	11.4	10.6	17.2	M
26-Jul-22	Pearl Dace	PD21	10.7	10.1	16.5	M
26-Jul-22	Pearl Dace	PD22	11.2	10.5	16.9	M
26-Jul-22	Pearl Dace	PD23	11.5	10.8	19.2	M
26-Jul-22	Pearl Dace	PD24	10.1	9.4	13.9	M
26-Jul-22	Pearl Dace	PD1	10.8	10.2	14.7	Alive
26-Jul-22	Pearl Dace	PD2	10.4	9.8	13.9	Alive
26-Jul-22	Pearl Dace	PD3	11.0	10.2	17.1	Alive
26-Jul-22	Pearl Dace	PD4	11.9	11.2	21.0	Alive
26-Jul-22	Pearl Dace	PD5	10.1	9.7	13.1	Alive
26-Jul-22	Pearl Dace	PD6	11.6	10.8	18.8	M
26-Jul-22	Pearl Dace	PD7	11.4	10.7	17.2	M
26-Jul-22	Pearl Dace	PD8	11.9	10.8	19.6	M
26-Jul-22	Pearl Dace	PD9	11.9	11.1	18.9	M

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
26-Jul-22	Pearl Dace	PD10	11.8	11.1	20.6	M
26-Jul-22	Pearl Dace	PD11	10.9	10.4	15.6	M
26-Jul-22	Pearl Dace	PD12	10.4	9.6	14.4	M
26-Jul-22	Pearl Dace	PD13	10.7	10.1	14.6	M
26-Jul-22	Pearl Dace	PD14	10.9	10.2	16.6	M
02-Sep-22	Pearl Dace	PD1	4.2	3.8	0.591	
02-Sep-22	Pearl Dace	PD2	5.9	5.6	0.458	
02-Sep-22	Pearl Dace	PD3	4.5	4.2	0.687	
02-Sep-22	Pearl Dace	PD4	4.0	3.7	0.595	duplicated fish id - different individual fish
02-Sep-22	Pearl Dace	PD4	5.4	4.9	0.978	duplicated fish id - different individual fish
02-Sep-22	Pearl Dace	PD5	5.0	4.6	1.324	
02-Sep-22	Pearl Dace	PD6	4.7	4.4	-	
02-Sep-22	Pearl Dace	PD7	4.6	4.3	0.804	
02-Sep-22	Pearl Dace	PD8	4.2	3.7	0.657	
02-Sep-22	Pearl Dace	PD9	7.2	6.7	3.347	
02-Sep-22	Pearl Dace	PD10	7.2	6.8	2.925	
02-Sep-22	Pearl Dace	PD11	4.1	3.6	0.550	
02-Sep-22	Pearl Dace	PD12	4.3	3.9	0.658	
02-Sep-22	Pearl Dace	PD13	4.2	3.9	0.561	
02-Sep-22	Pearl Dace	PD14	4.7	4.5	0.904	
02-Sep-22	Pearl Dace	PD15	5.9	5.5	1.641	
27-Jul-22	White Sucker	WS	4.3	4.0	0.5	
27-Jul-22	White Sucker	WS	3.7	3.4	0.4	
27-Jul-22	White Sucker	WS	3.6	3.4	0.5	
27-Jul-22	White Sucker	WS	4.2	4.0	0.6	
27-Jul-22	White Sucker	WS	3.4	3.2	0.3	
27-Jul-22	White Sucker	WS	3.6	3.3	0.4	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
27-Jul-22	White Sucker	WS	3.6	3.4	0.3	
27-Jul-22	White Sucker	WS	3.3	3.1	0.3	
27-Jul-22	White Sucker	WS	3.6	3.4	0.3	
27-Jul-22	White Sucker	WS	3.3	3.1	0.3	
27-Jul-22	White Sucker	WS	3.7	3.4	0.5	
27-Jul-22	White Sucker	WS	3.6	3.4	0.5	
27-Jul-22	White Sucker	WS	3.9	3.6	0.9	
27-Jul-22	White Sucker	WS	3.2	2.9	0.2	
27-Jul-22	White Sucker	WS	3.4	3.1	0.4	
27-Jul-22	White Sucker	WS	4.1	3.8	0.6	
27-Jul-22	White Sucker	WS	3.5	3.2	0.3	
27-Jul-22	White Sucker	WS	3.6	3.3	0.3	
27-Jul-22	White Sucker	WS	3.7	8.4	0.4	
26-Jul-22	White Sucker	WS01	22.7	21.4	122.3	
26-Jul-22	White Sucker	WS02	23.4	22.1	147.0	
26-Jul-22	White Sucker	WS03	22.3	21.0	32.0	
26-Jul-22	White Sucker	WS04	23.4	22.1	144.5	
26-Jul-22	White Sucker	WS05	21.8	20.6	126.8	

Table A - 9: Fish measurements for PWNF

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
25-Jul-22	Brown Bullhead	BBH01	20.8	20.4	114.2	Alive
25-Jul-22	Brown Bullhead	BBH02	8.5	20.9	125.4	Alive
23-Jul-22	Brown Bullhead	BBH14	7.9	7.7	7.0	
23-Jul-22	Brown Bullhead	BBH15	7.7	7.6	5.9	
23-Jul-22	Brown Bullhead	BBH16	10.0	9.8	13.7	
23-Jul-22	Brown Bullhead	BBH17	7.7	7.5	6.3	
23-Jul-22	Brown Bullhead	BBH18	7.0	6.9	5.4	
23-Jul-22	Brown Bullhead	BBH19	8.9	8.6	8.6	
23-Jul-22	Brown Bullhead	BBH20	8.4	8.2	8.3	
23-Jul-22	Brown Bullhead	BBH21	6.6	6.5	4.1	
23-Jul-22	Brown Bullhead	BBH22	9.3	9.1	12.3	
23-Jul-22	Brown Bullhead	BBH23	8.2	8.0	7.6	
23-Jul-22	Brown Bullhead	BBH24	8.1	7.9	7.2	
23-Jul-22	Brown Bullhead	BBH25	7.5	7.2	7.4	
23-Jul-22	Brown Bullhead	BBH26	8.9	8.7	6.9	
23-Jul-22	Brown Bullhead	BBH7	9.1	8.9	9.6	
23-Jul-22	Brown Bullhead	BBH8	8.0	7.8	6.2	
23-Jul-22	Brown Bullhead	BBH9	7.6	7.4	6.0	
23-Jul-22	Brown Bullhead	BBH10	9.8	9.6	12.2	
23-Jul-22	Brown Bullhead	BBH11	8.8	8.5	10.3	
23-Jul-22	Brown Bullhead	BBH12	9.5	9.3	12.0	
23-Jul-22	Brown Bullhead	BBH13	7.3	7.1	5.0	
23-Jul-22	Brown Bullhead	BBH1	9.3	9.0	9.8	
23-Jul-22	Brown Bullhead	BBH2	8.7	8.4	9.5	
23-Jul-22	Brown Bullhead	BBH3	8.7	8.4	9.5	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
23-Jul-22	Brown Bullhead	BBH4	7.4	7.1	6.6	
23-Jul-22	Brown Bullhead	BBH5	7.8	7.6	5.2	
23-Jul-22	Brown Bullhead	BBH6	7.6	7.4	6.1	
26-Jul-22	Brown Bullhead	BBH03	7.8	7.6	6.9	Alive
26-Jul-22	Brown Bullhead	BBH04	6.9	6.8	5.4	Alive
26-Jul-22	Brown Bullhead	BBH5	11.4	11.1	21.8	Alive
26-Jul-22	Brown Bullhead	BBH6	6.8	6.6	4.4	Alive
26-Jul-22	Brown Bullhead	BBH7	10.1	9.8	15.9	Alive
26-Jul-22	Brown Bullhead	BBH8	7.7	7.5	7.5	Alive
26-Jul-22	Brown Bullhead	BBH9	7.6	7.4	6.9	Alive
26-Jul-22	Brown Bullhead	BBH10	8.9	8.7	10.4	Alive
26-Jul-22	Brown Bullhead	BBH11	7.6	7..4	6.6	Alive
26-Jul-22	Brown Bullhead	BBH12	8.5	8.3	9.6	Alive
26-Jul-22	Brown Bullhead	BBH13	7.6	7.5	7.1	Alive
26-Jul-22	Brown Bullhead	BBH14	7.7	7.6	7.3	Alive
26-Jul-22	Brown Bullhead	BBH15	10.4	10.1	17.3	Alive
26-Jul-22	Brown Bullhead	BBH16	9.6	9.3	13.0	Alive
26-Jul-22	Brown Bullhead	BBH17	8.5	8.2	9.2	Alive
26-Jul-22	Brown Bullhead	BBH18	8.7	8.5	9.5	Alive
26-Jul-22	Brown Bullhead	BBH19	8.7	8.5	10.1	Alive
26-Jul-22	Brown Bullhead	BBH20	7.7	7.5	6.9	Alive
26-Jul-22	Brown Bullhead	BBH21	7.7	7.5	6.8	Alive
26-Jul-22	Brown Bullhead	BBH22	7.6	7.4	13.2	Alive
26-Jul-22	Brown Bullhead	BBH23	9.7	9.6	11.5	Alive
26-Jul-22	Brown Bullhead	BBH24	8.4	8.3	8.3	Alive
26-Jul-22	Brown Bullhead	BBH25	8.5	8.3	8.4	Alive

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
26-Jul-22	Brown Bullhead	BBH26	7.9	7.7	6.8	Alive
26-Jul-22	Brown Bullhead	BBH27	8.0	7.9	8.1	Alive
26-Jul-22	Brown Bullhead	BBH28	8.1	7.9	7.5	Alive
26-Jul-22	Brown Bullhead	BBH29	7.9	7.7	7.2	Alive
26-Jul-22	Brown Bullhead	BBH30	8.2	8.0	8.3	Alive
26-Jul-22	Brown Bullhead	BBH31	8.1	8.6	10.1	Alive
26-Jul-22	Brown Bullhead	BBH32	6.9	6.8	5.7	Alive
26-Jul-22	Brown Bullhead	BBH33	8.2	8.0	9.1	Alive
26-Jul-22	Brown Bullhead	BBH34	8.0	7.9	7.4	Alive
26-Jul-22	Brown Bullhead	BBH35	9.7	9.4	11.8	Alive
26-Jul-22	Brown Bullhead	BBH36	9.3	8.1	8.6	Alive
26-Jul-22	Brown Bullhead	BBH37	7.8	7.6	7.5	Alive
26-Jul-22	Brown Bullhead	BBH38	7.3	7.1	4.7	Alive
26-Jul-22	Brown Bullhead	BBH39	8.2	8.1	8.0	Alive
26-Jul-22	Brown Bullhead	BBH40	7.9	7.7	7.3	Alive
26-Jul-22	Brown Bullhead	BBH41	7.7	7.5	6.6	Alive
30-Aug-22	Brown Bullhead	BBH1	4.8	-	1.562	originally labelled BBH1
30-Aug-22	Brown Bullhead	BBH2	3.8	-	1.016	originally labelled BBH2
25-Jul-22	Central Mudminnow	CMM14	3.4	-	0.4	Juvenile
25-Jul-22	Central Mudminnow	CMM15	3.3	-	0.4	Juvenile
25-Jul-22	Central Mudminnow	CMM05	8.5	-	7.0	
25-Jul-22	Central Mudminnow	CMM06	9.9	-	11.9	
25-Jul-22	Central Mudminnow	CMM07	7.1	-	4.0	
25-Jul-22	Central Mudminnow	CMM08	8.1	-	6.3	
25-Jul-22	Central Mudminnow	CMM09	8.5	-	7.8	
25-Jul-22	Central Mudminnow	CMM10	8.6	-	7.9	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
25-Jul-22	Central Mudminnow	CMM11	8.6	-	6.8	
25-Jul-22	Central Mudminnow	CMM12	8.3	-	7.0	
25-Jul-22	Central Mudminnow	CMM13	8.8	-	8.6	
25-Jul-22	Central Mudminnow	CMM17	7.9	-	6.9	Started @ Right bank
25-Jul-22	Central Mudminnow	CMM18	7.6	-	5.9	up o bow
25-Jul-22	Central Mudminnow	CMM19	6.6	-	4.1	Dead
25-Jul-22	Central Mudminnow	CMM20	8.0	-	6.7	Dead
25-Jul-22	Central Mudminnow	CMM21	7.7	-	7.9	Dead
25-Jul-22	Central Mudminnow	CMM22	6.6	-	3.8	Dead
25-Jul-22	Central Mudminnow	CMM23	7.5	-	5.5	Dead
25-Jul-22	Central Mudminnow	CMM24	8.5	-	7.7	Dead
25-Jul-22	Central Mudminnow	CMM25	10.4	-	14.5	Dead
25-Jul-22	Central Mudminnow	CMM26	7.2	-	5.0	Dead
25-Jul-22	Central Mudminnow	CMM27	7.4	-	5.0	Alive
25-Jul-22	Central Mudminnow	CMM28	8.0	-	6.5	Alive
25-Jul-22	Central Mudminnow	CMM29	7.9	-	6.1	Dead
25-Jul-22	Central Mudminnow	CMM30	8.6	-	7.6	Dead
25-Jul-22	Central Mudminnow	CMM31	8.0	-	6.3	Dead
25-Jul-22	Central Mudminnow	CMM32	10.5	-	14.7	Dead
25-Jul-22	Central Mudminnow	CMM01	10.2	-	12.614	dead
25-Jul-22	Central Mudminnow	CMM02	10.3	-	11.9	Dead
25-Jul-22	Central Mudminnow	CMM03	9.9	-	13.8	Dead
25-Jul-22	Central Mudminnow	CMM04	9.9	-	12.2	Dead
23-Jul-22	Central Mudminnow	CMM3	7.7	-	5.5	
23-Jul-22	Central Mudminnow	CMM4	8.9	-	7.6	
23-Jul-22	Central Mudminnow	CMM06	7.8	-	7.3	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
23-Jul-22	Central Mudminnow	CMM07	8.4	-	7.5	
23-Jul-22	Central Mudminnow	CMM1	8.3	-	6.4	
23-Jul-22	Central Mudminnow	CMM2	8.7	-	7.7	
26-Jul-22	Central Mudminnow	CMM30	8.8	-	8.061	
25-Jul-22	Central Mudminnow	CMM31	9.1	-	8.450	
25-Jul-22	Central Mudminnow	CMM32	11.6	-	17.716	
25-Jul-22	Central Mudminnow	CMM33	11.0	-	17.240	
25-Jul-22	Central Mudminnow	CMM34	8.9	-	8.364	
25-Jul-22	Common Shiner	CS01	10.7	9.8	13.635	
25-Jul-22	Common Shiner	CS02	10.5	9.6	12.848	
30-Aug-22	Common Shiner	CS13	7.2	6.4	2.785	
30-Aug-22	Common Shiner	CS14	7.1	6.3	3.042	
30-Aug-22	Common Shiner	CS15	6.8	6.1	2.018	
30-Aug-22	Common Shiner	CS16	6.3	5.5	1.630	
30-Aug-22	Common Shiner	CS17	6.3	5.6	1.867	
30-Aug-22	Common Shiner	CS18	6.1	5.4	1.554	
30-Aug-22	Common Shiner	CS19	6.6	5.9	2.260	
30-Aug-22	Common Shiner	CS20	6.6	5.9	2.304	
30-Aug-22	Common Shiner	CS21	6.9	6.2	2.481	
30-Aug-22	Common Shiner	CS22	7.2	6.7	3.076	
30-Aug-22	Common Shiner	CS23	6.7	6.1	2.446	
30-Aug-22	Common Shiner	CS24	6.6	5.9	2.362	
30-Aug-22	Common Shiner	CS25	6.3	5.5	1.834	
30-Aug-22	Common Shiner	CS26	6.0	5.3	1.652	
30-Aug-22	Common Shiner	CS34	7.6	6.6	3.536	
30-Aug-22	Common Shiner	CS35	6.4	5.3	1.985	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
30-Aug-22	Common Shiner	CS36	5.7	4.9	1.339	
30-Aug-22	Common Shiner	CS37	7.0	6.3	2.980	
30-Aug-22	Common Shiner	CS38	7.0	6.0	2.603	
30-Aug-22	Common Shiner	CS39	7.3	6.6	3.242	
30-Aug-22	Common Shiner	CS27	6.0	5.4	1.769	
30-Aug-22	Common Shiner	CS28	7.3	6.5	3.057	
30-Aug-22	Common Shiner	CS29	7.0	6.3	2.791	
30-Aug-22	Common Shiner	CS30	9.9	9.0	8.256	
30-Aug-22	Common Shiner	CS31	6.8	6.0	2.646	
30-Aug-22	Common Shiner	CS32	6.6	5.9	2.143	
30-Aug-22	Common Shiner	CS33	6.8	6.4	-	
30-Aug-22	Common Shiner	CS40	7.6	6.8	3.334	
30-Aug-22	Common Shiner	CS41	8.6	7.8	5.245	
30-Aug-22	Common Shiner	CS42	11.0	10.1	10.925	
30-Aug-22	Common Shiner	CS43	5.9	5.3	1.709	
30-Aug-22	Common Shiner	CS44	6.0	5.4	1.680	
30-Aug-22	Common Shiner	CS45	5.2	4.6	0.941	
30-Aug-22	Common Shiner	CS46	6.5	5.8	2.054	
30-Aug-22	Common Shiner	CS47	5.5	4.9	1.183	
30-Aug-22	Common Shiner	CS48	6.5	5.7	1.984	
30-Aug-22	Common Shiner	CS49	7.4	6.4	3.049	
30-Aug-22	Common Shiner	CS50	8.2	7.4	4.347	
03-Sep-22	Common Shiner	CS03	5.1	5.7	1.189	
03-Sep-22	Common Shiner	CS04	6.7	5.9	2.241	
03-Sep-22	Common Shiner	CS05	7.2	6.4	2.890	
03-Sep-22	Common Shiner	CS06	9.3	8.3	6.430	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
03-Sep-22	Common Shiner	CS07	7.6	6.8	3.248	
03-Sep-22	Common Shiner	CS08	11.2	9.9	12.773	
03-Sep-22	Common Shiner	CS09	8.8	7.8	6.018	
03-Sep-22	Common Shiner	CS10	10.6	9.5	9.618	
03-Sep-22	Common Shiner	CS11	7.6	6.9	3.549	
03-Sep-22	Common Shiner	CS12	8.1	7.4	4.196	
03-Sep-22	Common Shiner	CS51	6.6	6.1	2.198	
03-Sep-22	Common Shiner	CS52	10.2	9.0	7.996	
03-Sep-22	Common Shiner	CS53	8.6	7.7	5.044	
03-Sep-22	Common Shiner	CS54	8.7	7.7	4.734	
25-Jul-22	Creek Chub	CC01	10.1	9.5	14.6	
30-Aug-22	Creek Chub	CC	18.9	18.9	-	Spring scale not available
25-Jul-22	Fathead Minnow	FHM01	2.8	2.6	0.1	Alive
25-Jul-22	Golden Shiner	GS03	7.4	6.7	3.8	Dead
25-Jul-22	Golden Shiner	GS01	11.2	10.2	14.5	Dead
30-Aug-22	Golden Shiner	GS1	7.9	7.0	4.038	
25-Jul-22	Northern Pike	NRPK08	12.8	12.1	11.9	
25-Jul-22	Northern Pike	NRPK05	16.1	15.2	28.2	Alive
25-Jul-22	Northern Pike	NRPK06	11.3	10.6	10.7	Blackspot, Alive
25-Jul-22	Northern Pike	NRPK01	14.9	14.1	23.5	dead
25-Jul-22	Northern Pike	NRPK02	14.8	14.0	20.2	Dead/Blackspot
25-Jul-22	Northern Pike	NRPK03	49.6	45.5	695.0	Dead/Blackspot
25-Jul-22	Northern Pike	NRPK04	33.6	31.5	203.6	Dead/Blackspot
26-Jul-22	Northern Pike	NRPK06	15.1	14.6	18.9	Alive
25-Jul-22	Northern Pike	NRPK09	13.4	12.7	12.6	Alive, Blackspot
25-Jul-22	Northern Pike	NRPK10	13.9	13.9	13.7	Alive, Blackspot

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
30-Aug-22	Northern Pike	NRPK11	24.8	23.1	-	Spring scale not available
30-Aug-22	Northern Pike	NRPK12	23.8	22.5	-	Spring scale not available
30-Aug-22	NRPK	NRPK13	16.0	15.0	22.800	originally labelled NRPK3
30-Aug-22	NRPK	NRPK14	21.3	19.6	-	
30-Aug-22	NRPK	NRPK15	12.5	11.9	10.411	originally labelled NRPK
25-Jul-22	White Sucker	WS04	22.2	20.9	112.6	Alive
25-Jul-22	White Sucker	WS05	19.5	18.4	77.4	Alive
25-Jul-22	White Sucker	WS01	23.2	21.8	137.5	Dead
25-Jul-22	White Sucker	WS02	21.8	20.4	114.2	Dead
25-Jul-22	White Sucker	WS03	22.4	20.9	125.4	Alive
03-Sep-22	White Sucker	WS	25.2	23.6	195.000	
03-Sep-22	White Sucker	WS	24.2	23.4	180.000	
03-Sep-22	White Sucker	WS	26.6	25.0	220.000	
03-Sep-22	White Sucker	WS	24.8	23.3	160.000	
03-Sep-22	White Sucker	WS	23.1	22.1	115.000	

Table A - 10: Fish measurements for PWFF

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
31-Aug-22	Blackside Darter	BSD	7.0	-	3.278	
31-Aug-22	Blackside Darter	BSD	8.0	-	-	fish released before weight taken
31-Aug-22	Blackside Darter	BSD	7.4	-	12.847	
01-Sep-22	Blackside Darter	BSD	4.4	4.2	0.636	
02-Sep-22	Blackside Darter	BSD	6.7	-	2.627	
26-Jul-22	Blackside Darter	BD01	6.9	6.6	3.1	Alive
26-Jul-22	Blackside Darter	BD02	6.8	6.4	3.3	
26-Jul-22	Blackside Darter	BD03	3.8	3.6	0.3	Alive
26-Jul-22	Brown Bullhead	BBH01	10.5	10.4	15.8	Alive
27-Jul-22	Brown Bullhead	BBH02	10.3	10.1	14.6	
27-Jul-22	Brown Bullhead	BBH03	7.8	7.5	5.7	
27-Jul-22	Brown Bullhead	BBH04	9.0	8.8	10.2	
27-Jul-22	Brown Bullhead	BBH05	6.4	6.3	3.6	
27-Jul-22	Brown Bullhead	BBH06	9.4	9.1	12.2	
26-Jul-22	Central Mudminnow	CMM02	2.4	-	0.1	Alive
27-Jul-22	Central Mudminnow	CMM03	3.0	-	0.2	Alive
27-Jul-22	Central Mudminnow	CMM04	3.3	-	0.2	Alive
27-Jul-22	Central Mudminnow	CMM1	10.6	-	13.7	
01-Sep-22	Common Shiner	CS41	8.9	8.2	5.695	
31-Aug-22	Common Shiner	CS13	6.8	6.2	2.599	
31-Aug-22	Common Shiner	CS14	5.8	5.3	1.626	
31-Aug-22	Common Shiner	CS15	6.1	5.6	1.918	
31-Aug-22	Common Shiner	CS16	7.5	6.9	3.653	
31-Aug-22	Common Shiner	CS17	6.3	5.7	2.226	
31-Aug-22	Common Shiner	CS18	6.0	5.3	1.589	
31-Aug-22	Common Shiner	CS19	6.1	5.5	1.739	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
31-Aug-22	Common Shiner	CS20	7.2	6.5	3.405	
31-Aug-22	Common Shiner	CS21	6.6	5.9	2.279	
31-Aug-22	Common Shiner	CS22	8.1	7.3	4.217	
31-Aug-22	Common Shiner	CS40	10.6	9.5	11.155	
31-Aug-22	Common Shiner	CS23	7.7	7.0	4.202	
31-Aug-22	Common Shiner	CS24	8.2	7.5	4.839	
31-Aug-22	Common Shiner	CS38	5.8	5.1	1.360	
31-Aug-22	Common Shiner	CS39	8.2	7.4	4.231	
31-Aug-22	Common Shiner	CS26	5.5	5.0	1.326	
31-Aug-22	Common Shiner	CS27	10.6	9.7	10.006	
31-Aug-22	Common Shiner	CS28	5.9	5.4	1.776	
31-Aug-22	Common Shiner	CS33	8.5	7.6	-	
31-Aug-22	Common Shiner	CS34	7.0	6.5	-	
31-Aug-22	Common Shiner	CS35	7.1	6.6	-	
31-Aug-22	Common Shiner	CS36	5.9	5.3	-	
31-Aug-22	Common Shiner	CS29	5.9	5.2	1.513	
31-Aug-22	Common Shiner	CS30	5.6	5.1	1.339	
31-Aug-22	Common Shiner	CS31	7.0	6.3	2.772	
31-Aug-22	Common Shiner	CS32	10.7	9.9	10.948	
01-Sep-22	Common Shiner	CS42	6.9	6.1	2.529	
01-Sep-22	Common Shiner	CS43	8.3	7.7	5.339	red"bulb on fish"
01-Sep-22	Common Shiner	CS44	7.3	6.7	3.463	
01-Sep-22	Common Shiner	CS45	6.9	6.2	2.440	
01-Sep-22	Common Shiner	CS46	7.3	6.6	3.077	
01-Sep-22	Common Shiner	CS47	7.9	6.9	3.842	
01-Sep-22	Common Shiner	CS48	6.0	5.3	1.697	
01-Sep-22	Common Shiner	CS49	6.4	5.8	2.503	
01-Sep-22	Common Shiner	CS50	5.4	4.9	1.447	
01-Sep-22	Common Shiner	CS51	7.7	6.9	3.217	

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
02-Sep-22	Common Shiner	CS62	8.6	7.9	5.414	
02-Sep-22	Common Shiner	CS63	10.2	9.3	8.544	
02-Sep-22	Common Shiner	CS64	9.5	10.6	9.810	
02-Sep-22	Common Shiner	CS65	6.2	5.5	1.646	
02-Sep-22	Common Shiner	CS66	12.1	10.9	16.471	
02-Sep-22	Common Shiner	CS67	10.8	10.0	10.948	
02-Sep-22	Common Shiner	CS52	7.0	6.3	2.952	
02-Sep-22	Common Shiner	CS53	6.3	5.4	1.735	
02-Sep-22	Common Shiner	CS54	5.9	5.2	1.632	
02-Sep-22	Common Shiner	CS55	8.3	7.6	4.578	
02-Sep-22	Common Shiner	CS56	4.3	3.9	0.573	
02-Sep-22	Common Shiner	CS57	8.8	7.8	5.211	
02-Sep-22	Common Shiner	CS58	8.1	7.3	4.236	
02-Sep-22	Common Shiner	CS59	8.3	7.3	4.659	
02-Sep-22	Common Shiner	CS60	5.8	5.1	1.422	
02-Sep-22	Common Shiner	CS61	6.4	5.6	2.101	
20-Jul-22	Common Shiner	CS01	10.4	9.6	5.7	Male (processed)
27-Jul-22	Common Shiner	CS2	6.9	6.3	3.2	
26-Jul-22	Creek Chub	CC01	3.9	3.6	0.4	Dead
26-Jul-22	Creek Chub	CC02	9.6	9.0	8.6	Alive, blackspot
27-Jul-22	Creek Chub	CC03	9.7	9.2	10.7	
27-Jul-22	Fathead Minnow	FHM1	5.2	4.8	0.5	
27-Jul-22	Fathead Minnow	FHM2	5.4	4.9	1.1	Blackspot
26-Jul-22	Golden Shiner	GS01	8.2	7.4	4.6	Alive
02-Sep-22	Johnny Darter	JD	6.6	-	2.649	
26-Jul-22	Johnny Darter	JD01	5.4	-	1.7	Alive
26-Jul-22	Johnny Darter	JD02	5.2	-	1.1	
01-Sep-22	Northern Pike	NRPK	14.9	14.0	17.057	
26-Jul-22	Northern Pike	NRPK04	15.1	14.0	172.0	Alive

Processing Date	Species	Fish ID	Total Length (cm)	Fork Length (cm)	Fresh weight (g)	NOTES
27-Jul-22	Northern Pike	NRPK05	14.4	13.5	2.5	Alive
20-Jul-22	Northern Pike	NRPK01	13.0	12.4	-	no weight-eaten by crayfish
20-Jul-22	Northern Pike	NRPK02	50.2	46.8	855.0	Alive
20-Jul-22	Northern Pike	NRPK03	47.4	44.1	615.0	Dead
27-Jul-22	Northern Pike	NRPK06	10.6	9.8	5.0	
27-Jul-22	Northern Pike	NRPK07	11.6	10.9	11.3	Dead
31-Aug-22	Pearl Dace	PD7	10.0	9.3	-	
20-Jul-22	Rock Bass	RB01	19.5	18.6	175.0	Alive
20-Jul-22	Rock Bass	RB02	20.0	19.4	180.0	Frayed Caudal/Alive
20-Jul-22	Rock Bass	RB03	15.4	14.3	100.0	Dead
20-Jul-22	Rock Bass	RB04	22.3	21.9	275.0	Alive
20-Jul-22	Rock Bass	RB05	20.0	19.4	190.0	Alive
01-Sep-22	Trout Perch	TP1	5.3	4.8	1.304	Trout perch
02-Sep-22	Trout Perch	TP	5.7	4.8	1.808	
20-Jul-22	Walleye	WALL01	28.3	26.6	210.0	Dead
31-Aug-22	White Sucker	WS	11.1	10.5	13.261	
31-Aug-22	White Sucker	WS	10.9	10.4	12.824	