

# Columbia Basin Invasive Northern Pike (*Esox lucius*) Suppression and Monitoring, British Columbia

(2022 – 2023) – Final

Okanagan Nation Alliance Program: Year 4



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Cover Photos

- Left: Six Northern Pike caught in Zuckerberg Pond on Jun 02 2022. Photo by Okanagan Nation Alliance.
- Top Right: Northern Pike adult captured Jun 20 2022. Photo by Okanagan Nation Alliance.
- Bottom Right: Young-of-year Northern Pike captured in Zuckerberg Pond on Jul 26 2022. Photo by Okanagan Nation Alliance.

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## Executive Summary

Northern Pike have been introduced (legally and illegally) to systems outside of their native distribution for the purposes of sport fishing. When introduced, Northern Pike are known to have detrimental effects on native fish populations, including salmonids. In 2004, Northern Pike were first observed in the Pend d'Oreille River Box Canyon Reservoir in Pend Oreille County, Washington. This population is suspected to have seeded the population now established in the lower Columbia River. As of January 2023, over 40,378 Northern Pike have been removed from the Columbia River Basin in Canada (946) and the United States (39,432) through active suppression, angler incentives, and other suppression initiatives.

In 2022, active suppression was conducted from May 12 – Oct 04 in the Columbia and Pend d'Oreille Rivers using gillnetting, backpack electrofishing, seine netting, trapping, and angling. In total, 179 Northern Pike were captured (all from the Columbia River) over 38 crew days. Most Northern Pike captured in 2022 were young-of-year (145 Northern Pike), from Zuckerberg Pond. Gillnetting was the primary method of suppression in 2022 (209 sets and 867 hours of soak time or active fishing time) and resulted in the most Northern Pike captures (168 Northern Pike). Backpack electrofishing occurred over six days (11 hours) and resulted in the removal of 10 young-of-year Northern Pike. Two seines were conducted through an estimated 787 m<sup>3</sup> of water and resulted in one young-of-year Northern Pike capture. Northern Pike were not captured in trapping or angling methods in 2022. An additional three Northern Pike were submitted for the email-in angler incentive program, and four Northern Pike were opportunistically removed during BC Hydro's Large River Indexing Program (CLBMON-45).

Spring catch-per-unit-effort has been comparable over the last five years (2018 – 2022) however is markedly lower than when suppression began in 2014 (89% lower in 2022 compared to 2014).

Columbia River Northern Pike capture locations were consistent with previous years, with the majority of captures occurring in the Robson Reach and by Zuckerberg Island. Adult Northern Pike have predominantly been encountered along the right downstream bank of the Robson Reach section of the Columbia River between Celgar Mill and the Robson Bridge, and near Zuckerberg Island and the Kootenay Oxbow downstream of the Robson Reach. In 2022, more Northern Pike were encountered in the area upstream of the Robson ferry landing (left downstream bank) known locally as "Sturgeon Island" than previous years. Northern Pike were not captured in the Pend d'Oreille River (Waneta Reservoir) in 2022. The Seven Mile Reservoir was not sampled in 2022 due to low capture numbers and low catch-per-unit effort in the previous two years.

Northern Pike habitat (shallow water with low flow and aquatic vegetation) is available in the Columbia and Pend d'Oreille Rivers. More Northern Pike have been captured in the Columbia River than the Pend d'Oreille River between 2018 – 2022, though Pend d'Oreille Northern Pike have been found to be larger and older. Water temperatures in the Pend d'Oreille River are generally warmer and more suitable for Northern Pike growth compared to the Columbia River Mainstem. However, off-channel habitat present in the Columbia River do reach optimal Northern Pike growing temperatures (Zuckerberg Pond). In 2022, adult Northern Pike tended to use

habitats similar to previous years, primarily in water depths of 2 – 7 m with aquatic vegetation. This habitat appears abundant in the Robson Reach of the Columbia River, where the majority of adult Northern Pike captures have occurred. Optimal rearing habitat has been identified at Zuckerberg Pond, and potential rearing habitat has been identified at Kootenay Oxbow, Waldie Island, and the Robson Reach.

Sculpin and Mountain Whitefish appear to be preferred prey of adult Northern Pike in the Columbia River. Dace, Kokanee, Northern Pikeminnow, Peamouth Chub, Rainbow Trout, Redside Shiners, Brook Trout, Lake Whitefish, and Yellow Perch have also been identified as Northern Pike prey species in the Columbia River and non-fish prey items included grasshoppers, aquatic sow bugs, wasps, flying ants, leeches, and other unidentified invertebrates. The dominant prey species of young-of-year Northern Pike in the Columbia River appears to be Sculpin and Yellow Perch. This may be a product of availability, as young-of-year Northern Pike were primarily captured in Zuckerberg Pond, which provides habitat for many invasive species (64% of bycatch in Zuckerberg Pond was non-native in 2022).

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## 1.0 Introduction

Northern Pike (*Exos lucius*) are a carnivorous fish with a circumpolar distribution. In Canada and the United States, they are native to the east of the Rocky Mountain Range; excluding Canadian Maritime Provinces and the Atlantic Coastal Plain (east of the Appalachian Mountain Range) in the United States (Figure 1; McPhail 2007; Hatfield and Pollard 2009). Northern Pike have been introduced (a species living outside its native distributional range due to human activity, either intentional or accidental), legally and illegally, to systems outside of their native distribution in Canada and the United States for the purposes of sport fishing (Hatfield and Pollard 2009; Runciman and Leaf 2009). Because Northern Pike are a prolific predatory fish species, they are known to have detrimental effects on native fish populations, including salmonids (Baxter and Neufeld 2015; Muhlfeld et al. 2008).

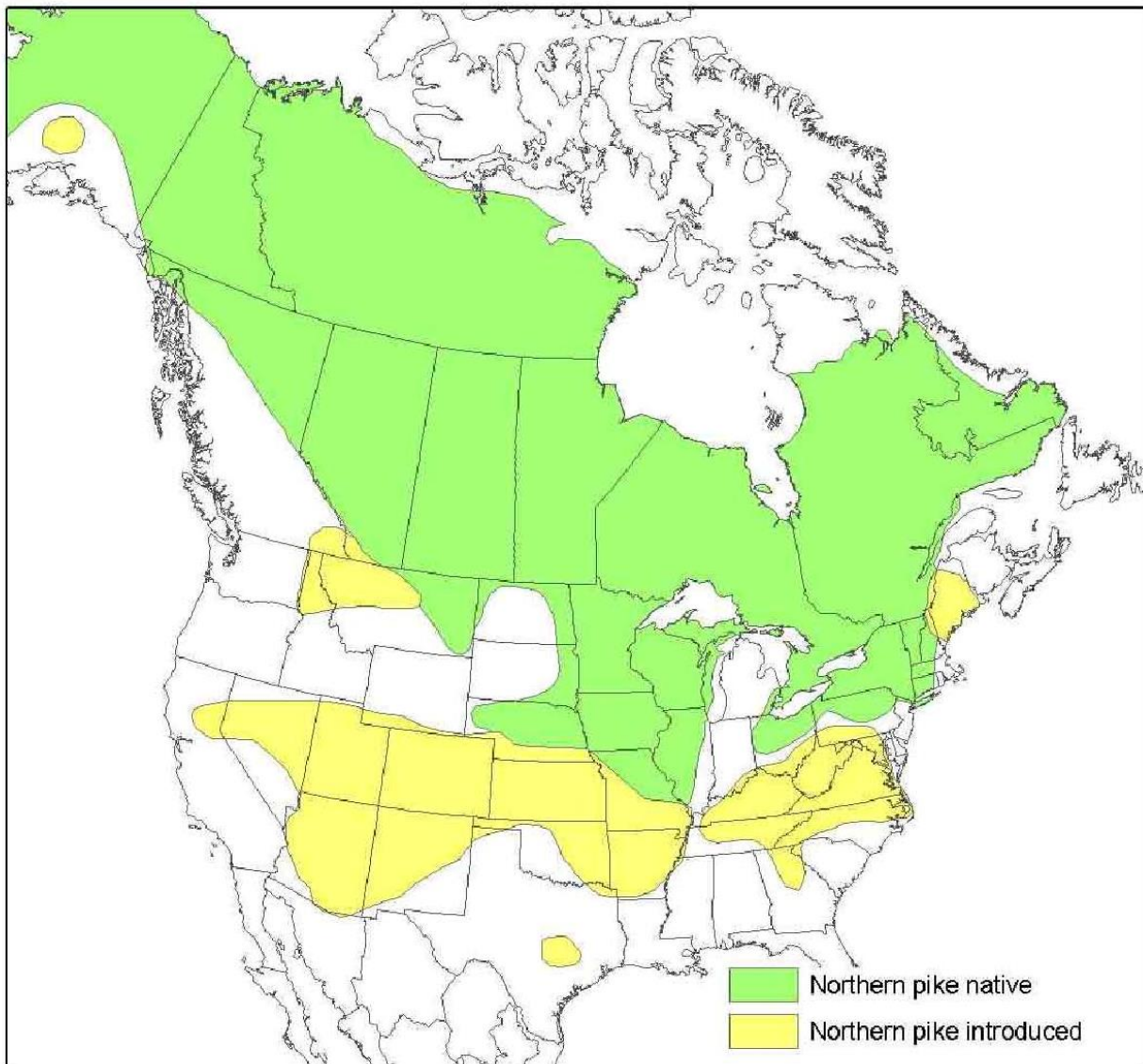


Figure 1. North American distribution of Northern Pike identifying their native and non-native (introduced) range (figure from Harvey 2009).

Northern Pike are monomorphic (males and females look the same, though females tend to be larger at age) and are easily identified by their duckbill-shaped head, elongated body and posteriorly-placed dorsal and anal fins, which allow rapid acceleration; one feature making them a successful predator (Doyon 1988; Hubbs and Lagler 2004; McPhail 2007).

Introduced Northern Pike were observed in the Koocanusa Reservoir in 1995 by the Montana Department of Fish, Wildlife, and Parks (Parnell 1996; Runciman and Leaf 2009). This population is suspected to have seeded British Columbia's first Northern Pike introduction at Ha Ha Lake near Wardner, BC; documented in 2005 (Harvey 2009; Runciman and Leaf 2009; Davis 2011). In 2004, Northern Pike were observed in the Pend d'Oreille River Box Canyon Reservoir in Pend Oreille County, Washington (WDFW and KTI 2012; Bartholdt 2018). This population is expected to have seeded the lower Columbia River (LCR) population via the Pend d'Oreille River (Ford and Thorley 2011). These non-native (introduced) populations are considered invasive (a species that can spread to a degree that causes damage to the environment, human economy or human health) in the Columbia River (Harvey 2009). Within the LCR, Northern Pike may pose a risk to resident fish including species listed under the Species at Risk Act (SARA) such as White Sturgeon (*Acipenser transmontanus*), Shorthead Sculpin (*Cottus confusus*), Columbia Sculpin (*Cottus hubbsi*), and Umatilla Dace (*Rhinichthys umatilla*).

## 1.1 Program Background

In response to the spread of Northern Pike throughout the Pacific Northwest, including southeastern British Columbia, a number of suppression programs have been initiated in Canada and the United States. Within the Columbia River Basin, Northern Pike are now known to inhabit the Kettle River in addition to the Pend d'Oreille River and Columbia River; photo evidence also indicates they may have reached Christina Lake via the Kettle River. As of January 2023, over 40,378 Northern Pike have been removed from the Columbia River Basin in Canada (946) and the United States (39,432) through active suppression, angler incentives, and other suppression initiatives (AMEC 2017; Baxter and Lawrence 2018; Wood 2019; McLellan et al. 2023; ONA 2022; WDFW and KTI 2023<sup>1</sup>, 2023<sup>2</sup>; BC Hydro unpublished data).

### 1.1.1 United States Suppression Efforts (Pend d'Oreille and Columbia Rivers)

In 2012, the Kalispel Tribe of Indians (KTI) and the Washington Department of Fish and Wildlife (WDFW) began an active suppression program in the Box Canyon Reservoir which has resulted in the removal of 19,430 Northern Pike as of January 2023 (814 in 2022; WDFW and KTI 2023<sup>1</sup>). An additional program was initiated in the Boundary Reservoir in 2016, which has resulted in the removal of 825 Northern Pike as of January 2023 (40 in 2022; WDFW and KTI 2023<sup>2</sup>).

In 2015, a dedicated Northern Pike Suppression Program was initiated in Lake Roosevelt to suppress Northern Pike population growth in the reservoir; this program involved the Colville Confederated Tribes (CCT), Spokane Tribe of Indians (STI), WDFW, and the US Department of Energy – Bonneville Power Administration (BPA). An estimated 19,177 Northern Pike have been removed from Lake Roosevelt as of January 2023 (1,252 in 2022; McLellan et al. 2023).



### 1.1.2 Canadian Suppression Efforts (Pend d’Oreille and Columbia Rivers)

In 2014, a gillnetting program was initiated in the LCR resulting in the removal of 323 Northern Pike between 2014 and 2017 (Baxter and Lawrence 2018). An angler reward program, initiated by FLRNORD in 2013/14 and 2015/16, resulted in the removal of an additional 29 Northern Pike from the LCR and four Northern Pike from the Pend d’Oreille River (Doutaz 2019).

In 2015 and 2016, additional detection programs were implemented by the Castlegar and District Wildlife Association (CDWA) and Golder Associates (2015), and Okanagan Nation Alliance (ONA; 2016). The CDWA and Golder piloted a larval study targeting Northern Pike in the LCR; however, none were detected (Golder 2015). In 2016, the ONA conducted a juvenile Northern Pike sampling program in the Robson Reach of the LCR resulting in the capture of one young-of-year (YOY) Northern Pike; this detection confirmed Northern Pike recruitment in the LCR (ONA 2016). Doutaz (2019) further supported this finding using microchemistry to determine 98% of Northern Pike sampled from the Columbia River originated from the Columbia River. Doutaz removed an additional 43 Northern Pike from the Pend d’Oreille River during 2016 and 2017.

In 2018, suppression efforts occurred in both the Columbia and Pend d’Oreille Rivers and resulted in the removal of 42 Northern Pike (Wood 2019). An ONA-led angler incentive program was also implemented in 2018, which resulted in the removal of four Northern Pike; three from the Columbia River and one from the Pend d’Oreille River (ONA 2020). The ONA also conducted a brief adult suppression program in 2018 (3,031 seconds electrofishing and 47.8 hours gillnetting) in the LCR and Pend d’Oreille Rivers, however no Northern Pike were captured.

In Year 1 (2019) of the ONA Northern Pike Suppression Program 45 Northern Pike were removed, 10 in the Pend d’Oreille River and 35 in the LCR (ONA 2020). During early detection monitoring in Christina Lake in Year 1 (2019), Northern Pike were not detected (ONA 2020). In Year 2 (2020), 144 Northern Pike were removed; six from the Pend d’Oreille River and 138 from the LCR (ONA 2021). In Year 3 (2021), 39 Northern Pike were removed, one from the Pend d’Oreille River and 38 from the LCR; an email-in angler incentive program was also initiated (no physical submission required due to COVID-19) and resulted in the removal of one Northern Pike from the Columbia River (ONA 2022). In Year 4 (2022), 179 Northern Pike were removed from the LCR through gillnetting, backpack electrofishing, and seine netting. An additional three Northern Pike were submitted through the ONA email-in angler incentive program.

In addition to targeted efforts, 86 Northern Pike have been opportunistically removed from the Columbia River since 2010 through BC Hydro’s Lower Columbia River Fish Population Indexing Surveys (CLBMON-45; BC Hydro unpublished data) and three since 2017 through BC Hydro’s Lower Columbia River Fish Stranding Assessment and Ramping Protocol (CLBMON-42A; BC Hydro unpublished data).

In total, from 2014 to 2022, 946 Northern Pike have been removed from the Canadian Columbia River Basin, 866 from the LCR and 80 from the Pend d’Oreille River.

## 1.2 Project Goals and Objectives

The primary goal of this program is to continue efforts to suppress adult and YOY Northern Pike in the Columbia and Pend d’Oreille Rivers (within Canada), while working to identify Northern Pike spawning and rearing locations and to monitor range expansion using eDNA. Specific goals and objectives include:

*Goal 1: Reduce the population of Northern Pike in the Columbia and Pend d’Oreille Rivers*

Objective 1.1: Utilize existing Northern Pike suppression methodologies from similar programs to ensure comparability (Catch-Per-Unit-Effort compared between years and programs)

Objective 1.2: Investigate and trial new Northern Pike capture methods that could increase suppression efforts

Objective 1.3: Identify primary Northern Pike spawning/rearing habitat to direct active suppression efforts

Objective 1.4: Minimize mortality of native species and Species at Risk (SARA)

*Goal 2: Monitor for Northern Pike range expansion at susceptible locations*

Objective 2.1: Utilize eDNA (environmental DNA) to monitor for Northern Pike presence outside of the current known range

Objective 2.2: Implement a rapid response plan to manage Northern Pike in newly detected areas

*Goal 3: Promote stewardship and public involvement in Northern Pike suppression*

Objective 3.1: Engage local stewardship groups through conferencing, outreach and education

Objective 3.2: Develop a bounty/lottery program to involve/reward anglers for participating in Northern Pike suppression

## 2.0 Methods

All methods used for this program were implemented in accordance with Department of Fisheries and Oceans SARA Permit 22-PPAC-0009 (Columbia River) and MFLNRORD Scientific Collection Permit CB2022-715623 (Lower Columbia, Lower Kootenay, and Pend d’Oreille Rivers) and PE22-719491 (Christina Lake).

### 2.1 Study Area

Active suppression and early detection monitoring occurred in the LCR, Lower Kootenay River (LKR), Pend d’Oreille River. eDNA sampling occurred in the same locations as suppression and early detection monitoring, with additional sites in the Kootenay River (upstream of Brilliant Dam), Lower Arrow Lakes Reservoir (upstream of HLK Dam), Kettle River (downstream of Kettle Falls), and Osoyoos Lake (Figure 2; Figure 3).

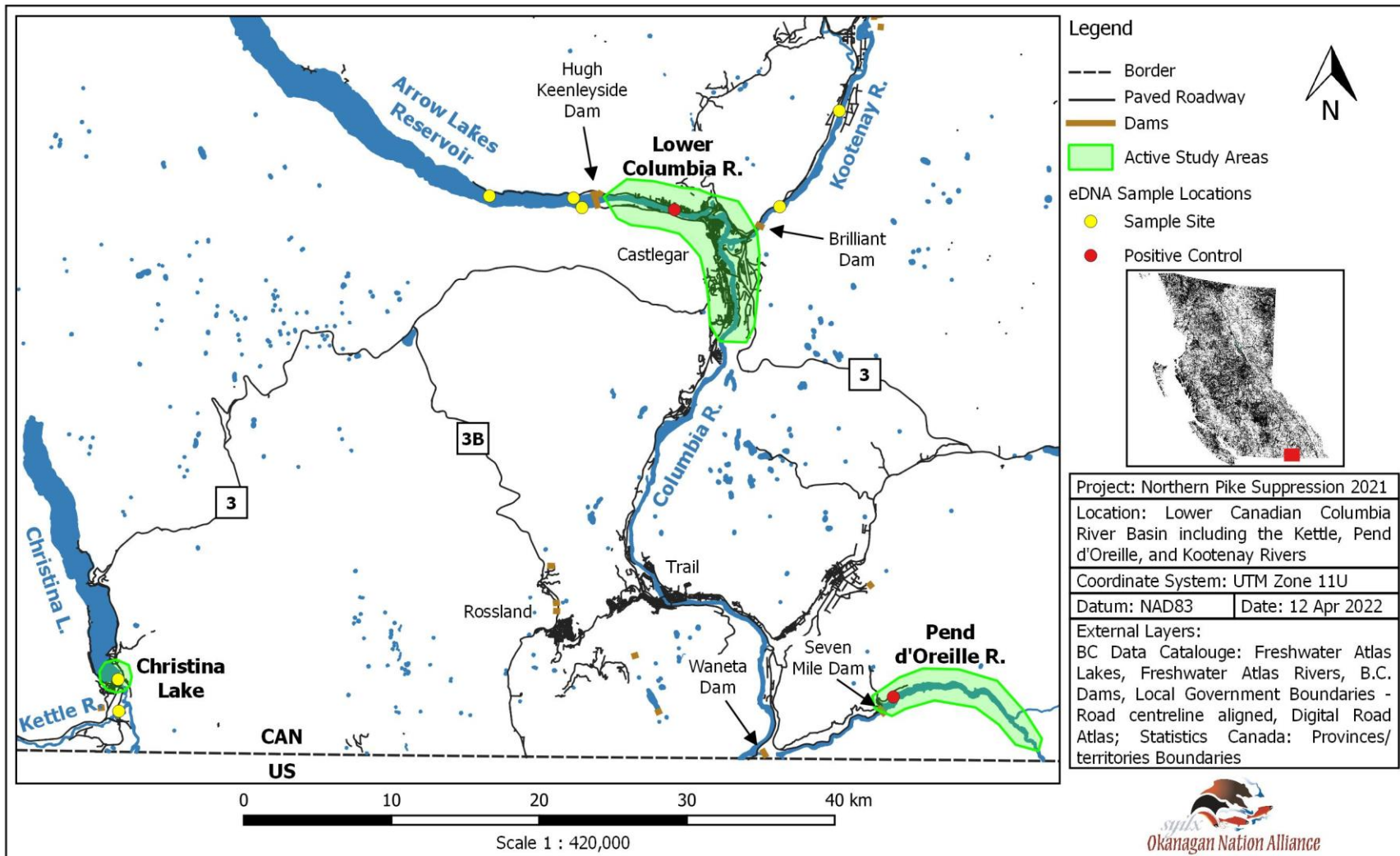


Figure 2. Northern Pike early detection monitoring and active suppression study areas and eDNA sampling locations (including positive control sites) within the Columbia River Basin in 2022. Lower Columbia River sampling includes the Lower Kootenay River downstream of Brilliant Dam. Data collected by the Okanagan Nation Alliance.

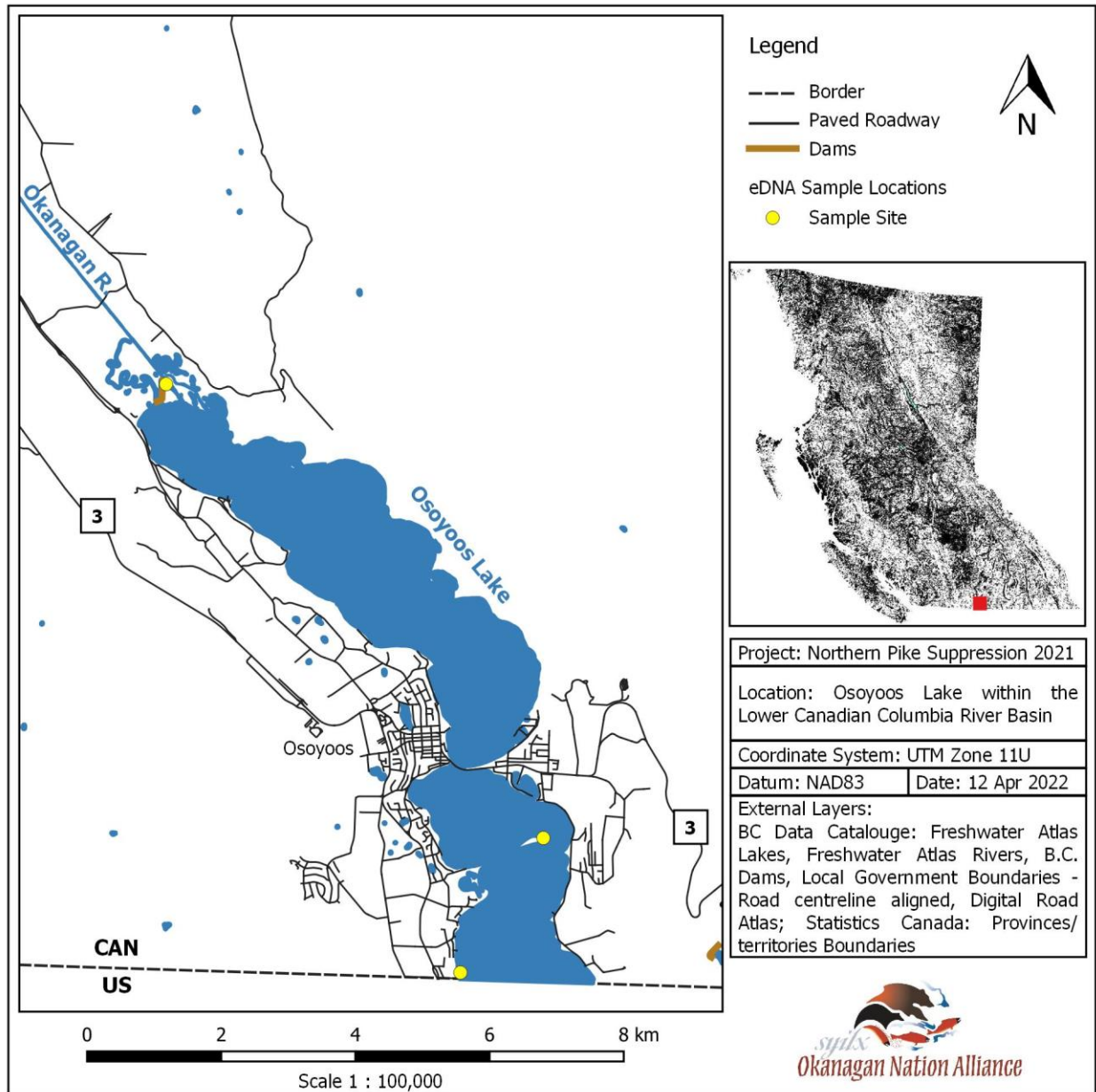


Figure 3. Northern Pike eDNA sampling locations in Osoyoos Lake within the Columbia River Basin in 2022. Data Collected by the Okanagan Nation Alliance.

Suppression efforts in the Columbia River in 2022 were focused between HLK Dam and Waterloo Eddy near Castlegar BC, targeting capture locations identified in previous suppression efforts (Baxter and Neufeld 2015; Baxter 2016; Baxter and Doutaz 2017; Baxter and Lawrence 2018; Wood 2019; ONA 2020; ONA 2021; ONA 2022). This area includes the lower reach of the Kootenay River between the Columbia/Kootenay River confluences, upstream 2.9 km to Brilliant Dam (see “Lower Columbia R.” suppression area in Figure 2); for the purposes of this report, this section of the Kootenay River is referred to as the “Lower Columbia River” or “LCR” sampling area unless specifically stated otherwise.

The Pend d’Oreille River is a tributary of the Columbia River and is approximately 209 km long originating in Lake Pend Oreille near Sandpoint, Idaho. The majority of the river is located in the United States before entering Canada downstream of Boundary Dam north of Metalline Falls, WA. The Pend d’Oreille River flows through southern BC for 24.6 km before draining into the Columbia River just north of the Canada/United States Border. Within the Canadian reach of the Pend d’Oreille there are two reservoirs: Waneta (9.4 km) and Seven Mile (14.4 km). The Waneta Reservoir was formed with the construction of Waneta Dam and extends from the forebay of Waneta Dam (RKm 0.8) to the tailrace of Seven Mile Dam (RKm 10.2). The Seven Mile Reservoir originates behind Seven Mile Dam and extends to the Boundary Dam tailrace (RKm 24.6). In 2022, active suppression was focused in the Waneta Reservoir due to low capture numbers and catch-per-unit effort (CPUE) in the Seven-Mile Reservoir (CPUE [Northern Pike/8hrs] went from 0.15 in 2019 to 0.02 in 2021) and because there has not been any effort in the Waneta Reservoir since 2019.

Christina Lake is located between Grand Forks and Castlegar, BC, and drains into the Kettle River, a tributary to the Columbia River. The lake is roughly 18 km long and has a surface area of 25.5 km<sup>2</sup> providing high recreational value; locally, Christina Lake is known as the warmest timber-lined lake in BC. Christina Lake was determined a high-priority monitoring location and a candidate for exploratory sampling because of the high potential for Northern Pike introduction through the Kettle River, which has confirmed Northern Pike presence. Northern Pike monitoring in Christina Lake was limited to eDNA sampling in 2022.

## 2.2 Early Detection Monitoring and Suppression Timing

Suppression activities began on May 12 2022 in the Pend d’Oreille River and May 31 2022 in the LCR, around the anticipated Northern Pike spawning window. The Pend d’Oreille River was only sampled in the spring (until May 26 2022), while suppression in the LCR occurred in three seasons: spring (May 31 – Jun 29), summer (Jul 01 – Aug 19), and fall (Aug 20 – Oct 4). Additionally, Northern Pike may be opportunistically captured and removed during the CLBMON-42A (sampling throughout the year) and the CLBMON-45 Indexing Program (Oct 04 – Nov 05 2022; BC Hydro unpublished data). The email-in angler incentive program occurred between April and December 2022; active participation appeared to be between April to September.

## 2.3 Sampling Methods

Gillnetting, backpack electrofishing, seine netting, trap netting (minnow and “N” traps) and angling methods were utilized in 2022 and implemented in a manner that ensured comparability to similar suppression programs (Box Canyon Reservoir, Boundary Reservoir, Lake Roosevelt) and past efforts in the LCR and Pend d’Oreille River. When required, methods were adjusted based on site-specific conditions to improve capture opportunities; comparability of data was considered when using adjusted methods.

### 2.3.1 Gillnetting

Two different gillnet types were used to target different life stages of Northern Pike. Spring Pike Index Nets (SPIN) were deployed from May through July to target adult Northern Pike (Table 1). Individual nets were constructed of five different mesh size panels (2”, 2.5”, 3”, 3.5”, 4”), with a total length of 45.72 m and depth of 1.83 m. Juvenile nets (1” monofilament nets, 45.72 m x 1.83 m) were deployed in August

into October to target YOY Northern Pike. Gillnets were deployed from a 24' jet-drive river boat at all sites except in Zuckerberg Pond where nets were deployed by hand or from a canoe due to shallow water, poor access, and heavy accumulations of aquatic vegetation (Figure 4).

Table 1. Gillnet panel specifications of the Spring Pike Index Nets in the Columbia and Pend d’Oreille Rivers including panel length (m), panel depth (m), mesh size (inch; stretched), monofilament material number (indicates type of monofilament from manufacturer), monofilament diameter (mm) and test strength (lbs).

Panel Number	Panel Length (m)	Panel Depth (m)	Mesh Size (inch)	Monofilament Material Number	Diameter (mm)	Net Test Strength (lbs)
1	9.144	1.83	2.0	#104/#4	0.33	11
2	9.144	1.83	2.5	#104/#4	0.33	11
3	9.144	1.83	3.0	#139/#6	0.40	17
4	9.144	1.83	3.5	#139/#6	0.40	17
5	9.144	1.83	4.0	#139/#6	0.40	17



Figure 4. Example of gillnet deployment via canoe in Zuckerberg Pond, Castlegar BC. Photo by Evan Smith, Okanagan Nation Alliance.

Gillnets were set in areas of known or suspected Northern Pike habitat (shallow, slow moving, abundant aquatic vegetation). Whenever possible, gillnets were set perpendicular to shore with the shallow end in ~1 m of water. SPIN nets were deployed with the smallest mesh size close to shore and the largest mesh size in deeper water. Gillnets were permitted to soak for up to four hours in the LCR and up to 24 hours in the Pend d’Oreille River in accordance with applicable permitting. Soak times in the LCR were reduced to two hours since White Sturgeon capture rates were high. Gillnets set in the Pend d’Oreille River during 2022 field season were reduced to eight hours due to the rapid water level changes present within the Waneta reservoir and risk of leaving nets with captured fish stranded.

### 2.3.2 Backpack Electrofishing

Backpack electrofishing was used in Zuckerberg Pond, the Kootenay Oxbow, and Waterloo Eddy in July and September to target YOY Northern Pike. A Smith-Root LR-24 electrofishing unit was used at settings of 30 Hz, 12% duty cycle at 25 W average-output power and then adjusted to increase efficiency. Variables such as conductivity, substrate, temperature, fish size, and species all effect the efficacy of the electrofishing unit (Beaumont et al. 2002). Settings were adjusted in accordance with the LR-24 Electrofisher User’s Manual (Smith-Root 2018) and were increased to 70 Hz with a 12% duty cycle producing 305 V. These settings are higher than those generally recommended for soft-bodied fish; however due to low native bycatch rates (ONA 2020) it was determined the risk to native species was low. If native species were encountered during backpack electrofishing, the power was turned off and resumed when the fish had left the sampling zone (15 m from the electrofisher). Other non-native (invasive) species were opportunistically captured and euthanized if encountered. Effort was measured in seconds, while site length (m), estimated effective width (m) and average depth (m) were also recorded.

### 2.3.3 Seine Netting

Seine nets measured 6’ deep by 40’ long and had ¾” mesh. Nets were used to seine shallow water areas within Waterloo Eddy (Jul 29) and Zuckerberg Pond (Sep 04) to target YOY Northern Pike. Two or three crew members were required to operate the seine net. Starting from a point on shore, one end of the seine was walked out and around to another point on shore. After a portion of water was isolated, the net ends are brought closer together and the area within the net is reduced. Care was taken to ensure the net fully expanded from the substrate to the water surface. As portions of the net were brought onshore, a crew member salvaged any fish and placed them in a live-well bucket with local water. Once the entire net was onshore, a final check for additional fish was completed. The water in the livewell was replenished often, particularly in the summer.

### 2.3.4 Angling and Trapping

Angling for Northern Pike occurred opportunistically with various lures. Effort was recorded as time angling and the type of lure was recorded if a Northern Pike was captured. Other recorded angling data included the angler and bycatch. All anglers possessed a valid BC fishing license and followed applicable BC Fishing Regulations. Minnow and “N” traps (Figure 5) were utilized to sample for YOY Northern Pike in Zuckerberg Pond and Kootenay Oxbow. Traps were placed for overnight sets up to 12 hours, using mixtures of dry and wet cat and dog food as bait.



Figure 5. Example of an “N” Trap used for young-of-year Northern Pike sampling. Photo by Ross Zeleznik, Okanagan Nation Alliance.

### 2.3.5 Habitat Data Collection

Habitat was classified by recording cover types, benthic profiles, and hydraulics at each sample location. Cover types included interstices, woody debris, aquatic vegetation, and terrestrial vegetation. In sites where multiple cover types were present, only the primary and secondary cover types were recorded. Benthic profile types included drop off, bench, high grade, and low grade. Seven hydraulic types were identified (most adapted from CLBMON-45), and were expanded to include shoreline sites (no identifiable flow). To see a full list of the three habitat classifications, see *Appendix A – Site Habitat Classifications*.

Habitat classifications were specific to a sample location and may vary within a site (e.g., Pike Bay or Buckley Campground) depending on where sampling occurred within a specific site. To classify the habitat within a site, the most frequent habitat classifications recorded were used.

Specific water quality measurements were collected at each site to supplement physical habitat descriptions (Table 2). Weather conditions, sample start time/date, and sample end time/date were recorded at all sites for all methodologies. Long-term water temperature data in Zuckerberg Pond were collected with HOBO Pendant Temperature/Light 64K Data Loggers. Water temperature data for the Pend d’Oreille River were obtained from the United States Geological Survey National Water Information System: Web Interface at the International Boundary (Station: 12398600; USGS 2021), while reservoir



elevation data were collected from BC Hydro (BC Hydro unpublished data). Water temperature and river elevation data for the Lower Columbia River were obtained from the Water Survey of Canada (WSC) at Birchbank (Station: 08NE049; WSC 2023). The YSI Pro2030 was calibrated at the beginning of the field season.

Table 2. Instruments used to collect habitat and water quality parameters at Northern Pike monitoring and suppression sites; including associated accuracy.

Instrument	Parameter	Accuracy
Humminbird Helix 7x Chirp GPS G2	Water Depth (m)	
	Surface Water Temperature (°C)	
Garmin 64st	UTM Location	± 3 m
YSI Pro2030	Dissolved Oxygen (mg/L)	± 2 % of the reading or ± 0.2 mg/L, whichever is greater
	Conductivity (µS/cm)	± 1.0 % of the reading or 1 µS/cm, whichever is greater
Secchi Disc	Water Clarity (m)	

## 2.4 Fish Handling, Processing, and Data Collection

All captured Northern Pike were euthanized before being scanned for a Passive Integrated Transmitter (PIT) tag, measured (fork length in mm), weighed (grams), and photographed. Northern Pike were dissected to inspect gonads for sex, stomach contents for prey species, and to remove a cleithrum for aging. Cleithrums were stored in a bag with an internal and external label that included the Northern Pike reference number, date, length, and weight. These samples were stored in a freezer until processing.

Preserved cleithrums were used to age Northern Pike using methods described by Faust et al. (2013). Cleithra were briefly (15 – 30 seconds) submerged in boiling water to loosen attached tissue, which was subsequently removed by hand. The process was repeated until cleithra were clean. Once completely dry (1 – 2 days), cleithra were placed in a black dish and submerged in water to improve visibility of annuli. Annuli were counted with the naked eye, or with a microscope depending on the inherent visibility of annuli. This method was chosen over otolith aging due to its reliability (specifically for Northern Pike) and its comparatively simple sample preparation (Faust et al. 2013). Adult Northern Pike are classified as ≥ 1 years old, while YOY Northern Pike are < 1 year-old (0).

All bycatch was identified to species and fork length measurements were taken. Certain species were also weighed and scanned for the presence of a PIT tag (Rainbow Trout [*Oncorhynchus mykiss*], Mountain Whitefish [*Prosopium williamsoni*], Bull Trout [*Salvelinus confluentus*], Cutthroat Trout [*Oncorhynchus clarkia*], Walleye [*Sander vitreus*]). Any native fish caught were processed first to increase survivability. While gillnetting, if possible, the boat operator would process native fish and release individuals while the net was being retrieved. While sampling in Zuckerberg Pond, any native fish species encountered were released in the Columbia River either upstream or downstream of Zuckerberg Pond. All invasive fish were euthanized and disposed of at the point of capture, with the exception of Walleye in the LCR and Pend d’Oreille River and Bass in Christina Lake as they are regionally managed sportfish.

## 2.5 Data Management and Mapping

All field data were recorded on project-specific datasheets with supplemental data recorded in field notebooks. Over the course of a field day, pictures of datasheets were taken as a digital backup. At the end of the day, all datasheets were scanned and transferred to the ONA shared network. Field data were entered into a Microsoft Excel database and QA/QC'd (Quality Assurance/Quality Control), while GPS data were stored in Garmin Basecamp (Version 4.7.4).

All mapping was completed on Q-GIS (Version 3.10.14-A Coruña) with layers obtained from 2022 field data and open-source external layers from the BC Data Catalog and Statistics Canada. All satellite imagery was open source from the ESRI World Imagery service and the year of the imagery is identified in each map. Individual layers and their source are identified in each map and are included in the references section under *6.1 Map Layer Sources*.

## 2.6 Data Analysis

Microsoft Excel (2016) was used for all summary statistics and graphs; geographical analyses were completed using Q-GIS.

### 2.6.1 Catch per unit Effort

Gillnet catch-per-unit-effort (CPUE) was calculated as catch per 8-hour period (Equation 1).  $CPUE_{8hr}$  was compared to previous years when timing and method of suppression was similar; typically, Apr 01 – Jun 30 (Baxter and Neufeld 2015; Baxter 2016; Baxter and Doutaz 2017; Baxter and Lawrence 2018; Wood 2019; ONA 2020; ONA 2021; ONA 2022). The number of Northern Pike captured and the number removed from the system may vary if Northern Pike escaped a net or trap during retrieval, or the individual was released for a specific purpose (e.g. mark-recaptures programs, historic angler incentive programs).

Equation 1. Gillnet catch-per-unit-effort equation.

$$CPUE_{8hr} = \frac{\text{Northern Pike captured}}{\text{Total gillnet hours}} \times 8 \text{ hours}$$

Backpack electrofishing CPUE was expressed as Northern Pike per hour using the calculation: Northern Pike captured / hours sampled (sample time in seconds / 60 seconds/ 60 minutes) and was compared to similar effort in 2020.

Seine net CPUE was expressed as Northern Pike per volume using the calculation: Northern Pike captured / total volume of water sampled (m<sup>3</sup>) and was compared to effort during 2016 and 2019 in the LCR.

Trapping CPUE was expressed as Northern Pike per hour using the calculation: Northern Pike captured / hours sampled. Separate CPUE's were calculated for each trap type.

Angling CPUE was expressed as Northern Pike per hour using the calculation: Northern Pike captured / angling hours. Angling CPUE was compared between years and between waterbodies. Lure type was not accounted for during CPUE calculations.

## 2.6.2 Northern Pike Population Dynamics

A variety of Northern Pike population dynamics were explored including relative population trends, spawning window variations, growth rate, identification of juvenile habitat, length-age relationships, length-weight relationships (size), condition factor, parasitic relationships, and diet.

The Columbia River Northern Pike population has previously been calculated using the Lincoln-Petersen mark-recapture method (Baxter and Neufeld 2015; Baxter 2016; Baxter and Doutaz 2017). However, the accuracy of these estimates are questionable as two of the five assumptions for the Lincoln-Petersen mark-recapture method were not met: (1) The population is physically (immigration or emigration) and demographically (recruitment or mortality) closed (so that N is constant over the time of sampling), and (2) marks or tags are not lost or missed (Wood 2019). Therefore, due to the complications of addressing these assumptions (primarily the assumption of a closed population), and the requirement to release tagged Northern Pike, mark-recapture population estimates did not occur between 2018 – 2022 (Wood 2019). Instead, a comparison of spring (Apr 01 – Jun 30) CPUE<sub>8hr</sub> is used to compare and estimate relative abundance trends between years in the LCR. The Pend d'Oreille River Northern Pike population has not been estimated.

Analyses of the Northern Pike spawning windows in the Columbia and Pend d'Oreille Rivers were conducted utilizing current and historic Northern Pike captures and available water temperature/elevation data. Temporal observations of spawning Northern Pike were graphed with the corresponding water temperatures/levels at the time to identify possible correlations.

Data on adult (1+ years) Northern Pike growth rates were collected opportunistically through the capture of previously tagged adults from other studies (e.g., Baxter and Neufeld 2015; Doutaz 2019). The growth rate for re-captured tagged adults is expressed by cm/year and kg/year (Equation 2).

Equation 2. Growth rate equation used to determine length or weight growth of re-captured Northern Pike.

$$AG = \frac{GP \text{ at second capture} - GP \text{ at initial capture}}{\text{Years at large}}$$

Where,

*AG* = Annual Growth (length in cm or weight in kg) by year

*GP* = Growth parameter (length in cm or weight in kg) of Northern Pike

*Years at large* = number of days between two capture events ÷ 365 days

Growth rates for YOY (0+ years) Northern Pike were estimated by capturing individuals at the same location over several weeks. Excel was used to calculate a linear regression and determine an equation expressed in cm/week and g/week.

Growth rates were compared to previous studies in the LCR for adults (Baxter and Neufeld 2015; Doutaz 2019; ONA 2022), and in Zuckerberg Pond for YOY Northern Pike (ONA 2021).

Northern Pike rearing habitat was primarily identified by the density of YOY Northern Pike captured or observed in a location. Habitat parameters were compared between sites with high YOY presence, and sites with no (or low) YOY presence.

Length/age, length/weight, and condition factor (Equation 3) were graphed to compare between systems. The condition factor equation used a species-specific population-fitted exponent developed by Doyon et al. (1988); the qualifier  $10^5$  transforms the value to bring it closer to 0.

Equation 3. Condition factor equation used to quantify the condition of Northern Pike in various systems.

$$K_n = \frac{(10^5 \times W)}{L^3}$$

Where,

$K_n$  = Condition factor of Northern Pike  $n$

$W$  = Weight of Northern Pike (g)

$L$  = Length of Northern Pike (mm)

Data on Northern Pike diet in the LCR and Pend d'Oreille River were obtained through observations of euthanized Northern Pike stomach contents. Stomach contents of Northern Pike were inspected and prey were identified to species (or family) to the best of the crew's ability. When prey items were intact, notations on length (mm) and weight (g) were recorded. Prey compositions were compared between the LCR and Pend d'Oreille River and between adults and YOY to identify differences in diet.

## 2.7 eDNA Sampling and Processing

In 2019, an eDNA primer was developed and QA/QC'd by the ONA kł c̓p̓alk̓ st̓im̓ Fish Health and Diagnostics Laboratory to detect Northern Pike in the Columbia River (ONA 2020). In 2022, eDNA samples were taken from Osoyoos Lake, Christina Lake, the Kettle River, Arrow Lakes Reservoir, and the Kootenay River; with positive control samples from the LCR and Pend d'Oreille River.

eDNA samples were collected with a Smith-Root backpack eDNA sampling unit (Figure 6) using the procedures outlined in sampler manual (Smith-Root 2022). A target of 2 L of water through a self-preserving (up to 6 months at room temperature) 5  $\mu$ m filter at a rate of 0.8 L/m was collected for each sample. One site consisted of three replicate samples, and a fourth sample of distilled water to act as a negative control. Samples were sent to the kł c̓p̓alk̓ st̓im̓ Fish Health and Diagnostics Laboratory in Penticton BC for processing.

Lab samples were processed using the Zymo research Quick-DNA/RNA MagBead Kit according to the manufacturer's recommended protocol. Each purified nucleic acid sample was split into two, stored at -80°C, and subsequently used as template in the quantitative polymerase chain reaction (qPCR). These samples were tested for viability using eplant qPCR assay according to Veldhoen et al. (2016) then tested for Northern Pike DNA using the primer developed by Carim et al. (2019) and QA/QC'ed by the ONA (ONA 2020).

Individuals involved in eDNA collection ensured they had not come into contact with Northern Pike for at least a week and wore fresh nitrile gloves between each replicate sample, and each site, to reduce cross contamination and instances of false positives. To avoid clogging the filter, collectors stood on shore while collecting the sample.



Figure 6. Smith-Root eDNA backpack sampler used to detect presence of Northern Pike in the Columbia River Watershed. Photo by Shelley Hackett, Okanagan Nation Alliance.

### 3.0 Results

In 2022, a total of 179 Northern Pike (179 – LCR and 0 – Pend d’Oreille River) were captured, all of which were euthanized, over 38 crew days. Northern Pike were captured by gillnetting (168), backpack electrofishing (10), and seine netting (1). Most Northern Pike captured in 2022 were YOY (145), from Zuckerberg Pond. Of the adults captured (34 total), 12 were spawn bound, spawning or spent.

Four additional Northern Pike were captured in the LCR during the CLBMON-45 Indexing Program between HLK Dam, Brilliant Dam and the confluence of the Columbia and Kootenay Rivers (Oct 03 – Nov 05 2022; BC Hydro unpublished data). Three Northern Pike were submitted by anglers to ONA as part of the email-in angler incentive program (from Zuckerberg Pond, Robson Reach, and LKR).

Water quality parameters (conductivity, dissolved oxygen, pH, and Secchi depth) were measured, but data are difficult to compare as the different waterbodies were not always sampled in the same month.

### 3.1 Effort and Catch per Unit Effort

Suppression efforts took place between May 12 and May 26 2022 (Pend d’Oreille River – Waneta Reservoir), and May 31 and Oct 04 on the LCR. Gillnetting was the most utilized method to capture Northern Pike, and was the second most effective with a CPUE of 0.19 Northern Pike/hour (Table 3). Backpack electrofishing was the most effective method with a CPUE of 0.91 Northern Pike/hour; however, this method was only used to target YOY in Zuckerberg Pond and other suspected rearing habitats. Seining was the only other method to capture a Northern Pike but was the least successful (CPUE = < 0.01 Northern Pike/m<sup>3</sup>). An additional 39 hours of boat electrofishing was conducted from HLK Dam downstream to the USA / CAN Border, inclusive of the LKR, during the CLBMON-45 Indexing Program (BC Hydro unpublished data); which resulted in the capture of four Northern Pike and a CPUE of 0.10 Northern Pike/hour. CPUE for Northern Pike submitted through the email-in angler incentive program were not estimated. A summary of all effort is available in *Appendix B – Northern Pike Suppression and Monitoring Sites by Method*. Maps of site location are provided in *Appendix C – Maps of Suppression Effort*.

Table 3. Summary of Northern Pike (NP) catch, total effort, and catch-per-unit-effort (CPUE) by method during monitoring and suppression activities May 12 – Oct 04 2022 (Oct 03 – Nov 05 2022 for CLBMON-45 data). CLBMON-45 Indexing Program data are expressed as catch per hour (BC Hydro unpublished data).

Sample Method	Waterbodies Sampled	NP Captured	Number of Checks / Passes	Effort Type	Total Effort	CPUE (NP/Effort)
Gillnetting	LCR / PDO	168	314	Hours	867	0.19
Backpack Electrofishing	LCR	10	9	Hours	11	0.91
Seine Netting	LCR	1	2	Cubic Meters	787	< 0.01
Minnow Trapping	LCR	0	15	Hours	188	0.00
“N” Trapping	LCR	0	3	Hours	49	0.00
Angling	LCR / PDO	0	3	Hours	3	0.00
CLBMON-45	LCR	4	129	Hours	39	0.10

The Columbia River had the highest gillnet effort and CPUE (Table 4). A description of gillnet effort by season, location, and net type is provided in *Appendix D – Summary of Gillnet Effort by Season, Location, and Gillnet Type*.

Table 4. Summary of gillnetting total effort and catch-per-unit-effort (CPUE) for Northern Pike monitoring and suppression by location from May 12 – Oct 04 2022. CPUE<sub>8hr</sub> is catch per 8-hour period.

Waterbody	NP Captured	Number of Checks	Soak Time (hrs)	CPUE <sub>8hr</sub>
Columbia River	168	283	769	1.75
Pend d’Oreille River	0	31	98	0.00
Total	168	314	867	1.55

Backpack electrofishing occurred in the LCR, with a focus on Zuckerberg Pond and exploratory sampling conducted in Waterloo Eddy and the Kootenay Oxbow (Table 5). Backpack electrofishing had the highest CPUE in 2022 due to the density of YOY Northern Pike in Zuckerberg Pond. Four adult Northern Pike were captured during the CLBMON-45 Indexing Program (BC Hydro unpublished data).

Table 5. Summary of backpack electrofishing total effort (time in hours) and Northern Pike (NP) catch-per-unit-effort (CPUE) by location between May 31 and Oct 04 2022, and boat electrofishing through the CLBMON-45 Indexing Program between Oct 03 and Nov 05 2022 (shaded; BC Hydro unpublished data).

Location	Northern Pike Captured	Time Sampled (Hours)	CPUE (NP / Hour)
Zuckerberg Pond	10	7	1.42
Waterloo Eddy	0	3	0.00
Kootenay Oxbow	0	1	0.00
Columbia River (CLBMON-45)	4	39	0.10

Similarly, seining occurred in the LCR, specifically in Zuckerberg Pond and Waterloo Eddy. Seining was the only other method to capture a Northern Pike in 2022. Zuckerberg Pond had the most effort and the one Northern Pike capture (Table 6).

Table 6. Summary of seining total effort (estimated volume seined in m<sup>3</sup>) and Northern Pike (NP) catch-per-unit-effort (CPUE) by location between May 31 and Oct 04 2022, including depth (meters).

Location	Northern Pike Captured	Volume Sampled (m <sup>3</sup> )	Min Depth (m)	Max Depth (m)	CPUE (NP / m <sup>3</sup> )
Zuckerberg Pond	1	420	0.2	0.4	< 0.01
Waterloo Eddy	0	367	0.1	0.5	0.00

The other methods implemented in the 2022 suppression programming (trapping and angling) did not result in any Northern Pike captures.

### 3.2 Distribution and Spawning

In the LCR, adult Northern Pike were primarily captured along the right downstream bank (river right) between Pike Bay (downstream of Celgar Mill) and the Robson Bridge, and along the left downstream bank (river left) from Sturgeon Island to the Robson ferry landing (Figure 7). Adults were also captured in Zuckerberg Pond and Waterloo Eddy (Figure 8). Northern Pike were not detected in the Pend d’Oreille River in 2022.

Based on the spawn-ready (spawn bound, spawning, or spawned out) Northern Pike caught in the LCR (seven females and four males; all in their second or third summer), the Northern Pike spawning window likely began prior to Jun 01 and ended on or after Jun 20 (two females in spawning condition on Jun 01/02 and a spawn bound male on Jun 20). Water temperatures during sets in the LCR ranged from 7.9 – 13.1 °C (11.7 – 12.5 °C in Zuckerberg Pond) during this time. An egg sac from a spawn-bound female weighed 433 g or 14% of the female’s body weight. Spawn-ready individuals were captured at Central Bay, Pike Bay, Sturgeon Island, and Zuckerberg Pond. All other individuals captured were YOY, immature, or mature in non-spawning condition.

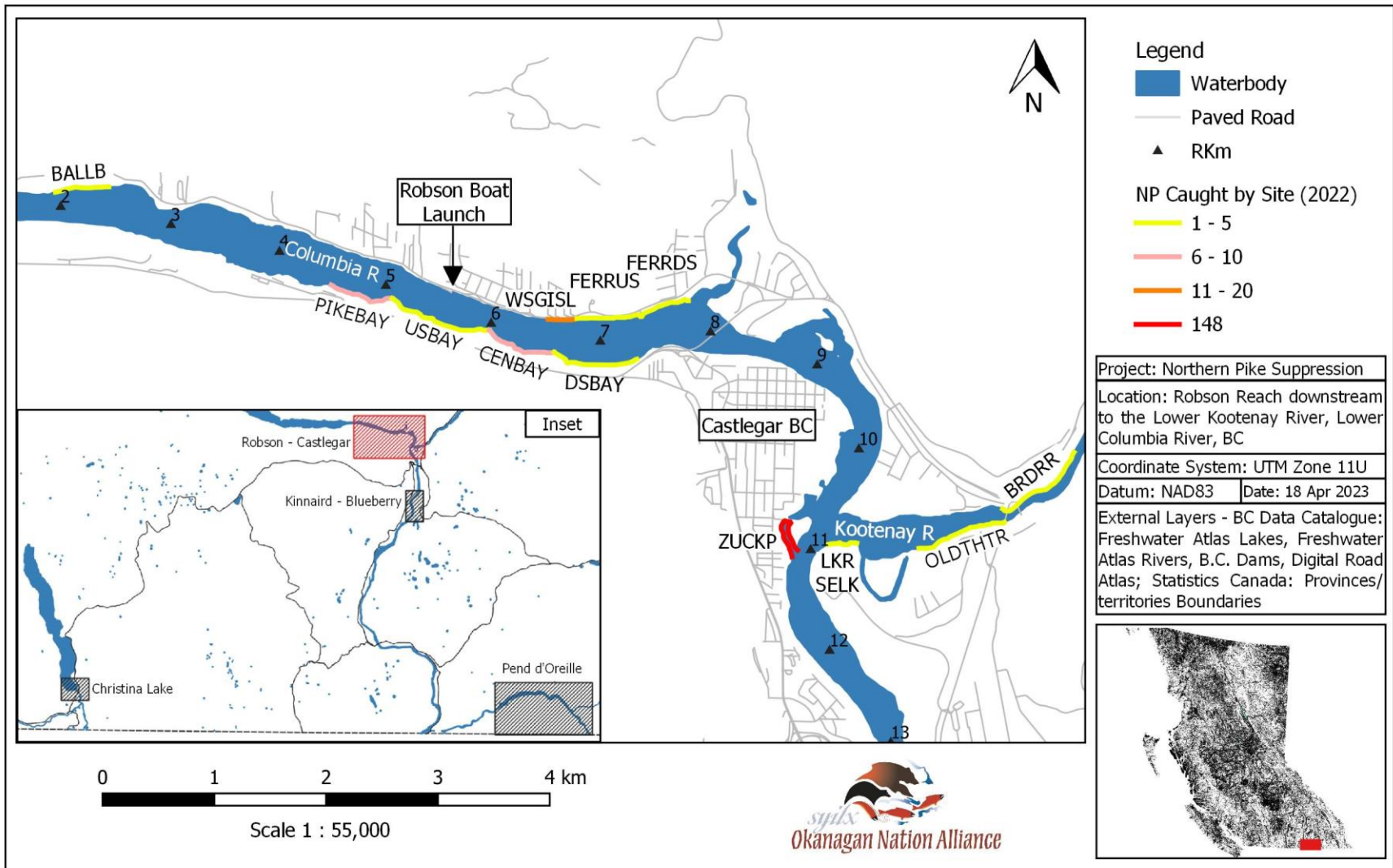


Figure 7. Location of suppression efforts (gillnetting and seining) and Northern Pike captures by site between May 31 and Nov 05 2022 in the Castlegar area. Capture data from Okanagan Nation Alliance (annual suppression program and angler incentive program) and BC Hydro unpublished data (CLBMON-45 Indexing Program).



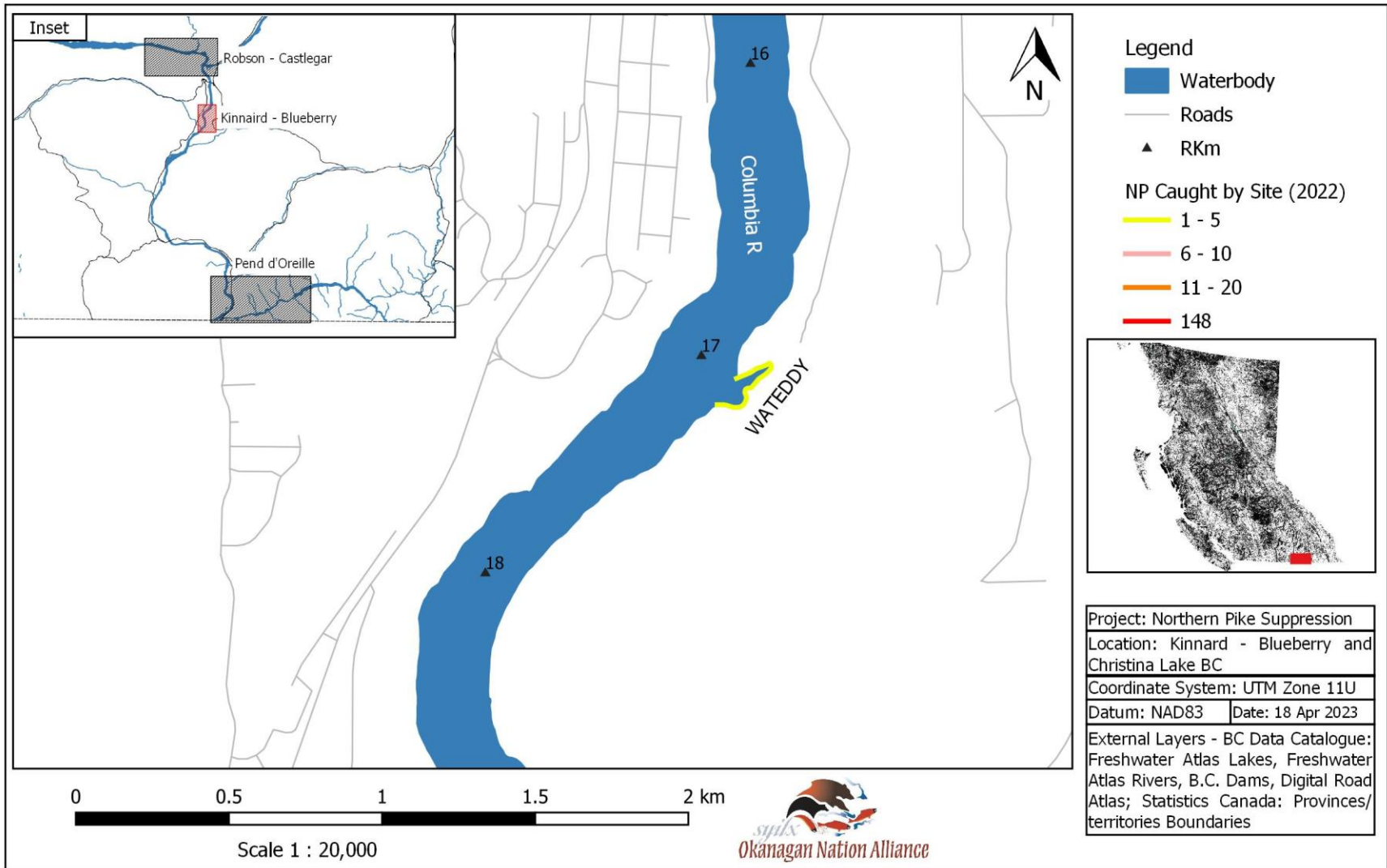


Figure 8. Location of suppression efforts (gillnetting and seining) and Northern Pike captures by site between May 31 and Nov 05 2022 in the Castlegar (Blueberry-Kinnaird) area. Capture data from Okanagan Nation Alliance (annual suppression program and angler incentive program) and BC Hydro unpublished data (CLBMON-45 Indexing Program).

### 3.3 Habitat and Habitat Use

Mean daily water temperatures between Apr 01 – Oct 31 2022 were warmer in the Pend d’Oreille River ( $15.2\text{ }^{\circ}\text{C} \pm 0.78\text{ }^{\circ}\text{C}$  with 95% CI,  $n = 209$ ; USGS 2023; Figure 9) than the LCR ( $12.2\text{ }^{\circ}\text{C} \pm 0.62\text{ }^{\circ}\text{C}$  with 95% CI,  $n = 214$ ; WSC 2023). Average daily water temperatures were within the Northern Pike optimal temperature for growth and preference ( $20\text{ }^{\circ}\text{C} - 22\text{ }^{\circ}\text{C}$ ) for a total of 15 days in the Pend d’Oreille River, but did not exceed the upper limit for Northern Pike preference ( $25\text{ }^{\circ}\text{C}$ ; Casselman and Lewis 1996). LCR average daily water temperatures did not exceed  $18.9\text{ }^{\circ}\text{C}$  (WSC 2023).

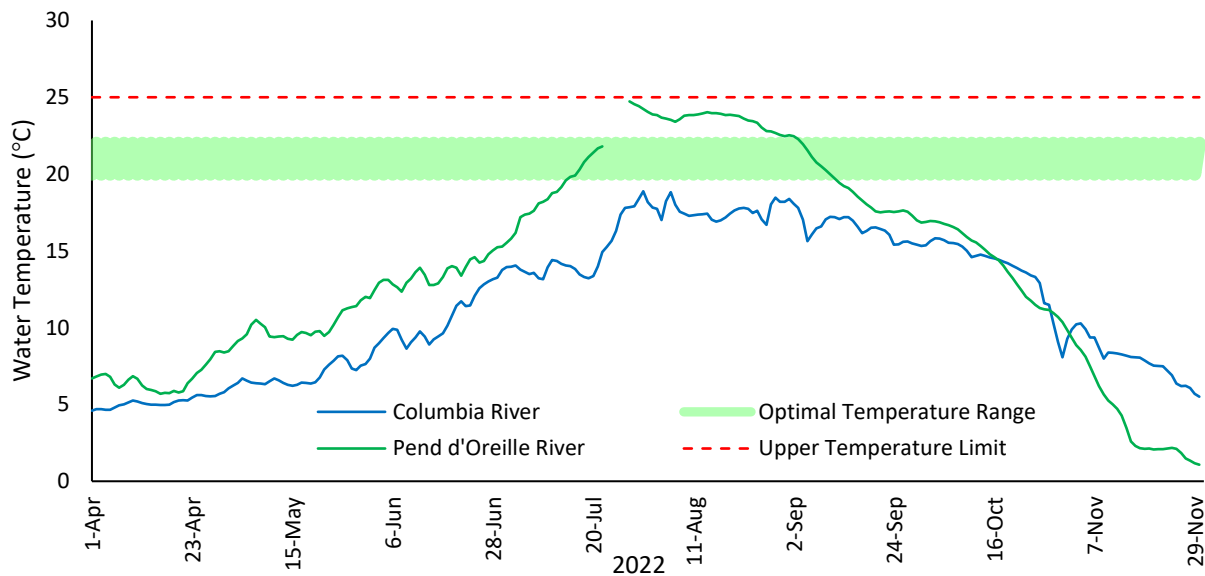


Figure 9. Average daily water temperature ( $^{\circ}\text{C}$ ) of the Columbia River (WSC 2023) and Pend d’Oreille River (USGS 2023) Apr 01 – Nov 31 2022 with the optimal temperature range for Northern Pike growth and preference ( $20\text{ }^{\circ}\text{C} - 22\text{ }^{\circ}\text{C}$ ), and the upper preferred temperature limit ( $25\text{ }^{\circ}\text{C}$ ; Casselman and Lewis 1996).

Northern Pike were typically encountered in water depths between 1 – 7 m and appeared to occur more frequently in ponds and glides with aquatic vegetation and low gradient bathymetric profiles (Figure 10). These sites are typically found in the Robson Reach in the LCR. Sites with aquatic vegetation as the primary cover and low gradient bathymetric profiles were sampled more than other types.

During suppression activities in 2022, all YOY Northern Pike were captured in water depth between 0.0 – 2.9 m. Reduced water flows through the LCR isolated Zuckerberg Pond for several periods of time throughout the 2022 suppression season. These periods restrict immigration and emigration from the pond and result in higher water temperatures (ONA 2019).

Due to the abundance of shallow, weedy habitat, non-native species appear to be thriving in Zuckerberg Pond and this location may be seeding the LCR Mainstem. In 2022, all YOY Northern Pike captured were found in Zuckerberg Pond.

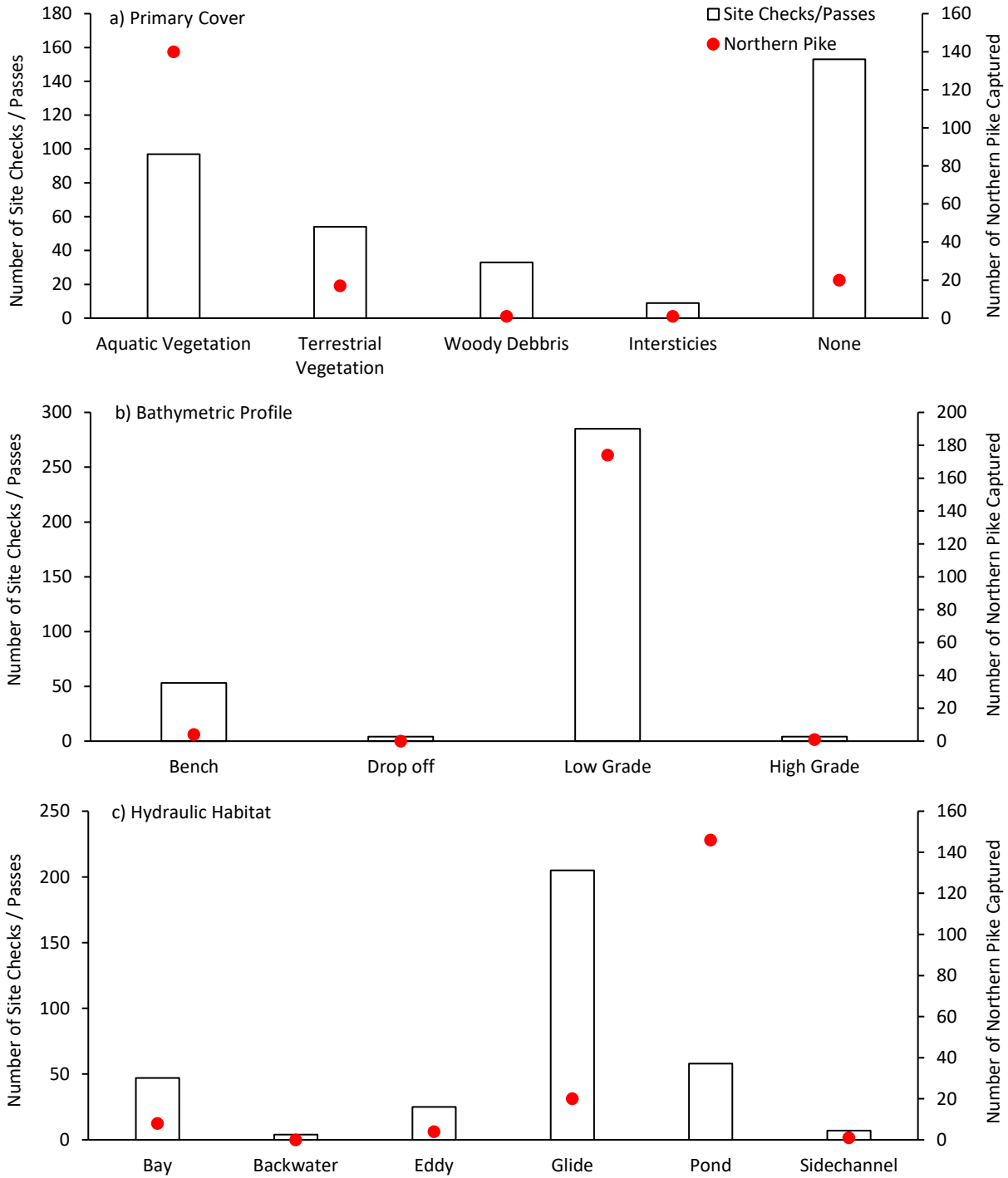


Figure 10. Number of site checks/passes (all methods) by primary cover (a), bathymetric profile (b), and hydraulic habitat (c), and associated number of Northern Pike captured during monitoring and suppression activities in 2022.

### 3.4 Population Dynamics and Growth

Of the adult Northern Pike sexed in the LCR (n = 38), 55% were males (Table 7). Individuals classified as unknown sex were typically YOY. YOY Northern Pike captured during suppression and the email-in angler incentive program were limited to Zuckerberg Pond, but two additional YOY Northern Pike were caught in the LCR during CLBMON-45 near the Robson Bridge and in the LKR.

Table 7. Summary of Northern Pike removed from May 12 – Nov 05 2022 by waterbody, differentiating between males, females, unknown sex, and young-of-year (YOY) Northern Pike including individuals removed during the email-in angler incentive program and CLBMON-45 Indexing Program from Oct 03 – Nov 05 2022 (shaded; BC Hydro unpublished data).

Location	Adult			YOY	Total
	Male	Female	Unknown		
Pend d'Oreille River	0	0	0	0	0
Columbia River	19	14	1	145	179
Columbia River (email-in angler incentive program)	2	0	0	1	3
Columbia River (CLBMON-45)	0	1	1	2	4
<b>Total</b>	<b>21</b>	<b>15</b>	<b>2</b>	<b>148</b>	<b>186</b>

Northern Pike ranged in length from 63 mm – 800 mm and were aged between 0 (YOY) and 3+ years (Figure 11). Both the largest (female, 3+ years, 800 mm, 4,500 g) and the smallest (YOY, 63 mm, 2 g) Northern Pike were captured in Zuckerberg Pond. All Northern Pike biological data are available in *Appendix E – Northern Pike Biological Data*.

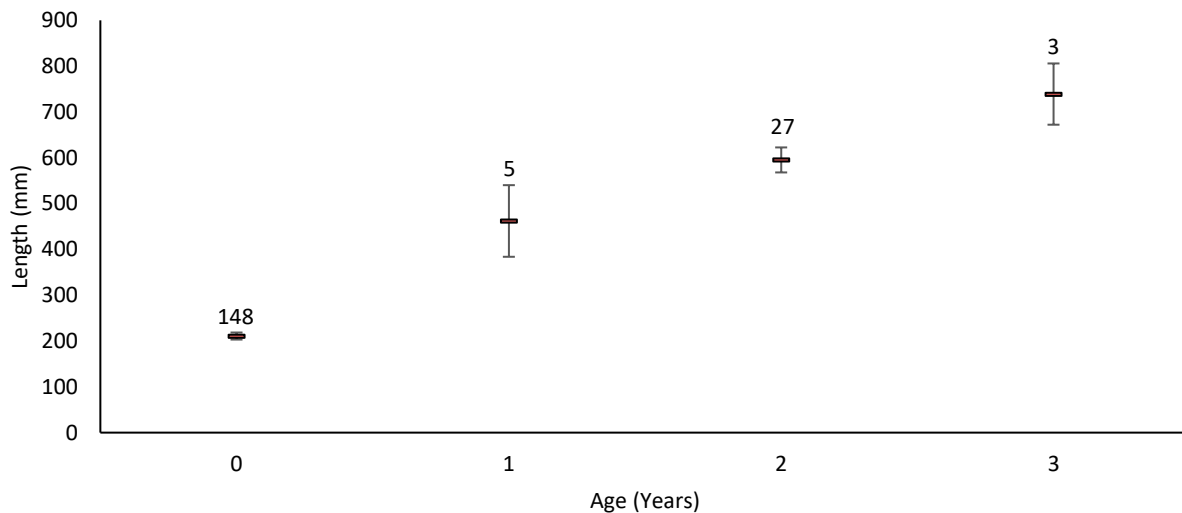


Figure 11. Age of Northern Pike (where 0 = young-of-year) caught between May 12 and Nov 05 2022, including the email-in angler incentive program and CLBMON-45 Indexing Program data (Oct 03 – Nov 05 2022; BC Hydro unpublished data), by average fork length (mm; with 95% confidence intervals). Sample size (above) indicates the number of individuals that were aged.

The average length of adult Northern Pike captured was 586 mm (n = 38) with an average weight of 1,988 g (n = 38). YOY Northern Pike removed had an average length of 211 mm (n = 148) and an average weight of 96 g (n = 148). YOY NP were not released for mark-recapture in 2022.

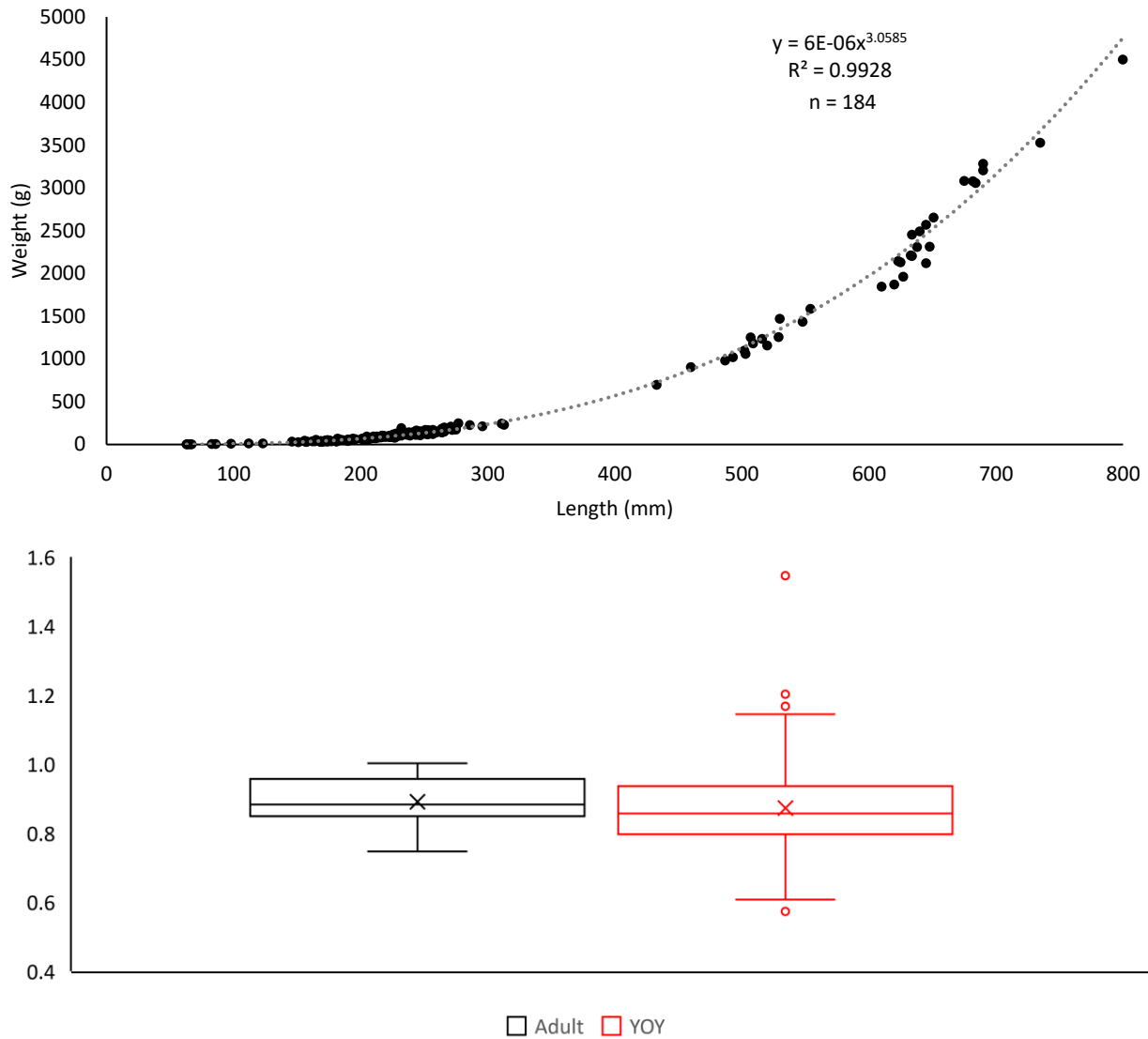


Figure 12. Length and weight (top) and condition factor (bottom) of Northern Pike removed from May 19 – Nov 05 2022, including the email-in angler incentive program and CLBMON-45 Indexing Program data (BC Hydro unpublished data).

Growth rate of YOY Northern Pike in Zuckerberg Pond was estimated to be 1.8 cm/week and 15.0 g/week, based on the average length and weight of Northern Pike captures by week between Jul 19 and Oct 24 2022 (Figure 13).

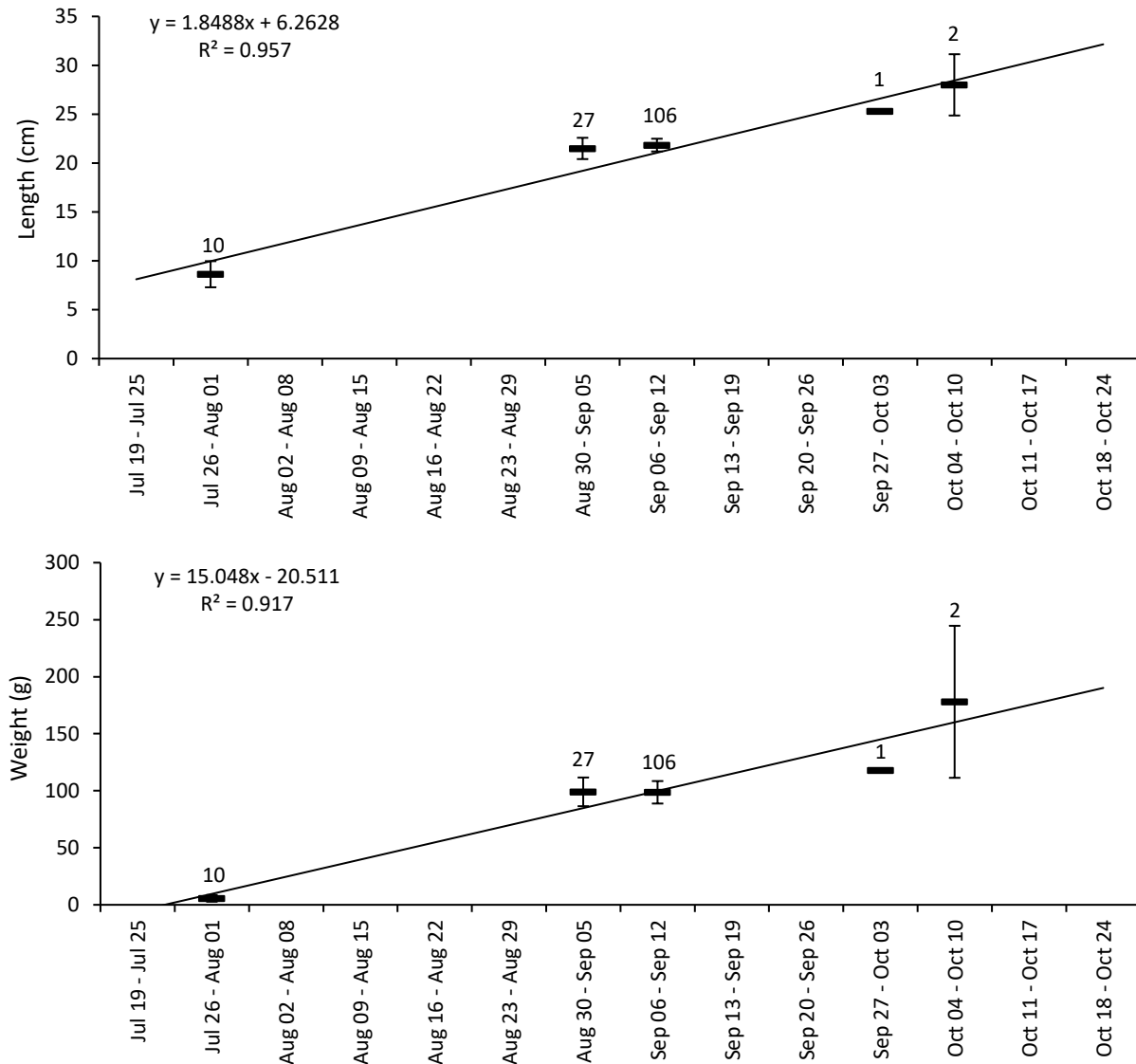


Figure 13. (Top) Average fork length (mm) of young-of-year Northern Pike captured at Zuckerberg Pond (per week) between Jul 19 and Oct 24 2022 used to estimate linear growth rate; (bottom) average weight (g) of young-of-year Northern Pike captured at Zuckerberg Pond (per week) between Jul 19 and Oct 24 2022, used to estimate weight growth. Averages shown with 95% confidence intervals and sample size (number of Northern Pike).

### 3.5 Diet and Parasitic Relationships

Fish or fish parts were identified in 72% of inspected Northern Pike stomachs (n = 179). Identified prey included Suckers (*Catostomidae* sp.), Mountain Whitefish, Peamouth Chub (*Mylocheilus caurinus*), Sculpin (*Cottoidea* sp.), Redside Shiner (*Richardsonius balteatus*), Rainbow Trout, and Northern Pikeminnow (*Ptychocheilus oregonensis*). Other stomach contents included grasshoppers, aquatic sow bugs, wasps, leeches, and snails.

The dominant identifiable prey species for adult Northern Pike in the LCR (n = 34) were Mountain Whitefish (9% of inspected stomach contents; Figure 14). The dominant identifiable prey species for YOY Northern Pike (n = 145) in the LCR were sculpin (42% of inspected stomach contents) and secondarily was invertebrates (6% of inspected stomach contents).

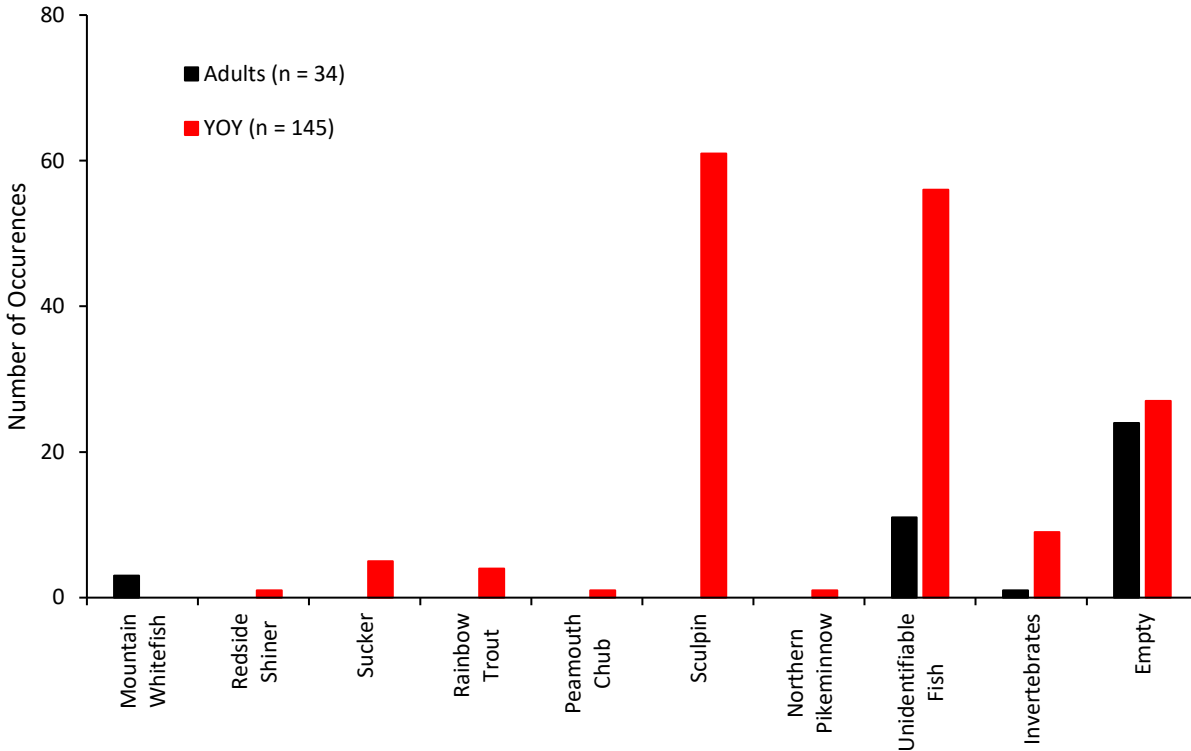


Figure 14. Number of occurrences of prey items in inspected adult and young-of-year (YOY) Northern Pike stomach contents, including the email-in angler incentive program and CLBMON-45 Indexing Program data (Oct 03 – Nov 05 2022; BC Hydro unpublished data).

Parasites resembling tapeworms were found in the stomach or intestines of 97.6% of recorded adult and YOY Northern Pike (n = 169).

### 3.6 Bycatch

In total 1,023 fish of 21 different species were captured as bycatch during monitoring and suppression activities. Of the 1,023 fish, 597 (58.4%) were native species and 426 (41.6%) were non-native species; with Lake Whitefish (*Coregonus clupeaformis*) consisting of the highest percentage of total bycatch (36.0%;

Table 8). All non-native species (excluding Walleye and Lake Whitefish) were euthanized in accordance with applicable permitting. In total, 47 non-native fish (excluding Walleye, Lake Whitefish, and Northern Pike) were removed during this program. For information regarding total bycatch by location and sample method see *Appendix F – Bycatch Data*.



Table 8. Bycatch species captured from May 12 – Oct 04 2022 for all Northern Pike suppression and monitoring methods. Superscript numbers indicate the location of capture: Lower Columbia River including Lower Kootenay River “1” and Pend d’Oreille River “2”.

Species	Scientific Name	Status	# Caught
Kokanee <sup>1</sup>	<i>Oncorhynchus nerka</i>	Native	1
Sucker (General) <sup>1</sup>	<i>Catostomidae</i> sp.	Native	37
Largescale Sucker <sup>1,2</sup>	<i>Catostomus macrocheilus</i>	Native	15
Longnose Dace <sup>1</sup>	<i>Rhinichthys cataractae</i>	Native	11
Longnose Sucker <sup>1</sup>	<i>Catostomus catostomus</i>	Native	42
Mountain Whitefish <sup>1</sup>	<i>Prosopium williamsoni</i>	Native	115
Northern Pikeminnow <sup>1,2</sup>	<i>Ptychocheilus oregonensis</i>	Native	40
Rainbow Trout <sup>1,2</sup>	<i>Oncorhynchus mykiss</i>	Native	55
Redside Shiner <sup>1</sup>	<i>Richardsonius balteatus</i>	Native	220
Sculpin (General) <sup>1</sup>	<i>Cottoidea</i> sp.	Native	12
Umatilla Dace <sup>1</sup>	<i>Rhynchichthys umatilla</i>	Native	1
White Sturgeon <sup>1</sup>	<i>Acipenser transmontanus</i>	Native	49
Brook Trout <sup>1,2</sup>	<i>Salvelinus fontinalis</i>	Non-Native	5
Brown Trout <sup>2</sup>	<i>Salmo trutta</i>	Non-Native	1
Common Carp <sup>1</sup>	<i>Cyprinus carpio</i>	Non-Native	12
Lake Whitefish <sup>1</sup>	<i>Coregonus clupeaformis</i>	Non-Native	368
Smallmouth Bass <sup>2</sup>	<i>Micropterus dolomieu</i>	Non-Native	8
Tench <sup>1</sup>	<i>Tinca tinca</i>	Non-Native	15
Walleye <sup>1,2</sup>	<i>Sander vitreus</i>	Non-Native	11
Yellow Perch <sup>1,2</sup>	<i>Perca flavescens</i>	Non-Native	6

### 3.6.1 Native Species Bycatch

In 2022, 597 native fish from 11 species were captured as bycatch during Northern Pike suppression efforts. The LCR had the highest number of native species bycatch with 586 fish of 11 species (98.2% of native species bycatch); with the Pend d’Oreille River efforts resulting in 11 fish of three species (1.8% of total native species bycatch). The combined mortality rate of native species for all sampling methods was 12.0% (72 individuals). Gillnetting had the highest native species mortality (19.8%), followed by backpack electrofishing (4.0%) and seining (7.0%). Other methods did not result in native species mortality. Mortality of SARA-listed species did not occur.

White Sturgeon were scanned for a PIT tag whenever possible, some individuals escaped gillnets before they could be scanned. White Sturgeon were removed from gillnets while in the river, and were only brought on-board the vessel when necessary. All White Sturgeon were released in good health and gillnet set times were reduced from four hours to two hours once the occurrence of White Sturgeon bycatch increased. To further reduce instances of White Sturgeon bycatch, sampling was excluded at sites with multiple White Sturgeon captures. For PIT tag information of White Sturgeon, see *Appendix G – White Sturgeon PIT Tag Information*.

### 3.6.2 Non-Native Species Bycatch

The LCR had the highest number of non-native species bycatch with 413 fish of six species (96.9% of total non-native species bycatch). The Pend d’Oreille River non-native species bycatch was 13 fish of four species (3.0% of total non-native species bycatch). Zuckerberg Pond bycatch was 64.0% non-native species (30.0% of the total LCR non-native bycatch), primarily due to large quantities of Lake Whitefish (102 individuals).

### 3.7 eDNA Sampling Results

In total, 58 eDNA samples were taken at 12 sites from spring to fall (Table 9; Figure 15). This was the first season utilizing the Smith-Root eDNA Backpack Sampler. Control samples from the LCR and the Pend d’Oreille River did not result in positive Northern Pike detections. Northern Pike were not detected in the in any sample locations in 2022. As this is the first year utilizing the backpack sampler collection method, adjustments may be required to sampling flow rates or sample sizes to determine the best field technique.

Table 9. Northern Pike eDNA sample lab results for 2022 by watershed code, site, and type including positive control samples taken from the Columbia River and Pend d’Oreille River.

Watershed Code	Site	Type	Spring Sample Date	Spring / Summer Lab Result	Fall Sample Date	Fall Lab Result
300	Zuckerberg Pond	Positive Control	Jun 15	Not detected		
300	HLK Forebay East	Exploratory	Jul 06	Not detected	Sep 14	Not detected
300	HLK Forebay West	Exploratory	Jul 06	Not detected	Sep 14	Not detected
300	Syringa	Exploratory	Jul 06	Not detected	Sep 14	Not detected
310	Osoyoos Lake North	Exploratory	Jun 22	Not detected		
310	Osoyoos Lake Border	Exploratory	Jun 22	Not detected		
310	Osoyoos Lake Swiws	Exploratory	Jun 22	Not detected		
320	Kettle River	Exploratory	Jun 22	Not detected		
320-160600	Christina Lake	Exploratory	Jun 22	Not detected		
330	Seven Mile	Positive Control	Jun 22	Not detected		
340	Brilliant Forebay	Exploratory	Jun 22	Not detected		
340	Glade	Exploratory	Jul 06	Not detected		

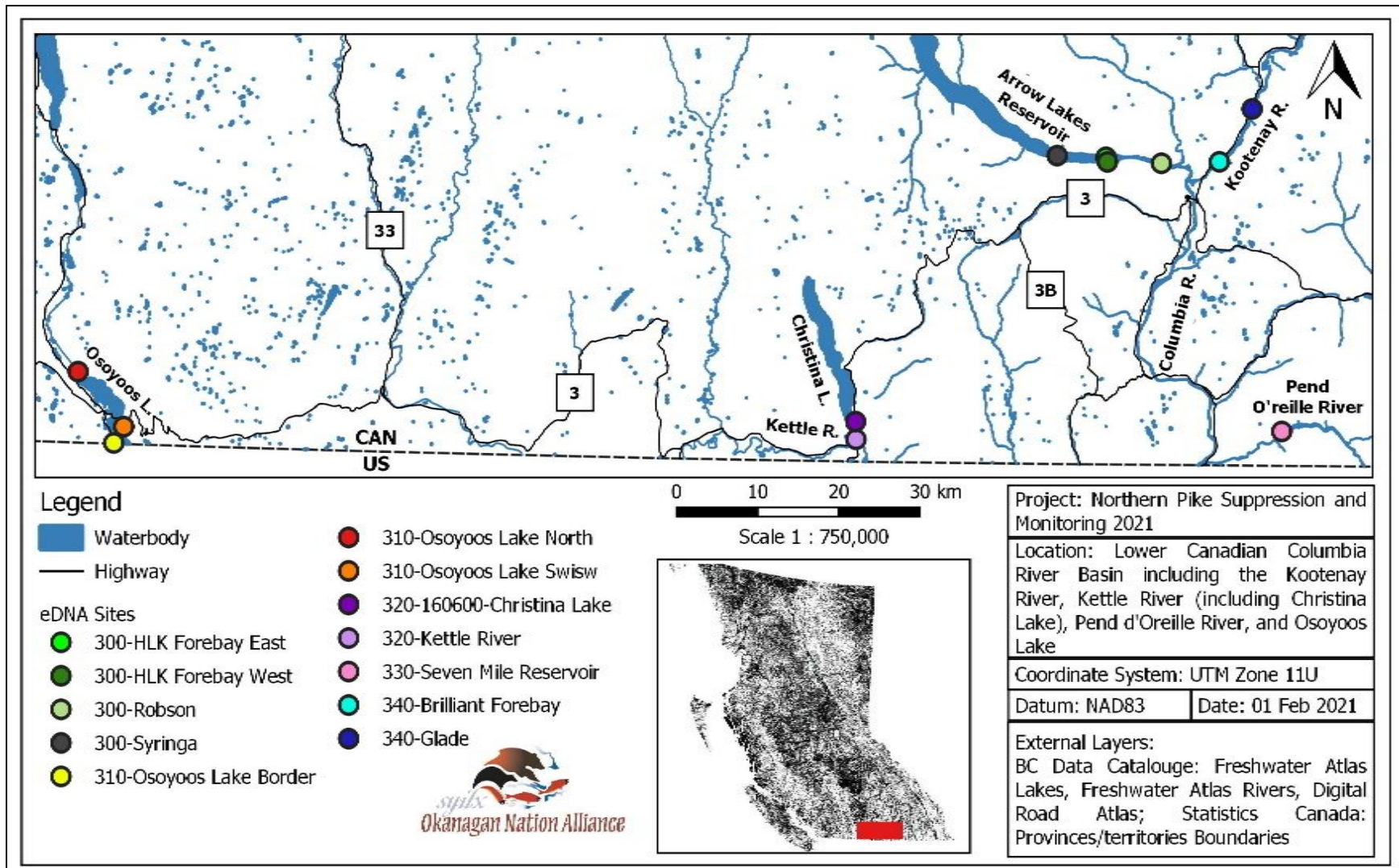


Figure 15. Northern Pike eDNA sample locations, including positive control samples taken from the Columbia River and Pend d’Oreille River.

## 4.0 Discussion

The 2022 Northern Pike Suppression Program season was successful as 179 Northern Pike were removed from the Columbia River and Northern Pike were not detected in the Pend d’Oreille River. Removals in this year stand were higher than the previously recorded high in 2020 (144). Seven additional Northern Pike were removed, four during BC Hydro’s CLBMON-45 Indexing Program in 2022 (BC Hydro unpublished data), and three through the email-in angler incentive program. Methods used in 2022 were similar to past years of the program and yielded many similar results.

### 4.1 Population and Catch per Unit Effort

The Northern Pike population in the LCR was suspected to have decreased from 2014 to 2017 (Table 10; Baxter and Neufeld 2015; Baxter 2016; Baxter and Doutaz 2017; Baxter and Lawrence 2018), but the accuracy of these estimates is uncertain (Wood 2019).

Table 10. Summary of Northern Pike population estimates in the Columbia River between 2014 and 2017 using the Lincoln-Petersen mark-recapture method with 95% confidence intervals and their respective sources.

Year	Population Estimate	Minimum Estimate	Maximum Estimate	Northern Pike Removed	Source
2014	725	478	2,759	133	Baxter and Neufeld 2015
2015	410	151	670	116	Baxter 2016
2016	107	59	155	49	Baxter and Doutaz 2017
2017	99	25	172	41	Baxter and Lawrence 2018

For the purposes of this report, comparable CPUE<sub>8hr</sub> is defined as effort using SPIN nets in April through June in the LCR when water temperatures were > 7 °C. Spring CPUE<sub>8hr</sub> in 2022 decreased by 36% from 2021 while effort was 23% higher. Spring CPUE<sub>8hr</sub> was similar to 2018 and 89% lower than when suppression began in 2014 (Table 11). More Northern Pike were caught in 2022 than previous years (excluding 2021) during this comparable timeframe; this was likely a result of the increased effort. High water levels and cool water temperatures in the LCR for spring 2022 may have influenced the CPUE, as these conditions reduced the amount of sampling sites and increased debris flow.

Table 11. Comparable (spring: April – June) Northern Pike CPUE<sub>8hr</sub> (Northern Pike/8-hours) from 2014 to 2022 in the Columbia River.

Year	Total Northern Pike	CPUE <sub>8hr</sub>	Source
2014	92	3.48	Baxter and Neufeld 2015
2015	85	1.52	Baxter 2016
2016	49	1.02	Baxter and Doutaz 2017
2017	18	0.33	Baxter and Lawrence 2018
2018	19	0.41	Wood 2019
2019	14	0.60	ONA 2020
2020	10	0.49	ONA 2021
2021	37	0.61	ONA 2022
2022	30	0.39	Present

In 2022, 14 female adult Northern Pike were captured during suppression efforts. Seven of these individuals showed indications to be in spawning. One of the captured females was removed from Zuckerberg Pond after an apparent successful spawn event. Suppression efforts indicate that river conditions in 2022 were favorable for Northern Pike spawning success with 146 YOY removed. Results from YOY removal are comparable to 2020 when Zuckerberg Pond last had a successful spawning event (Table 12).

Table 12. Reported Northern Pike removals from 2010 to 2022, by program, in the Columbia River (LCR), Pend d’Oreille River (PDO), and Christina Lake (XL); with their respective data sources. Dashes indicate sampling was not conducted.

Year	Location	Suppression	CLBMON -45*	CLBMON -42A*	Angler Incentive	By Location	Columbia Basin Total	Source
2010	LCR	-	4	0	-	4	4	
2011	LCR	-	8	0	-	8	8	
2012	LCR	-	1	0	-	1	1	
2013	LCR	-	24	0	-	24	24	
2014	LCR	133	9	0	21	163	163	Baxter and Neufeld 2015
2015	LCR	116	3	0	8	127	131	Baxter 2016
	PDO	-	-	-	4	4		
2016	LCR	40	3	0	-	43	43	Baxter and Douthaz 2017 Douthaz 2019
	PDO**	-	-	-	-	-		
2017	LCR	35	4	2	-	39	84	Baxter and Lawrence 2018 Douthaz 2019
	PDO**	43	-	-	-	43		
2018	LCR	27	2	0	3	32	48	Wood 2019 ONA 2020
	PDO	15	-	-	1	16		
2019	LCR	35	17	1	-	52	63	ONA 2020
	PDO	10	-	-	-	10		
	XL	0	-	-	-	0		
2020	LCR	138	2	0	-	140	146	ONA 2021
	PDO	6	-	-	-	6		
2021	LCR	38	5	0	1	44	45	ONA 2022
	PDO	1	-	-	-	1		
	XL	0	-	-	-	0		
2022	LCR	179	4	0	3	186	186	Present
	PDO	0	-	-	-	0		
<b>Total:</b>							<b>946</b>	

\* All BC Hydro unpublished data

\*\* Douthaz (2019) describes the capture of 43 Northern Pike in the Pend d’Oreille Reservoir between 2016 and 2017, but specific location data and captures by year are not available.

In 2019 and 2020, Zuckerberg Pond was identified as an area that provided quality rearing habitat for Northern Pike and other invasive species. All YOY Northern Pike captured in 2022 were recovered from Zuckerberg Pond.

Prior to 2019, suppression efforts around Zuckeberg Island were focused on the upstream bay in the LCR Mainstem, and not in Zuckeberg Pond itself (Baxter and Lawrence 2018; Wood 2019). In 2022, Northern Pike spawn events were detected within Zuckeberg pond with the capture of a spawned out female and YOY. Therefore, the increased total number of Northern Pike removed from the LCR in 2022 was likely a result of increased effort in Zuckeberg Pond after identifying successful spawning event and does not necessarily indicate an increase in the Northern Pike population. The presence of seven females in spawning condition at several locations may indicate that conditions in the LCR were more favorable to spawning for Northern Pike in 2022 compared to 2021 (when no spawning individuals were detected).

Northern Pike population estimates in the Pend d’Oreille River (Seven Mile and Waneta Reservoirs) have not been conducted. Spring Northern Pike CPUE<sub>8hr</sub> in the Pend d’Oreille River has decreased annually since 2018 (Table 13). Effort in 2021 decreased by 69% from 2020, which may have influenced Northern Pike captures. Northern Pike were not captured in the Pend d’Oreille River in 2022 over 98 hours of gillnetting effort. Northern Pike spring CPUE in the Pend d’Oreille River is not available prior to 2018.

Table 13. Comparable (spring: April – June) Northern Pike CPUE<sub>8hr</sub> (Northern Pike/8-hours) from 2018 to 2022 in the Pend d’Oreille River.

Year	Total Northern Pike	CPUE <sub>8hr</sub>	Source
2018	15	0.39	Wood 2019
2019	10	0.15	ONA 2020
2020	6	0.04	ONA 2021
2021	1	0.02	ONA 2022
2022	0	0	Present

A summary of effort by sample type targeting Northern Pike between 2014 and 2022 is available in *Appendix H – Summary of Northern Pike Suppression Efforts 2014 – 2022*.

## 4.2 Distribution and Spawning

LCR Northern Pike capture locations in 2022 were consistent with previous years, with the majority of captures occurring in the Robson Reach (Baxter and Neufeld 2015; Baxter 2016; Baxter and Doutaz 2019; Baxter and Lawrence 2018; Wood 2019; ONA 2020; ONA 2021; ONA 2022). In general, adult Northern Pike in the LCR are predominantly encountered along the right downstream bank of the Robson Reach between Celgar Mill and Robson Bridge, the left downstream bank between the Robson Community Church, and the Robson Bridge (Figure 16). Few adults have been encountered downstream of the Robson Bridge (Figure 17). YOY Northern Pike are typically captured in Zuckeberg Pond, and sporadically throughout the Robson Reach, Waldie Island, and the Kootenay Oxbow.

In 2022, Northern Pike were not encountered in the Waneta Reservoir and the Seven Mile Reservoir was not sampled. Effort was focused in the Waneta Reservoir because suppression activities have occurred exclusively (in the Pend d’Oreille River) in the Seven Mile Reservoir since 2020 due to increased recreational usage of the Waneta Launch during COVID-19, and fluctuating water levels of the Waneta Reservoir resulting in access issues. In previous years, Northern Pike were captured west of the Waneta Boat Launch on the left downstream bank in the Waneta Reservoir, but the majority of Northern Pike in the Pend d’Oreille River were in the Seven Mile Reservoir (Figure 18; Wood 2019; ONA 2020; ONA 2021; ONA 2022).

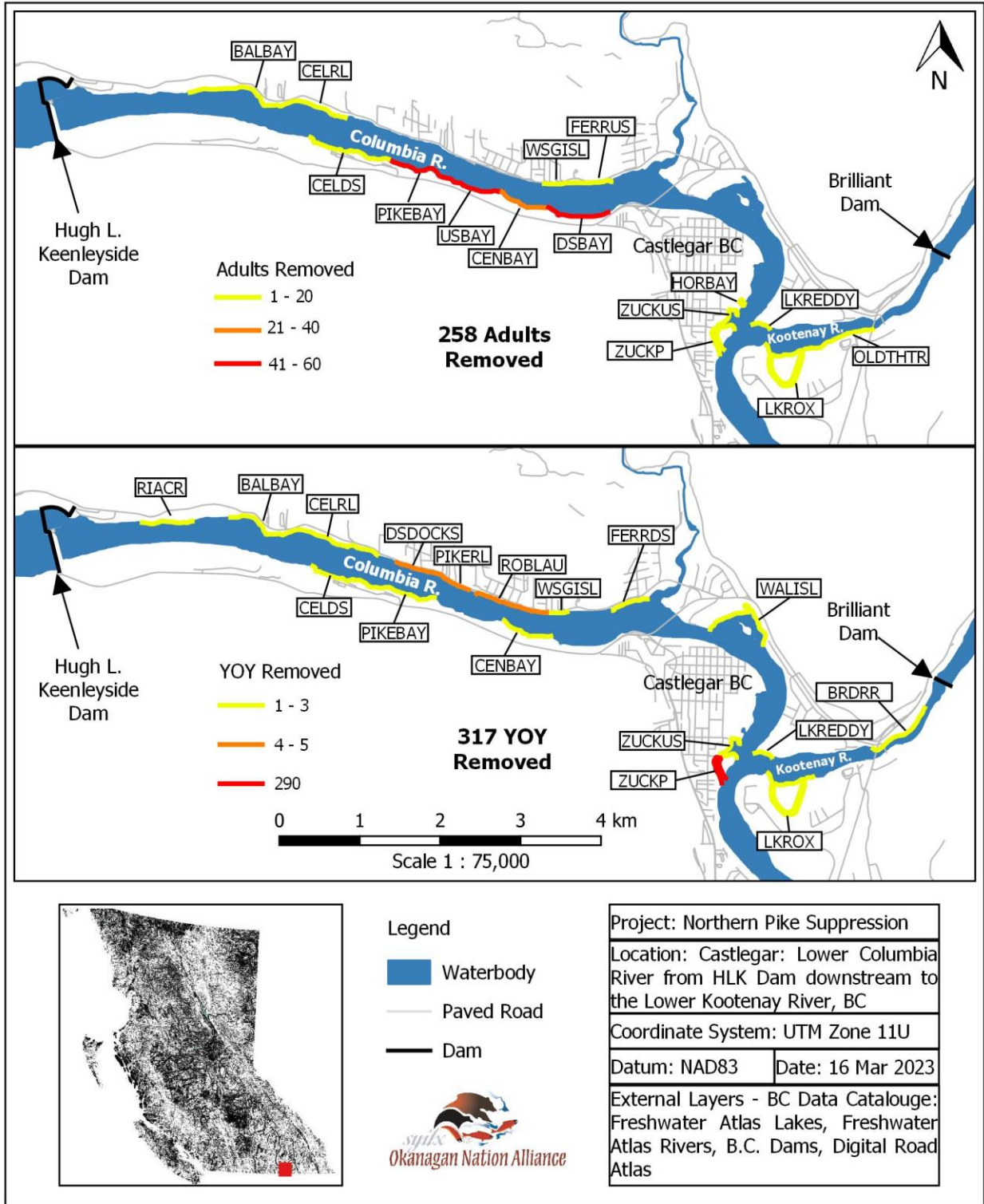


Figure 16. Adult (top) and young-of-year (YOY; bottom) Northern Pike removal locations (2010 – 2022) in the Castlegar area. Map only portrays Northern Pike capture data with readily available location data (BC Hydro unpublished data; Baxter 2016; Baxter 2017; Baxter 2018; Wood 2019; ONA 2020; ONA 2021; ONA 2022).

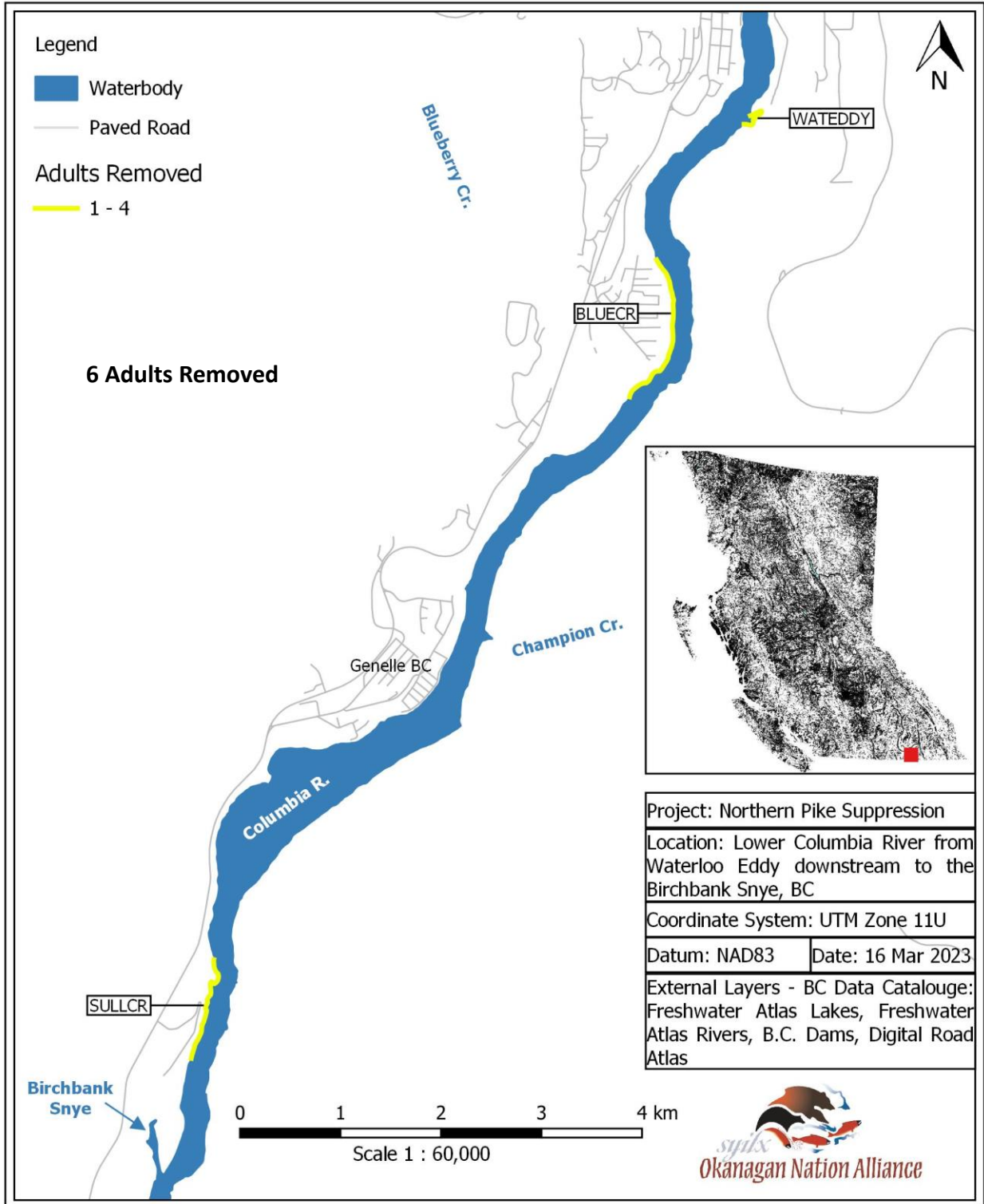


Figure 17. Adult Northern Pike removal locations (2010 – 2022) in the Genelle area. Map only portrays Northern Pike capture data with readily available location data (BC Hydro unpublished data; Baxter 2016; Baxter 2017; Baxter 2018; Wood 2019; ONA 2020; ONA 2021; ONA 2022).



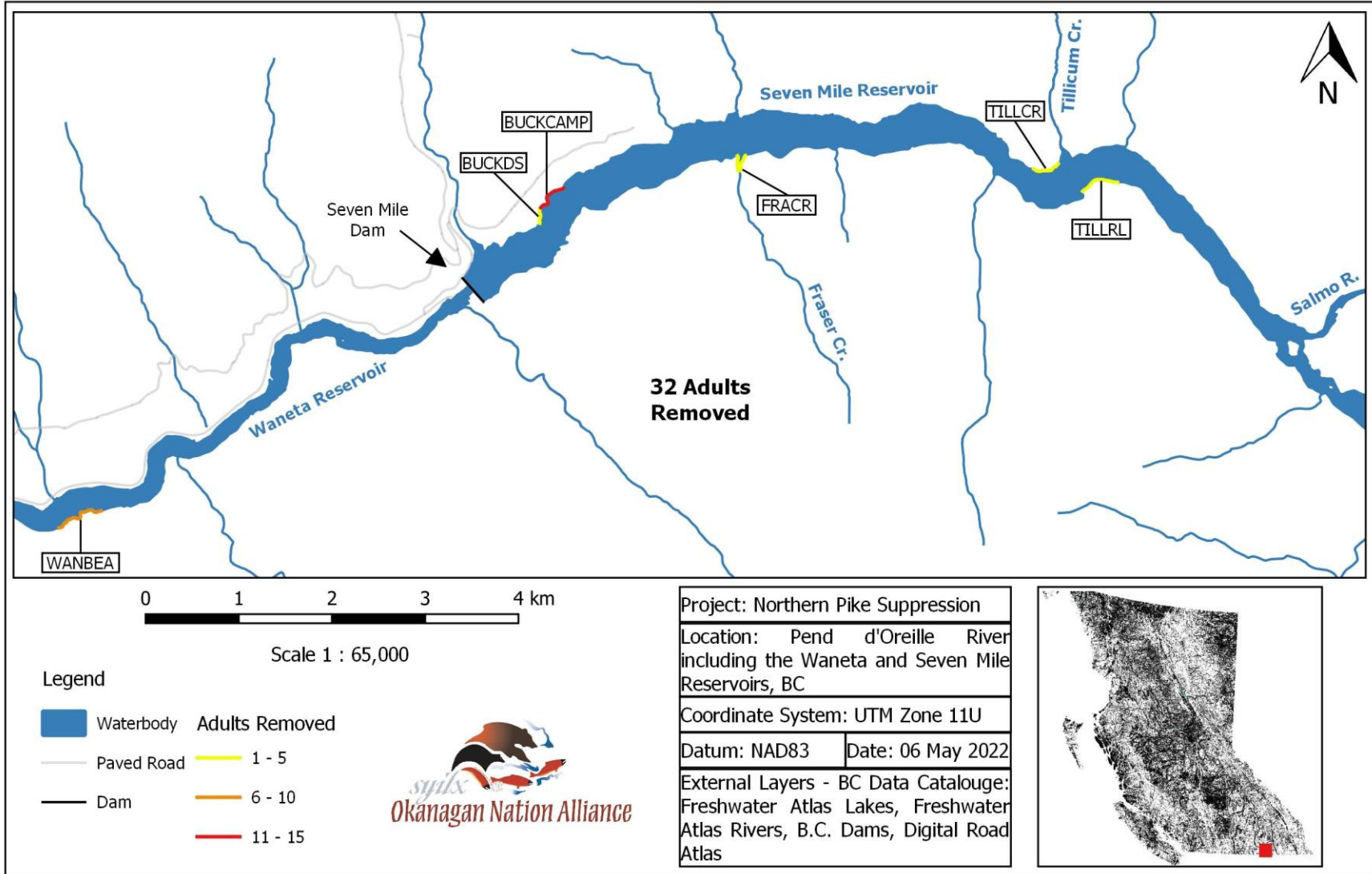


Figure 18. Adult Northern Pike removal locations (2018 – 2022) in the Pend d'Oreille River. Map only portrays Northern Pike capture data with readily available location data (Wood 2019; ONA 2020; ONA 2021, ONA 2022).

eDNA sampling in 2022 did not result in any detected Northern Pike presence, including the positive control sites. Based on non-detections of both positive control sites, there may have been an issue with sample collection and eDNA results for exploratory sites could be a false negative. A spawned female was captured the day of the LCR positive control site collection in close proximity to the collection site, so eDNA should have been detected. However, Northern Pike captures and CPUE in the Pend d’Oreille River have decreased since 2018 to the point where only one Northern Pike was captured in 2021. Therefore, Northern Pike numbers in the Pend d’Oreille River may be low enough to produce a negative eDNA sample and the status of this site as a positive control should be re-assessed. The method for eDNA collection and filtering changed from water sample collection/lab filtering (2020 – 2021; ONA 2021; ONA 2022) to field filter collection with a Smith-Root eDNA Backpack Sampler. As a result, filter size changed from 0.45 µm (2020 – 2021) to 5.0 µm to avoid clogging. The filter size may have affected the detectability of Northern Pike eDNA, and a higher volume of water may need to be sampled with the backpack eDNA sampler 5.0 µm filter to achieve proper results.

#### 4.2.1 Columbia River Spawning

Based on spawn conditioned Northern Pike, the 2022 spawning window was estimated to be between late May and late June; later than previous years where Northern Pike typically begin spawn in early May (Baxter and Neufeld 2015; Wood 2019; ONA 2020). This was likely due to a cool spring in 2022, where water temperatures did not average 8 °C until May 23 (compared to May 8 in 2020; ONA 2021).

The locations of spawn conditioned adult and YOY Northern Pike continue to support previous data that the Robson Reach and Zuckerberg Island are Northern Pike spawning sites (Baxter and Neufeld 2015; Baxter and Lawrence 2018; Wood 2019; ONA 2020; ONA 2021; ONA 2022). To date, the Robson Reach (both banks from HLK to Robson Bridge), Waldie Island, Zuckerberg Island, Millennium Park, and the Kootenay Oxbow have all been identified as potential Northern Pike spawning locations.

### 4.3 Habitat and Habitat Use

General Northern Pike habitat characteristics (shallow water with low flow and abundant aquatic vegetation) are consistently available in the Columbia and Pend d’Oreille Rivers where Northern Pike capture locations occur. More Northern Pike have been captured in the LCR than the Pend d’Oreille River, though Pend d’Oreille captures are typically larger and older (Figure 19; Wood 2019; ONA 2020; ONA 2021; ONA 2022). This may indicate recruitment in the LCR is more prevalent than in the Pend d’Oreille River, possibly due to reservoir elevation changes in the Seven Mile and Waneta Reservoirs.

Water temperatures in the Pend d’Oreille River appear to be more suitable for Northern Pike growth than the LCR. The Pend d’Oreille River had 15 days where the average daily water temperature was within the Northern Pike optimal temperature for growth and preference (20 – 22 °C) whereas the LCR Mainstem did not reach 20 °C in 2022 (Cassleman and Lewis 1996; WSC 2023). However, off-channel habitats are present in the LCR that do reach optimal Northern Pike growing temperatures (Zuckerberg Pond).

The relationship between length and weight of all Northern Pike measured from the LCR and Pend d’Oreille River can be described through a power function equation (Equation 4) and has high fit ( $R^2 = 0.99$ ; Figure 19).

Equation 4. Northern Pike length and weight power function equation.

$$W = 5 \times 10^{-6} \times L^{3.0896}$$

where,  
*W* = Northern Pike weight (g)  
*L* = Northern Pike length (mm)

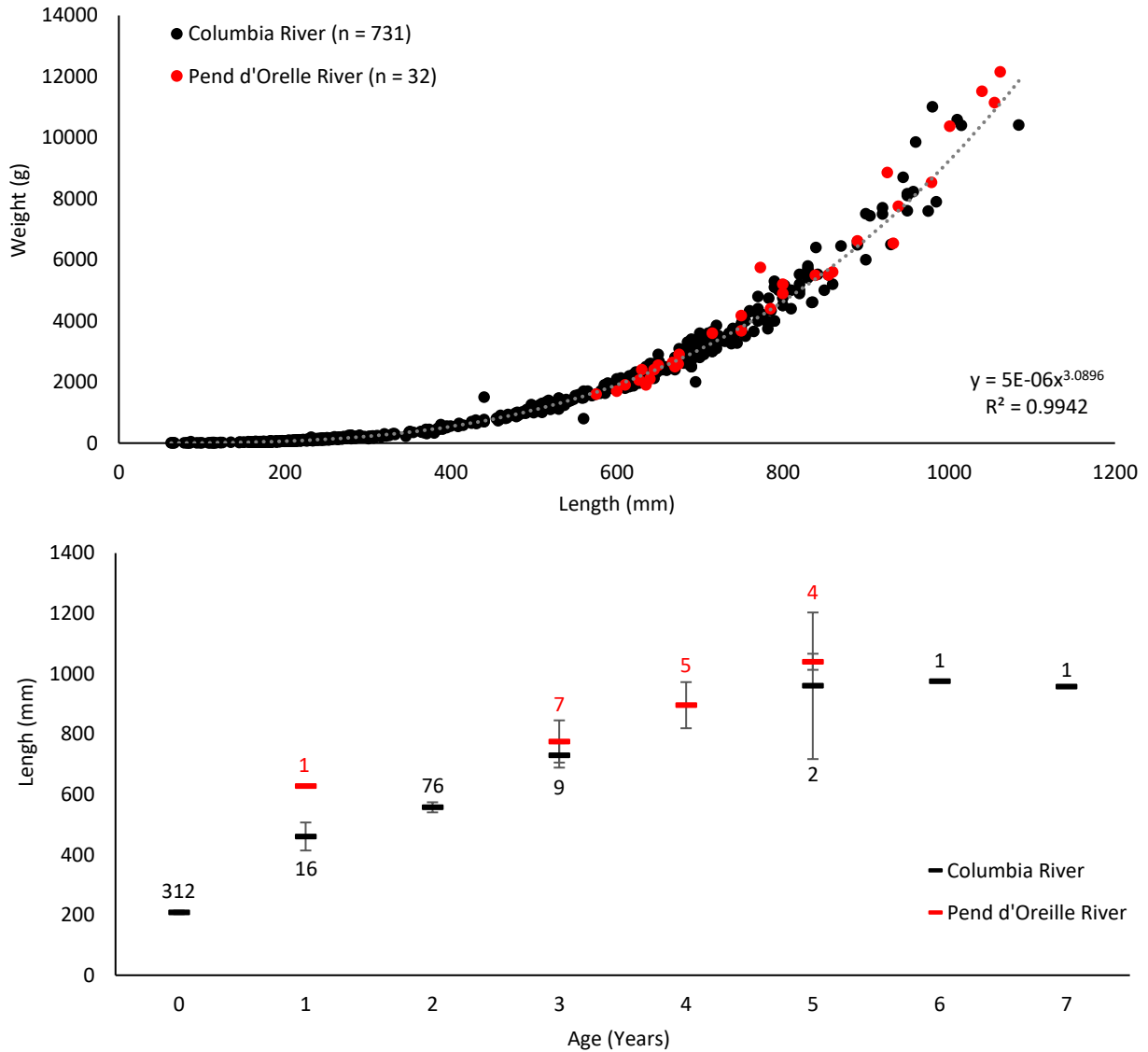


Figure 19. (Top) Size (length by weight) of Northern Pike in the Columbia River (black) and Pend d’Oreille River (red) captured between 2010 and 2022; where sample size (n) = number of Northern Pike (BC Hydro unpublished data; Baxter and Neufeld 2015; Baxter 2016; Baxter and Doutaz 2019; Baxter and Lawrence 2018; Wood 2019; ONA 2020; ONA 2021; ONA 2022). (Bottom) Age of Northern Pike in the Columbia River (black) and Pend d’Oreille River (red) with 95% confidence intervals; where sample size (number of Northern Pike) is represented by the respective colours for all captures between 2019 and 2022 (ONA 2020; ONA 2021; ONA 2022).

#### 4.3.1 Adult Northern Pike

Adult Northern Pike appeared to be utilizing similar habitats to previous years, primarily areas with depths of 2 – 7 m with aquatic vegetation (Baxter and Neufeld 2015; Baxter 2016; Baxter and Doutaz 2017; Baxter and Lawrence 2018; Wood 2019; ONA 2020; ONA 2021; ONA 2022). This habitat is abundant in the Robson Reach of the LCR, where the majority of adult Northern Pike captures have occurred.

#### 4.3.2 Young-of-Year Northern Pike

The capture of 146 YOY Northern Pike from Zuckerberg Pond in 2022 supports previous observations that Zuckerberg Pond provides rearing habitat for YOY Northern Pike (Wood 2019; ONA 2021). Kootenay Oxbow, Waldie Island, and the Robson Reach have also been identified as potential YOY Northern Pike rearing habitats (ONA 2016; Baxter and Lawrence 2018; Wood 2019; ONA 2021).

The YOY Northern Pike growth rate in 2022 was higher for length (1.8 cm/week in 2022 compared to 1.1 cm/week in 2020) and weight (15.0 g/week in 2022 compared to 9.4 g/week in 2020; Figure 20). These growth rates also appear higher than YOY Northern Pike studied on two shallow lakes on Manitoulin Island in Lake Huron between 1968 and 1971 (1.04 cm/week; Cassleman and Lewis 1996). Temperature is a significant factor in Northern Pike growth (Cassleman and Lewis 1996; McPhail 2007) and the variation in growth between 2020 and 2022 in Zuckerberg Pond is likely due to changes in water temperature. Similarly, YOY Northern Pike in the LCR Mainstem likely have a lower growth rates, based on the comparison on YOY Northern Pike size in the LCR Mainstem and Zuckerberg Pond from 2019 (ONA 2020; Figure 21). The comparison of YOY size in the LCR Mainstem and Zuckerberg Pond has not occurred since 2020 because too few YOY have been captured in the LCR Mainstem.

YOY size is significant considering fecundity of Northern Pike is proportional to body size, which can be 9,000 eggs per pound (454 g; Scott and Crossman 1973). Therefore, individuals rearing in Zuckerberg Pond have the potential to become more prolific spawners, due to their accelerated growth rate, than those rearing in the LCR Mainstem. As a result, suppression activities targeting YOY Northern Pike should prioritize Zuckerberg Pond and similar habitats.

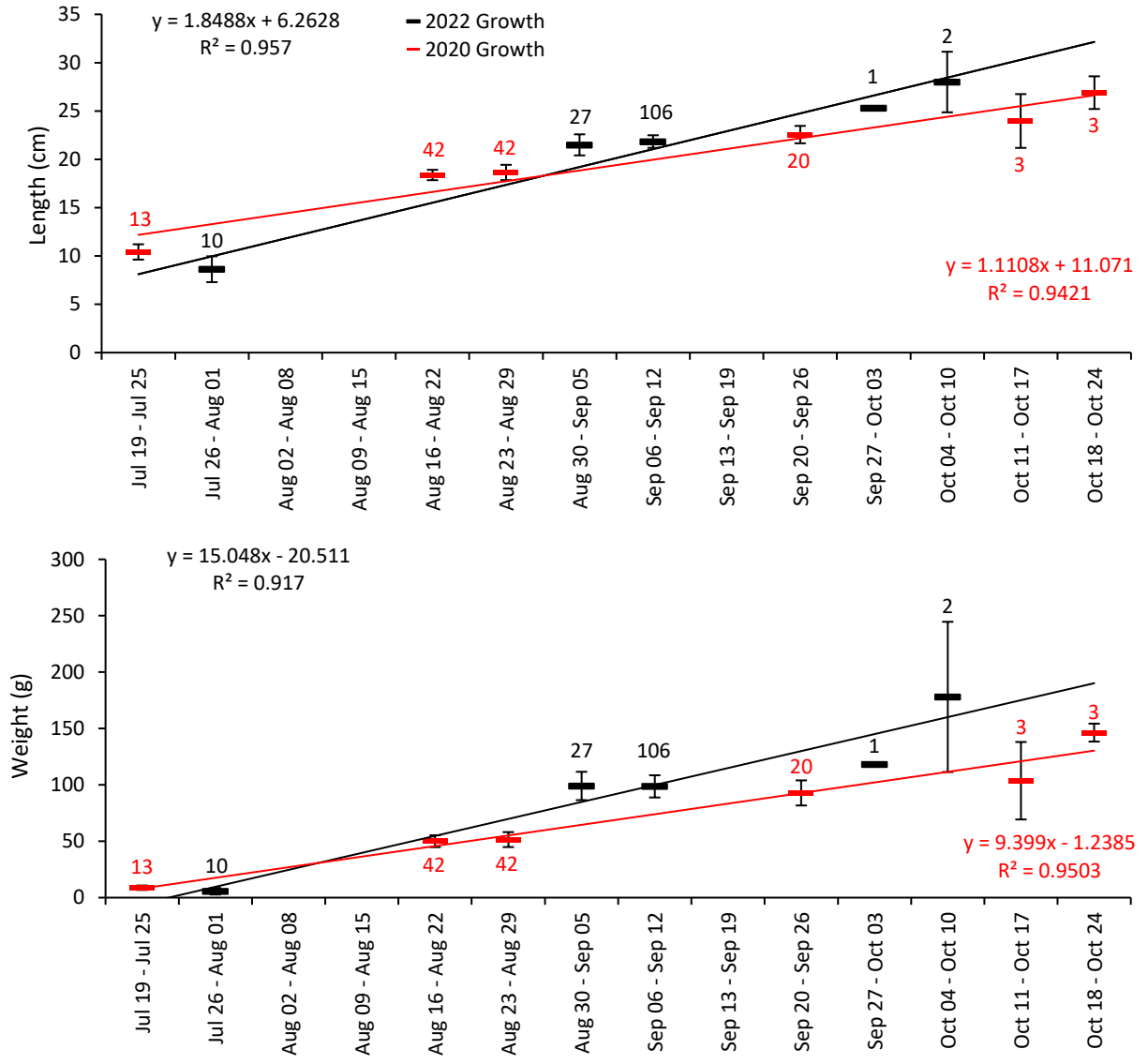


Figure 20. (Top) Average fork length (mm) of young-of-year Northern Pike captured per week at Zuckerberg Pond between Jul 19 and Oct 24 2020 (red) and 2022 (black) used to estimate linear growth rate. (Bottom) Average weight (g) of young-of-year Northern Pike captured per week at Zuckerberg Pond between Jul 19 and Oct 24 2020 (red) and 2022 (black), used to estimate weight growth. Averages displayed with 95% confidence intervals and sample size (number of Northern Pike) is represented in the respective colour.

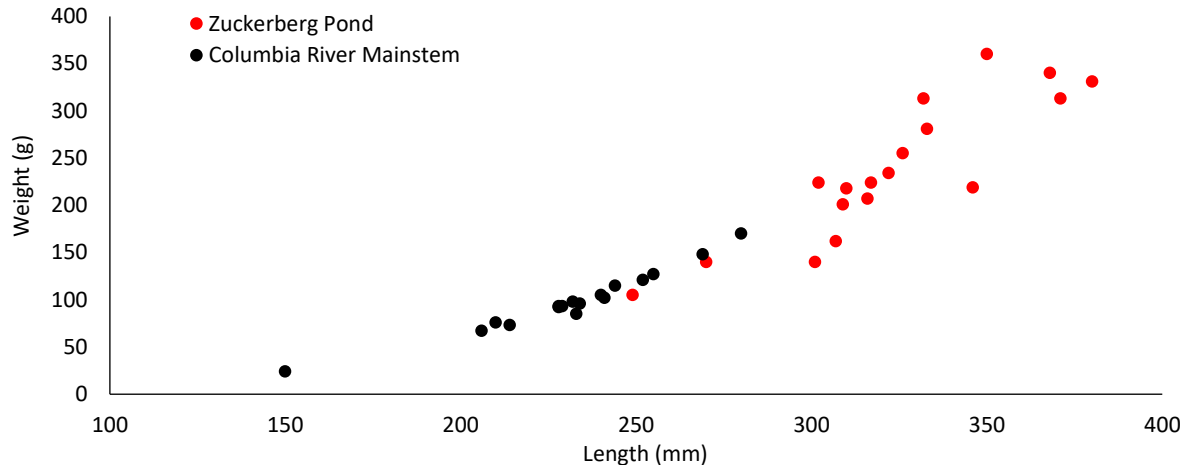


Figure 21. Size (length by weight) of juvenile Northern Pike captured between Aug 27 and Nov 3 2019, including data from the CLBMON 45 Indexing Program (BC Hydro unpublished data), in the Columbia River Mainstem and Zuckerberg Pond; Figure from ONA (2020).

YOY Northern Pike were typically found in depths of 0.0 – 2.9 m, with individuals < 150 mm length often in a depth of 0.0 – 0.5 m of water with abundant vegetation; consistent with previous observations (Baxter and Lawrence 2018; ONA 2020; ONA 2021; ONA 2022). YOY Northern Pike appear to frequent shallow habitat and move deeper as they grow; a general rule being 10 cm of water depth per 10 mm of body length for every week after peak-spawning until they reach 150 mm (Cassleman and Lewis 1996).

To target YOY Northern Pike, effort should be focused on habitats that are shallow and possess abundant aquatic vegetation, with priority given to sites with water temperatures higher than the LCR average. Sites capable of reaching the optimum temperature for YOY growth and recruitment (22 – 24 °C) should be a particular priority (Cassleman and Lewis 1996). The Pend d’Oreille River appears to possess suitable YOY Northern Pike rearing habitat, though none have been encountered during active suppression between 2018 and 2021 (Wood 2019; ONA 2020; ONA 2021).

#### 4.4 Diet and Predation

Adult Northern Pike stomach analyzed since 2010 have been primarily empty (70%; n = 244), while YOY stomachs were generally full (77%; n = 288). Sculpin and Mountain Whitefish appear to be the preferred prey of adult Northern Pike in the LCR (Figure 22). Sculpin appear to be the preferred prey of YOY Northern Pike followed by invertebrates. The YOY predation rate of Yellow Perch is high compared Rainbow Trout and sucker species, but this is likely due to availability in Zuckerberg Pond. Invertebrate prey items include grasshoppers, aquatic sow bugs, wasps, flying ants, and leeches.

Northern Pike stomachs in the Pend d’Oreille River are empty 75% of the time (compared to 41% of the time in the Columbia River). Empty stomachs may be more common in the Pend d’Oreille River because Northern Pike are captured while (or near) spawning and may not be eating. Individuals in the LCR are caught into the summer and fall when predation increases (Baxter and Neufeld 2015, Doutaz 2019; Wood 2019; ONA 2020; ONA 2021; ONA 2022). Yellow Perch, Lake Whitefish, Northern Pikeminnow, Suckers, and invertebrates have been identified in Pend d’Oreille River Northern Pike stomachs from 2018 – 2020 (Figure 23; Wood 2019; ONA 2020; ONA 2021; ONA 2022).

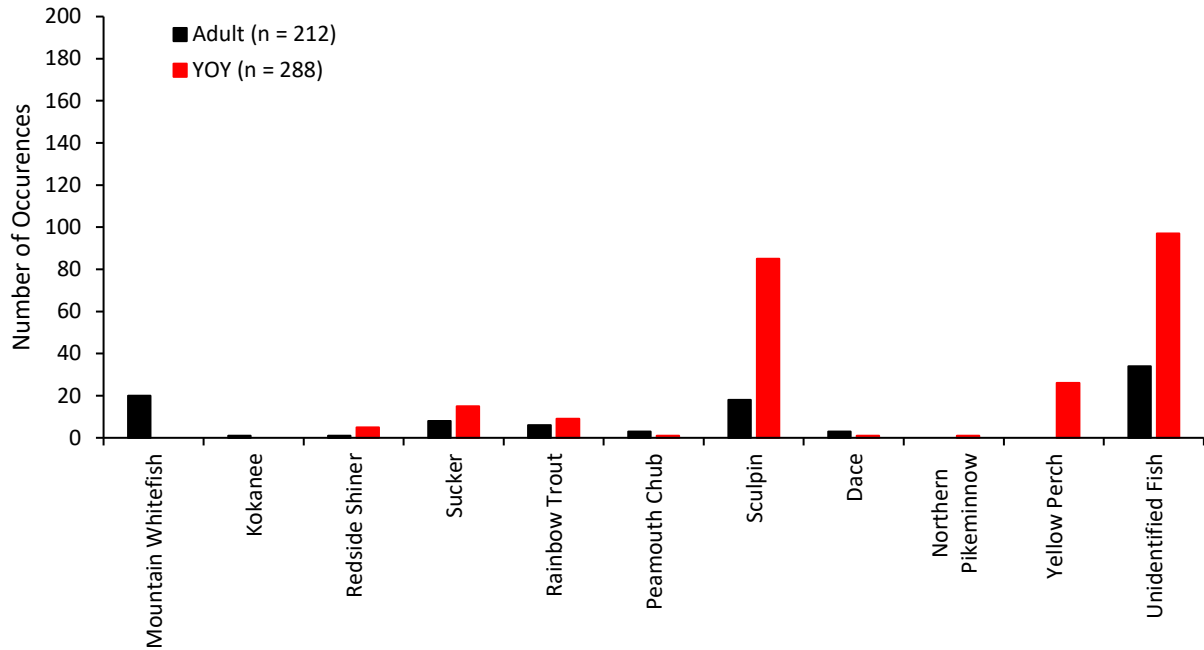


Figure 22. Number of occurrences of prey items in adult (black) and young-of-year (YOY; red) Northern Pike stomachs from the Columbia River between 2010 and 2022; where n = the number of stomachs analyzed (BC Hydro unpublished data; Baxter and Neufeld 2015; Baxter 2016; Baxter and Doutaz 2019; Baxter and Lawrence 2018; Wood; ONA 2020; ONA 2021; ONA 2022).

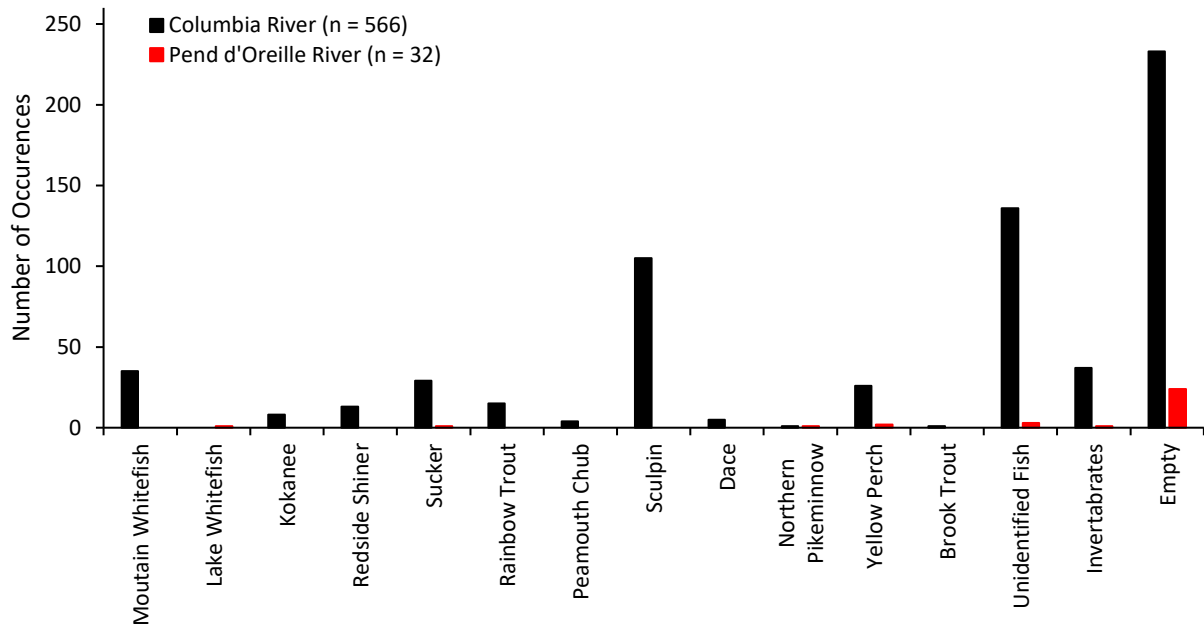


Figure 23. Number of occurrences of prey items in Northern Pike stomachs from the Columbia River (black) and Pend d'Oreille River (red) captured between 2010 and 2022; where n = the number of stomachs analyzed (BC Hydro unpublished data; Baxter 2016; Baxter 2017; Baxter 2018; Wood 2019; ONA 2020; ONA 2021; ONA 2022).

The predation of sculpin and dace, particularly by YOY Northern Pike is concerning due to the presence of listed Shorthead Sculpin and Umatilla Dace in the LCR. Though neither species has been positively identified in stomach contents due to the condition of specimens at the time of observation, it is assumed Northern Pike would consume Shorthead Sculpin or Umatilla Dace if encountered. White Sturgeon, another at-risk species, have not been detected in a Northern Pike stomach in the LCR to date.

#### 4.5 Parasitic Relationships

A high number of adult Northern Pike have been observed with parasites in the stomach or intestine in both the LCR and Pend d’Oreille Rivers (Baxter and Neufeld 2015; Wood 2019; ONA 2020). Parasites were found in 98% of inspected Northern Pike intestines in 2022. In 2014, pathology samples from Northern Pike in the LCR were sent to Provincial Freshwater Fisheries Society of BC Fish Health Lab for the screening of viral tests, bacterial tests, and parasites; the results of which did not identify any concerns (Baxter and Neufeld 2015). Tapeworms observed in Northern Pike are likely *Eubothrium* or *Proteocephalus* (Baxter and Neufeld 2015). However, pathology sampling in the Pend d’Oreille River has not occurred, and observations of parasites are more frequent in this location (Wood 2019; ONA 2020).

Parasites can cause behavioural changes and adverse health effects in fish depending on the host and parasite species, concentration, and diversity of parasites in the host, and environmental stressors (pollution, temperatures, angling pressure, etc.; Dick and Watson 1997; Barber et al. 2000). Of particular interest is the species *Triaenophorus crassus*, a tapeworm closely associated with Whitefish and Northern Pike (Dick and Watson 1977). *Triaenophorus crassus* typically begins its life cycle by parasitizing a small copepod (*Cyclops bicuspidatus*), and only continues its lifecycle when ingested by a plankton feeding Cisco or Whitefish; the final stage of *Triaenophorus crassus* occurs when it is ingested by a Northern Pike (Dick and Watson 1977). The possible presence of *Triaenophorus crassus* in the Columbia and Pend d’Oreille Rivers is concerning when considering ongoing salmon re-introduction efforts to the Columbia River above the Grand Coulee Dam by various Tribal and First Nation organizations (including the ONA) and Canada and United States governments, as a high percentage of Sockeye (*Oncorhynchus nerka*) smolts were documented to be parasitized by *Triaenophorus crassus* in the Wood River Lakes, Alaska (Groot and Margolis 1991). Presently, the Bering Sea drainage (Alaska) is the only known instance of *Triaenophorus crassus* parasitizing Sockeye due to the co-existence of Sockeye and Northern Pike in local lakes (Groot and Margolis 1991). Dick and Watson (1977) identified Northern Pike removal as the easiest way to reduce *Triaenophorus crassus* in waterbodies.

## 5.0 Recommendations

The following are recommended to improve the Northern Pike Suppression and Monitoring Program in 2023:

1. Spring sampling effort for adult Northern Pike should focus on the Northern Pike spawning window in the LCR (when water temperatures reach 8 °C), Pend d’Oreille River (when water temperatures reach 8 °C, or ~ 1 week after a large drafting event in the Seven Mile Reservoir), and Christina Lake (when water temperatures reach 8 °C) using SPIN nets and boat electrofishing. The timing of the spawning windows may occur concurrently and up to three crews may be required. If three crews are not feasible, priority should be given to the LCR. Night electrofishing should occur in the Pend d’Oreille River and LCR after Northern Pike start spawning.

Fall sampling effort for YOY Northern Pike should be focused mid-July to late October using 1” monofilament nets. In the LCR, juvenile nets should be placed in locations where YOY Northern



Pike were previously caught (Figure 16). Night electrofishing for YOY should occur in the Pend d'Oreille River to identify rearing habitat, and in the Robson Reach if other gillnetting or electrofishing programs are not occurring.

Based on 2022 and past efforts, the priority windows are:

- a. Pend d'Oreille River            April 20 to May 20 & August 20 – October 30
- b. Christina Lake                    April 20 to May 20
- c. Columbia River                  May 15 to June 25 & July 20 – October 30

Actual sampling dates may change based on field conditions and Northern Pike encounters in 2023.

2. Spring Northern Pike spawn monitoring should occur at locations where YOY have been identified (Figure 16), with exploratory sampling at Birchbank Snye (UTM 11U 447399, 5446340), the Genelle Backchannel (UTM 11U 448658, 5450312) and Fort Sheppard Eddy (UTM 11U 455112, 5431131). The correlation between Zuckerberg Pond's isolation from the LCR Mainstem and the river level measured at Birchbank Station should be identified to direct timing of suppression activities. Utilization of a fyke net at the river connection of Zuckerberg Pond should be implemented to capture spawning Northern Pike and inventory full use of Zuckerberg Pond during identified spawning window.
3. Continue the eDNA sampling program, with consideration of similar programs to avoid duplicate sampling, to monitor Northern Pike range expansion (through natural migration of the introduced population and/or anthropogenic introductions) in the Columbia Basin at high risk sites which may include but are not limited to
  - Christina Lake (North) (UTM 11U 405817, 5450693)
  - Christina Creek/Kettle River Confluence (UTM 11U 412140, 5431472)
  - Hugh Keenleyside Dam Forebay (East) (UTM 11U 441778, 5465902)
  - Hugh Keenleyside Dam Forebay (West) (UTM 11U 443334, 5465080)
  - Syringa Provincial Park (UTM 11U 436681, 5465733)
  - Brilliant Headpond (UTM 11U 455230, 5464280)
  - Glade (UTM 11U 460400, 5471570)
  - Revelstoke Wetlands (East) (UTM 11U 417283, 5646158)
  - Revelstoke Wetlands (North) (UTM 11U 415658, 5647599)
  - Revelstoke Wetlands (South) (UTM 11U 417318, 5645621)
  - Osoyoos Lake (North) (UTM 11U 315859 5439243)
  - Osoyoos Lake (Swisw) (UTM 11U 321483 5432479)
  - Osoyoos Lake (Border) (UTM 11U 320247 5430473)

eDNA sampling methods used in 2020 – 2021 should be replicated alongside the Smith-Root eDNA Backpack Sampler to test comparability and effectiveness of these methods.

4. Northern Pike monitoring at Christina Lake presents a unique opportunity. The Christina Lake Stewardship Society (CLSS) is highly interested in Northern Pike monitoring and eager to participate. It is recommended that the ONA partners with CLSS to provide training and equipment so CLSS members can volunteer and contribute to Northern Pike monitoring in Christina Lake.
5. Continue surveys to increase Northern Pike habitat data. This will continue to involve the creation of defined sites through the Columbia and Pend d'Oreille Rivers with the documentation of depth, aquatic vegetation/cover types, general hydrologic characteristics, and substrate types at each site. Sites with and without Northern Pike presence could then be more effectively compared.

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## 6.1 Map Layer Sources

### **British Columbia Data Catalogue:**

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### **Statistics Canada:**

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### **ESRI World Imagery:**

[https://server.arcgisonline.com/arcgis/rest/services/World\\_Imagery/MapServer](https://server.arcgisonline.com/arcgis/rest/services/World_Imagery/MapServer)

## Appendix A – Site Habitat Classifications



Table 14. Observed cover types and sub-types at Northern Pike monitoring and suppression sites.

Cover Type	Definition and Cover Sub-Types	
Woody Debris (WD)	Woody debris that can provide cover for adult or YOY juvenile Northern Pike; can include logs, docks, submerged root wads, submerged docks, etc.	
Aquatic Vegetation (AV)	Aquatic vegetation in enough abundance to provide cover for Northern Pike. When possible, identify and record the approximate growth stage and density.	
	Growth Stage	Density
	a = short, stubby, small b = long, large	1 = sparse 2 = intermittent, patchy 3 = dense mat
Terrestrial Vegetation (TV)	Living terrestrial vegetation that is submerged or overhanging providing cover for Northern Pike. Document availability of submerged and / or overhanging vegetation.	
	Overhanging Vegetation Availability	Submerged Vegetation Availability
	1 = <10 m2 2 = >10 m2	3 = minimal, providing little cover 4 = minimal, providing good cover 5 = abundant, providing little cover 6 = abundant, providing good cover
Interstices (I)	Rocks large enough to provide cover for Northern Pike. Differentiate between boulders and bedrock.	
	1 = large boulders 2 = bedrock features	

Table 15. Benthic profile descriptions at Northern Pike monitoring and suppression sites.

Profile Type	Max Water Depth (m)	Definition
Bench (BE)	< 2	Flat benthic profile; water depth is ± 2 m from the start of the net
Low Grade (LG)	2 – 12	Water depth gradually increases from the start of the net
High Grade (HG)	12 – 15	Water depth increases rapidly, yet linearly from the start of the net
Drop Off (DO)	> 15	Water depth suddenly and significantly increases; may be found if sampling extends past the edge of a bench

Table 16. Hydraulic habitat descriptions at Northern Pike monitoring and suppression sites. Descriptions adapted from BC Hydro’s Lower Columbia River Fish Population Indexing Surveys (CLBMON-45).

Hydraulic Habitat Type	Definition
Eddy (E)	A main-channel habitat which represents large (< 30 m in diameter) areas of counter-current flows with depths generally > 5 m; produced by major bank irregularities and are available at all flow stages, although current velocities within eddy are dependent on flow levels. High quality areas for adult and sub-adult salmonid life-stages. High availability of instream cover.
Sidechannel (SC)	Off-channel habitat that is separate from the mainstem and has an in-flow and out-flow. SC habitats generally present at higher flow stages: characterized by low-nil velocity, variable depths (generally < 4 m) and predominantly depositional substrates (i.e., sand/silt/gravel); often supports growth of aquatic vegetation; very important areas for rearing and feeding.
Snye (SN)	A side channel area that is separated from the mainstem at the upstream end but retains a connection at the lower end. SN habitats generally present only at lower flow stages since area is a flowing side channel at higher flows; characterized by low-nil velocity, variable depths (generally < 3 m) and predominately depositional substrates (i.e., sand/silt/gravel); often supports growths of aquatic vegetation; very important areas for rearing and feeding.
Glide (G)	A main-channel habitat where current is present and flows parallel to the riverbanks. Available at all water levels and typically have a medium velocity, variable depths (1 to > 20 m), and commonly associated with armoured/stable substrates (i.e., bedrock/boulder/cobble); supports growth of aquatic vegetation; important for rearing and feeding.
Bay (B)	A main-channel habitat with parallel banks perpendicular to flow, often > 30 m in diameter and commonly associated with tributary confluences. Generally characterized with depositional sediments, low-nil velocity, variable depths, and little aquatic vegetation. Generally shielded from wind.
Pond (P)	Off-channel habitat that is completely disconnected from the mainstem; generally present at lower flows. Characterized by depositional sediments, nil velocities, shallow depths (< 3 m), and an abundance of aquatic and terrestrial vegetation.
Turbulent (T)	Mainstem habitat characterized by high velocities, armoured/stable substrates, variable water depths (> 3 m), low-nil aquatic vegetation, and minimal cover; more prevalent at higher flows.
Backwater (BW)	Main-channel habitat adjacent to the main flow characterized by nil flow; depositional sediments, present of abundant aquatic vegetation, and generally is not associated with a confluence. Differentiated from an eddy by a lack of flow, but physically similar.
Shoreline (SL)	Habitat with no detectable flow (i.e., lakes shores); flow is not detectable throughout the width of the waterbody at the sampling location.

## Appendix B – Northern Pike Suppression and Monitoring Sites by Method

## Appendix B-1: Gillnet Sites

Table 17. 2022 gillnet sites by Watershed (Pend d'Oreille River, Columbia River, and Kootenay River) with coordinates, set depths (m), dates, set/pull times and temperatures (°C), and Northern Pike (NP) presence.

Set	Location	Site ID	Location (UTM Zone 11U)				Depth (m)		Set			Pull			# NP
			Start		End		Min	Max	Date	Time	Temp (°C)	Date	Time	Temp (°C)	
			Easting	Northing	Easting	Northing									
1	Waneta Reservoir	GNPDO_001	458979	5428528	458938	5428562	0.0	8.1	5/12/2022	11:30	9.2	5/12/2022	13:35	9.2	0
2	Waneta Reservoir	GNPDO_002	458866	5428465	458827	5428494	0.2	4.7	5/12/2022	11:40	9.2	5/12/2022	13:43	9.2	0
3	Waneta Reservoir	GNPDO_003	458746	5428370	458741	5428410	0.3	7.3	5/12/2022	11:59	9.2	5/12/2022	14:01	9.2	0
4	Waneta Reservoir	GNPDO_004	458673	5428352	458701	5428387	0.5	8.1	5/12/2022	12:05	9.2	5/12/2022	14:11	9.2	0
5	Waneta Reservoir	GNPDO_005	459672	5428841	459667	5428805	0.2	3.8	5/12/2022	12:19	9.3	5/12/2022	15:13	9.3	0
6	Waneta Reservoir	GNPDO_006	459021	5428552	458988	5428586	0.5	8.5	5/13/2022	11:00	9.2	5/13/2022	13:59	9.2	0
7	Waneta Reservoir	GNPDO_007	458978	5428528	458946	5428564	0.5	8.4	5/13/2022	11:07	9.2	5/13/2022	14:08	9.2	0
8	Waneta Reservoir	GNPDO_008	458873	5428470	458832	5428498	1.3	7.7	5/13/2022	11:26	9.2	5/13/2022	14:17	9.2	0
9	Waneta Reservoir	GNPDO_009	458825	5428415	458799	5428446	0.5	2.7	5/13/2022	11:37	9.2	5/13/2022	14:40	9.2	0
10	Waneta Reservoir	GNPDO_010	458782	5428700	458747	5428665	0.0	7.4	5/13/2022	12:32	9.2	5/13/2022	14:53	9.2	0
11	Waneta Reservoir	GNPDO_011	459024	5428557	458985	5428572	0.0	9.2	5/19/2022	10:05	9.4	5/19/2022	13:15	9.4	0
12	Waneta Reservoir	GNPDO_012	458981	5428524	458952	548563	0.3	7.8	5/19/2022	10:15	9.4	5/19/2022	13:27	9.4	0
13	Waneta Reservoir	GNPDO_013	458940	5428506	458940	5428530	1.0	8.1	5/19/2022	10:30	9.4	5/19/2022	13:48	9.4	0
14	Waneta Reservoir	GNPDO_014	458834	5428425	458812	5428467	0.2	3.5	5/19/2022	10:42	9.4	5/19/2022	13:58	9.4	0
15	Waneta Reservoir	GNPDO_015	458820	5428404	458780	5428431	0.5	2.6	5/19/2022	10:52	9.4	5/19/2022	14:07	9.4	0
16	Waneta Reservoir	GNPDO_016	459018	5428561	458996	5428592	0.3	8.2	5/20/2022	10:45	9.2	5/20/2022	13:41	9.2	0
17	Waneta Reservoir	GNPDO_017	458978	5428531	458952	5428570	0.2	7.6	5/20/2022	10:07	9.2	5/20/2022	13:46	9.2	0
18	Waneta Reservoir	GNPDO_018	458935	5428517	458898	5428549	0.3	8.0	5/20/2022	10:11	9.2	5/20/2022	13:59	9.2	0
19	Waneta Reservoir	GNPDO_019	458868	5428485	458850	5428529	0.0	9.2	5/20/2022	10:23	9.2	5/20/2022	14:05	9.2	0
20	Waneta Reservoir	GNPDO_020	458834	5428434	458801	5428465	0.1	6.2	5/20/2022	10:29	9.2	5/20/2022	14:16	9.2	0
21	Waneta Reservoir	GNPDO_021	458999	5428533	458973	5428568	0.2	7.2	5/25/2022	10:28	10.1	5/25/2022	13:19	10.1	0
22	Waneta Reservoir	GNPDO_022	458935	5428492	458913	5428532	0.3	7.0	5/25/2022	10:32	10.1	5/25/2022	13:29	10.1	0
23	Waneta Reservoir	GNPDO_023	458873	5428467	458842	5428498	0.3	6.2	5/25/2022	10:36	10.1	5/25/2022	13:43	10.1	0
24	Waneta Reservoir	GNPDO_024	458834	5428417	458803	5428449	0.2	2.5	5/25/2022	10:47	10.1	5/25/2022	13:49	10.1	0
25	Waneta Reservoir	GNPDO_025	458781	5428708	458747	5428675	0.4	2.6	5/25/2022	10:53	10.1	5/25/2022	13:57	10.1	0
26	Waneta Reservoir	GNPDO_026	459194	5428577	459181	5428618	0.0	5.6	5/26/2022	9:38	10.5	5/26/2022	13:15	10.5	0
27	Waneta Reservoir	GNPDO_027	459015	5428553	459017	5428554	0.2	10.2	5/26/2022	9:48	10.5	5/26/2022	13:25	10.5	0
28	Waneta Reservoir	GNPDO_028	458939	5428513	458919	5428549	0.0	7.4	5/26/2022	9:53	10.5	5/26/2022	13:43	10.5	0
29	Waneta Reservoir	GNPDO_029	458872	5428481	458855	5428521	0.1	8.9	5/26/2022	9:56	10.5	5/26/2022	14:07	10.5	0
30	Waneta Reservoir	GNPDO_030	458828	5428423	458792	5428453	0.1	2.1	5/26/2022	10:13	10.5	5/26/2022	14:10	10.5	0
31	Waneta Reservoir	GNPDO_031	459610	5428810	459639	5428789	0.2	3.2	5/26/2022	10:20	10.5	5/26/2022	14:29	10.5	0
32	Columbia Mainstem	GNLCR_001	448372	5464829	448388	5464877	0.9	13.4	5/31/2022	9:55	6.3	5/31/2022	12:20	6.4	0
33	Columbia Mainstem	GNLCR_001	448372	5464829	448388	5464877	0.9	13.4	5/31/2022	12:20	6.4	5/31/2022	14:37	6.7	0
34	Columbia Mainstem	GNLCR_002	448491	5464792	448488	5464844	0.9	11.0	5/31/2022	10:06	6.3	5/31/2022	12:30	6.4	1
35	Columbia Mainstem	GNLCR_002	448491	5464792	448488	5464844	0.9	11.0	5/31/2022	12:30	6.4	5/31/2022	14:52	6.7	0
36	Columbia Mainstem	GNLCR_003	448741	5464725	448755	5464778	1.0	13.0	5/31/2022	10:18	6.3	5/31/2022	12:48	6.4	0
37	Columbia Mainstem	GNLCR_003	448741	5464725	448755	5464778	1.0	13.0	5/31/2022	12:48	6.4	5/31/2022	15:17	6.7	0
38	Columbia Mainstem	GNLCR_004	449839	5464357	449828	5464397	1.3	11.3	5/31/2022	10:24	6.3	5/31/2022	12:53	6.4	0

Set	Location	Site ID	Location (UTM Zone 11U)				Depth (m)		Set			Pull			# NP
			Start		End		Min	Max	Date	Time	Temp (°C)	Date	Time	Temp (°C)	
			Easting	Northing	Easting	Northing									
39	Columbia Mainstem	GNLCR_004	449839	5464357	449828	5464397	1.3	11.3	5/31/2022	12:53	6.4	5/31/2022	15:30	6.6	0
40	Columbia Mainstem	GNLCR_005	450217	5464252	450255	5464285	0.9	10.2	5/31/2022	10:36	6.3	5/31/2022	13:13	6.4	0
41	Columbia Mainstem	GNLCR_005	450217	5464252	450255	5464285	0.9	10.2	5/31/2022	13:13	6.4	5/31/2022	15:35	6.6	0
42	Columbia Mainstem	GNLCR_006	450419	5464222	450380	5442502	1.4	8.5	5/31/2022	10:43	6.3	5/31/2022	13:27	6.4	0
43	Columbia Mainstem	GNLCR_006	450419	5464222	450380	5442502	1.4	8.5	5/31/2022	13:27	6.4	5/31/2022	15:40	6.6	0
44	Columbia Mainstem	GNLCR_007	450603	5464228	450589	5464263	1.7	5.7	5/31/2022	10:49	6.3	5/31/2022	13:37	6.4	0
45	Columbia Mainstem	GNLCR_007	450603	5464228	450589	5464263	1.7	5.7	5/31/2022	13:37	6.4	5/31/2022	15:45	6.6	0
46	Columbia Mainstem	GNLCR_008	446219	5465800	446232	5464754	1.8	2.7	5/31/2022	11:08	6.3	5/31/2022	13:48	6.5	0
47	Columbia Mainstem	GNLCR_008	446219	5465800	446232	5464754	1.8	2.7	5/31/2022	13:48	6.5	5/31/2022	15:58	6.6	0
48	Columbia Mainstem	GNLCR_009	448380	5464829	448450	5464833	1.0	6.5	6/1/2022	10:02	7.6	6/1/2022	12:02	7.8	0
49	Columbia Mainstem	GNLCR_009	448380	5464829	448419	5464864	1.0	14.2	6/1/2022	12:02	7.8	6/1/2022	15:48	7.9	0
50	Columbia Mainstem	GNLCR_010	448529	5464782	448591	5464820	0.5	1.5	6/1/2022	10:06	7.6	6/1/2022	12:20	7.8	0
51	Columbia Mainstem	GNLCR_010	448546	5464801	448558	5464843	0.5	13.3	6/1/2022	12:20	7.8	6/1/2022	15:57	8.2	0
52	Columbia Mainstem	GNLCR_011	448765	5464710	448766	5464758	0.6	11.2	6/1/2022	10:14	7.6	6/1/2022	12:34	7.8	0
53	Columbia Mainstem	GNLCR_011	448765	5464710	448766	5464758	0.6	11.2	6/1/2022	12:34	7.8	6/1/2022	16:04	8.2	0
54	Columbia Mainstem	GNLCR_012	449573	5464461	449605	5464488	0.4	10.4	6/1/2022	10:26	8.0	6/1/2022	12:47	7.9	0
55	Columbia Mainstem	GNLCR_012	449573	5464461	449605	5464488	0.4	10.4	6/1/2022	12:47	7.9	6/1/2022	16:12	8.4	0
56	Columbia Mainstem	GNLCR_013	449789	5464349	449794	5464382	1.0	2.5	6/1/2022	10:38	7.9	6/1/2022	12:56	7.9	0
57	Columbia Mainstem	GNLCR_013	449799	5464352	449826	5464387	1.7	7.6	6/1/2022	12:56	7.9	6/1/2022	16:20	8.3	1
58	Columbia Mainstem	GNLCR_014	449970	5464323	449968	5464372	0.8	12.2	6/1/2022	10:40	7.5	6/1/2022	13:05	7.9	1
59	Columbia Mainstem	GNLCR_015	450312	5464230	450305	5464265	1.2	9.2	6/1/2022	10:51	7.5	6/1/2022	15:30	7.9	0
60	Columbia Mainstem	GNLCR_016	446290	5465762	446333	5465733	1.8	2.5	6/1/2022	11:06	7.9	6/1/2022	16:53	8.3	0
61	Columbia Mainstem	GNLCR_017	448379	5464831	448410	5464870	0.6	14.6	6/2/2022	10:22	9.2	6/2/2022	12:35	9.0	0
62	Columbia Mainstem	GNLCR_017	448379	5464831	448410	5464870	0.6	14.6	6/2/2022	12:35	9.3	6/2/2022	14:56	9.3	0
63	Columbia Mainstem	GNLCR_018	448488	5464793	448506	5464840	1.2	11.1	6/2/2022	10:32	9.0	6/2/2022	13:06	9.1	2
64	Columbia Mainstem	GNLCR_018	448488	5464793	448506	5464840	1.2	11.1	6/2/2022	13:06	9.3	6/2/2022	14:59	9.3	0
65	Columbia Mainstem	GNLCR_019	448751	5464718	448761	5464767	1.0	11.1	6/2/2022	10:38	9.0	6/2/2022	13:25	9.1	0
66	Columbia Mainstem	GNLCR_019	448751	5464718	448761	5464767	1.0	11.1	6/2/2022	13:25	9.1	6/2/2022	15:05	9.7	0
67	Columbia Mainstem	GNLCR_020	449586	5464453	449589	5464499	1.5	11.5	6/2/2022	10:53	9.0	6/2/2022	13:33	9.2	0
68	Columbia Mainstem	GNLCR_020	449586	5464453	449589	5464499	1.5	11.5	6/2/2022	13:33	9.2	6/2/2022	15:16	9.3	0
69	Columbia Mainstem	GNLCR_021	449837	5464362	449873	5464412	2.0	13.5	6/2/2022	10:56	9.2	6/2/2022	13:46	9.0	1
70	Columbia Mainstem	GNLCR_021	449837	5464362	449873	5464412	2.0	13.5	6/2/2022	13:46	9.0	6/2/2022	15:24	9.2	0
71	Columbia Mainstem	GNLCR_022	450068	5464340	450095	5464384	1.3	15.0	6/2/2022	11:04	9.0	6/2/2022	14:03	9.1	0
72	Columbia Mainstem	GNLCR_022	450068	5464340	450095	5464384	1.3	15.0	6/2/2022	14:03	9.1	6/2/2022	15:33	9.2	0
73	Columbia Mainstem	GNLCR_023	450391	5464226	450402	5464262	2.0	8.0	6/2/2022	11:12	9.0	6/2/2022	14:16	9.1	0
74	Columbia Mainstem	GNLCR_023	450391	5464226	450402	5464262	2.0	8.0	6/2/2022	14:16	9.1	6/2/2022	15:43	9.3	0
75	Columbia Mainstem	GNLCR_024	450132	5464594	450169	5464559	2.0	8.0	6/2/2022	11:16	9.0	6/2/2022	14:30	9.0	3
76	Columbia Mainstem	GNLCR_024	450132	5464594	450169	5464559	2.0	8.0	6/2/2022	14:30	9.0	6/2/2022	15:53	9.1	0
77	Columbia Mainstem	GNLCR_025	448330	5464838	448346	5464881	1.0	10.0	6/3/2022	9:46	9.5	6/3/2022	12:31	9.8	0
78	Columbia Mainstem	GNLCR_026	448731	5464725	448755	5464775	1.0	12.5	6/3/2022	9:51	9.4	6/3/2022	13:01	9.4	0
79	Columbia Mainstem	GNLCR_026	448731	5464725	448755	5464775	1.0	12.5	6/3/2022	13:01	9.4	6/3/2022	15:58	9.5	0
80	Columbia Mainstem	GNLCR_027	449620	5464431	449638	5464468	1.0	7.5	6/3/2022	9:57	9.3	6/3/2022	13:22	9.7	0
81	Columbia Mainstem	GNLCR_027	449620	5464431	449638	5464468	1.0	7.5	6/3/2022	13:22	9.7	6/3/2022	16:11	9.6	0
82	Columbia Mainstem	GNLCR_028	449804	5464338	449810	5464385	1.0	6.0	6/3/2022	10:03	9.3	6/3/2022	13:41	9.5	0

Set	Location	Site ID	Location (UTM Zone 11U)				Depth (m)		Set			Pull			# NP
			Start		End		Min	Max	Date	Time	Temp (°C)	Date	Time	Temp (°C)	
			Easting	Northing	Easting	Northing									
83	Columbia Mainstem	GNLCR_028	449804	5464338	449810	5464385	1.0	6.0	6/3/2022	13:41	9.5	6/3/2022	16:17	9.8	0
84	Columbia Mainstem	GNLCR_029	450253	5464240	450264	5464283	1.0	11.0	6/3/2022	10:09	9.3	6/3/2022	13:56	9.4	0
85	Columbia Mainstem	GNLCR_029	450253	5464240	450264	5464283	1.0	11.0	6/3/2022	13:56	9.4	6/3/2022	16:23	9.5	0
86	Columbia Mainstem	GNLCR_030	450156	5464589	450153	5464543	1.5	11.0	6/3/2022	10:14	9.3	6/3/2022	14:05	9.4	1
87	Columbia Mainstem	GNLCR_030	450156	5464589	450153	5464543	1.5	11.0	6/3/2022	14:05	9.4	6/3/2022	16:30	9.7	0
88	Columbia Mainstem	GNLCR_031	452296	5462862	452342	5462864	1.8	3.4	6/3/2022	10:28	9.4	6/3/2022	14:20	10.0	0
89	Columbia Mainstem	GNLCR_032	453302	5456749	453280	5456797	1.2	5.3	6/3/2022	10:45	8.8	6/3/2022	14:49	9.3	0
90	Columbia Mainstem	GNLCR_033	448515	5464785	448534	5464830	0.8	11.8	6/3/2022	12:40	9.4	6/3/2022	15:38	9.5	0
91	Columbia Mainstem	GNLCR_034	448393	5464822	448416	5464861	1.2	15.3	6/6/2022	10:13	10.0	6/6/2022	12:38	10.1	0
92	Columbia Mainstem	GNLCR_034	448393	5464822	448416	5464861	1.2	15.3	6/6/2022	12:38	10.1	6/6/2022	15:16	9.8	0
93	Columbia Mainstem	GNLCR_035	448785	5464703	448785	5464742	0.9	7.0	6/6/2022	10:18	10.0	6/6/2022	12:40	9.9	0
94	Columbia Mainstem	GNLCR_035	448785	5464703	448785	5464742	0.9	7.0	6/6/2022	12:40	9.9	6/6/2022	15:22	10.0	0
95	Columbia Mainstem	GNLCR_036	449666	5464418	449658	5464458	1.3	5.7	6/6/2022	10:24	10.0	6/6/2022	12:47	10.2	0
96	Columbia Mainstem	GNLCR_036	449666	5464418	449658	5464458	1.3	5.7	6/6/2022	12:47	10.2	6/6/2022	15:42	10.2	1
97	Columbia Mainstem	GNLCR_037	450046	5464333	450067	5464377	2.0	15.4	6/6/2022	10:28	10.0	6/6/2022	12:54	10.0	0
98	Columbia Mainstem	GNLCR_037	450046	5464333	450067	5464377	2.0	15.4	6/6/2022	12:54	10.0	6/6/2022	15:22	9.9	0
99	Columbia Mainstem	GNLCR_038	450151	5464600	450143	5464553	2.0	10.7	6/6/2022	10:31	10.0	6/6/2022	13:10	9.9	0
100	Columbia Mainstem	GNLCR_038	450151	5464600	450143	5464553	2.0	10.7	6/6/2022	13:10	9.9	6/6/2022	16:00	10.0	0
101	Columbia Mainstem	GNLCR_039	450271	5464606	450264	5464552	1.6	11.6	6/6/2022	10:35	10.1	6/6/2022	13:30	9.9	1
102	Columbia Mainstem	GNLCR_039	450271	5464606	450264	5464552	1.6	11.6	6/6/2022	13:30	9.9	6/6/2022	16:14	9.9	0
103	Columbia Mainstem	GNLCR_040	452436	5464443	452434	5464398	3.0	3.0	6/6/2022	10:49	9.0	6/6/2022	13:52	9.3	0
104	Columbia Mainstem	GNLCR_040	452436	5464443	452434	5464398	3.0	3.0	6/6/2022	13:52	9.3	6/6/2022	16:23	9.3	0
105	Columbia Mainstem	GNLCR_041	453338	5456814	453289	5456828	1.4	4.0	6/6/2022	11:05	10.6	6/6/2022	14:40	11.1	1
106	Columbia Mainstem	GNLCR_042	448365	5464838	448347	5464885	1.4	11.3	6/7/2022	10:15	10.0	6/7/2022	12:28	10.0	0
107	Columbia Mainstem	GNLCR_042	448365	5464838	448347	5464885	1.4	11.3	6/7/2022	12:28	10.0	6/7/2022	14:32	9.9	0
108	Columbia Mainstem	GNLCR_043	448706	5464762	448733	5464794	1.7	16.1	6/7/2022	10:20	9.8	6/7/2022	12:39	9.9	0
109	Columbia Mainstem	GNLCR_043	448706	5464762	448733	5464794	1.7	16.1	6/7/2022	12:39	9.9	6/7/2022	14:38	10.0	0
110	Columbia Mainstem	GNLCR_044	449675	5464417	449680	5464454	1.4	9.3	6/7/2022	10:30	10.1	6/7/2022	13:01	10.1	0
111	Columbia Mainstem	GNLCR_044	449675	5464417	449680	5464454	1.4	9.3	6/7/2022	13:01	10.1	6/7/2022	14:45	10.4	0
112	Columbia Mainstem	GNLCR_045	449953	5464327	449958	5464366	1.7	11.4	6/7/2022	10:36	9.9	6/7/2022	13:07	9.9	0
113	Columbia Mainstem	GNLCR_045	449953	5464327	449958	5464366	1.7	11.4	6/7/2022	13:07	9.9	6/7/2022	14:52	10.0	0
114	Columbia Mainstem	GNLCR_046	450205	5464260	450232	5464298	1.6	12.6	6/7/2022	10:39	10.4	6/7/2022	13:19	10.1	0
115	Columbia Mainstem	GNLCR_046	450205	5464260	450232	5464298	1.6	12.6	6/7/2022	13:19	10.1	6/7/2022	14:57	10.4	0
116	Columbia Mainstem	GNLCR_047	450155	5464597	450154	5464553	2.2	10.5	6/7/2022	10:48	9.9	6/7/2022	13:24	10.1	0
117	Columbia Mainstem	GNLCR_047	450155	5464597	450154	5464553	2.2	10.5	6/7/2022	13:24	10.1	6/7/2022	15:03	10.4	0
118	Columbia Mainstem	GNLCR_048	450307	5464613	450307	5464565	1.5	6.7	6/7/2022	10:51	10.1	6/7/2022	13:37	9.9	2
119	Columbia Mainstem	GNLCR_048	450307	5464613	450307	5464565	1.5	6.7	6/7/2022	13:37	9.9	6/7/2022	15:10	10.4	0
120	Columbia Mainstem	GNLCR_049	452446	5464445	452417	5464407	2.2	4.5	6/7/2022	11:12	9.2	6/7/2022	13:58	9.6	0
121	Columbia Mainstem	GNLCR_050	450517	5464619	450526	5464575	1.3	5.5	6/7/2022	14:06	10.3	6/7/2022	15:16	10.4	0
122	Columbia Mainstem	GNLCR_051	448421	5464807	448423	5464853	1.4	14.7	6/8/2022	9:24	8.8	6/8/2022	11:35	8.8	0
123	Columbia Mainstem	GNLCR_051	448421	5464807	448423	5464853	1.4	14.7	6/8/2022	11:35	8.8	6/8/2022	14:42	8.8	0
124	Columbia Mainstem	GNLCR_052	448729	5464734	448739	5464775	1.5	13.6	6/8/2022	9:33	8.8	6/8/2022	11:47	8.8	0
125	Columbia Mainstem	GNLCR_052	448729	5464734	448739	5464775	1.5	13.6	6/8/2022	11:47	8.8	6/8/2022	14:52	8.8	0
126	Columbia Mainstem	GNLCR_053	449921	5464328	449911	5464369	1.4	10.8	6/8/2022	9:41	8.8	6/8/2022	11:59	8.8	0

Set	Location	Site ID	Location (UTM Zone 11U)				Depth (m)		Set			Pull			# NP
			Start		End		Min	Max	Date	Time	Temp (°C)	Date	Time	Temp (°C)	
			Easting	Northing	Easting	Northing									
127	Columbia Mainstem	GNLCR_053	449921	5464328	449911	5464369	1.4	10.8	6/8/2022	11:59	8.8	6/8/2022	14:59	8.8	0
128	Columbia Mainstem	GNLCR_054	450137	5464294	450168	5464326	1.4	11.3	6/8/2022	9:50	8.9	6/8/2022	12:07	8.8	0
129	Columbia Mainstem	GNLCR_054	450137	5464294	450168	5464326	1.4	11.3	6/8/2022	12:07	8.8	6/8/2022	15:05	8.8	0
130	Columbia Mainstem	GNLCR_055	450151	5464598	450140	5464557	1.8	10.6	6/8/2022	9:55	8.7	6/8/2022	12:15	8.7	0
131	Columbia Mainstem	GNLCR_055	450151	5464598	450140	5464557	1.8	10.6	6/8/2022	12:15	8.7	6/8/2022	15:29	8.7	0
132	Columbia Mainstem	GNLCR_056	450275	5464612	450268	5464565	1.4	6.5	6/8/2022	10:01	8.8	6/8/2022	12:29	8.8	2
133	Columbia Mainstem	GNLCR_056	450275	5464612	450268	5464565	1.4	6.5	6/8/2022	12:29	8.8	6/8/2022	15:36	8.7	0
134	Columbia Mainstem	GNLCR_057	450467	5464592	450478	5464552	2.9	9.3	6/8/2022	10:04	8.8	6/8/2022	12:46	8.7	0
135	Columbia Mainstem	GNLCR_057	450467	5464592	450478	5464552	2.9	9.3	6/8/2022	12:46	8.7	6/8/2022	15:43	8.8	0
136	Columbia Mainstem	GNLCR_058	453352	5456835	453300	5456815	2.5	6.0	6/8/2022	10:24	9.8	6/8/2022	13:11	9.9	0
137	Columbia Mainstem	GNLCR_059	450579	5464604	450596	5464564	2.5	8.3	6/8/2022	13:29	8.9	6/8/2022	15:49	8.8	0
138	Columbia Mainstem	GNLCR_060	448267	5464855	448276	5464898	1.4	8.2	6/9/2022	9:44	8.4	6/9/2022	11:50	8.6	0
139	Columbia Mainstem	GNLCR_060	448267	5464855	448276	5464898	1.4	8.2	6/9/2022	11:50	8.6	6/9/2022	13:55	8.7	0
140	Columbia Mainstem	GNLCR_061	448646	5464810	448706	5464821	2.6	12.4	6/9/2022	9:53	8.4	6/9/2022	11:59	8.5	0
141	Columbia Mainstem	GNLCR_061	448646	5464810	448706	5464821	2.6	12.4	6/9/2022	11:59	8.5	6/9/2022	14:14	8.6	0
142	Columbia Mainstem	GNLCR_062	449709	5464409	449706	5464463	2.1	14.2	6/9/2022	10:00	8.2	6/9/2022	12:05	8.5	0
143	Columbia Mainstem	GNLCR_062	449709	5464409	449706	5464463	2.1	14.2	6/9/2022	12:05	8.5	6/9/2022	14:20	8.5	0
144	Columbia Mainstem	GNLCR_063	450334	5464221	450334	5464261	2.2	9.8	6/9/2022	10:10	8.2	6/9/2022	12:13	8.4	0
145	Columbia Mainstem	GNLCR_063	450334	5464221	450334	5464261	2.2	9.8	6/9/2022	12:13	8.4	6/9/2022	14:30	8.7	0
146	Columbia Mainstem	GNLCR_064	450149	5464596	450169	5464547	2.4	10.7	6/9/2022	10:18	8.2	6/9/2022	12:23	8.5	0
147	Columbia Mainstem	GNLCR_064	450149	5464596	450169	5464547	2.4	10.7	6/9/2022	12:23	8.5	6/9/2022	14:45	8.7	0
148	Columbia Mainstem	GNLCR_065	450279	5464607	450272	5464562	1.4	8.5	6/9/2022	10:24	8.2	6/9/2022	12:31	8.5	1
149	Columbia Mainstem	GNLCR_065	450279	5464607	450272	5464562	1.4	8.5	6/9/2022	12:31	8.5	6/9/2022	15:10	8.7	0
150	Columbia Mainstem	GNLCR_066	450422	5464589	450428	5464551	2.1	9.4	6/9/2022	10:30	8.2	6/9/2022	12:52	8.5	1
151	Columbia Mainstem	GNLCR_066	450422	5464589	450428	5464551	2.1	9.4	6/9/2022	12:52	8.5	6/9/2022	15:17	8.6	0
152	Columbia Mainstem	GNLCR_067	446240	5465760	446223	5465721	3.1	15.2	6/9/2022	10:43	8.6	6/9/2022	13:15	8.6	0
153	Columbia Mainstem	GNLCR_067	446240	5465760	446223	5465721	3.1	15.2	6/9/2022	13:15	8.6	6/9/2022	15:32	8.6	0
154	Columbia Mainstem	GNLCR_068	450411	5464570	450403	5464524	2.7	10.3	6/13/2022	9:49	9.0	6/13/2022	11:54	9.0	0
155	Columbia Mainstem	GNLCR_068	450411	5464570	450403	5464524	2.7	10.3	6/13/2022	11:54	9.0	6/13/2022	14:42	9.0	0
156	Columbia Mainstem	GNLCR_069	450263	5464592	450257	5464545	1.8	12.4	6/13/2022	9:51	9.1	6/13/2022	12:29	9.0	2
157	Columbia Mainstem	GNLCR_069	450263	5464592	450257	5464545	1.8	12.4	6/13/2022	12:29	9.0	6/13/2022	14:52	8.9	0
158	Columbia Mainstem	GNLCR_070	450148	5464601	450131	5464559	0.4	10.0	6/13/2022	9:57	9.1	6/13/2022	12:51	9.1	0
159	Columbia Mainstem	GNLCR_070	450148	5464601	450131	5464559	0.4	10.0	6/13/2022	12:51	9.1	6/13/2022	15:00	9.0	0
160	Columbia Mainstem	GNLCR_071	449962	5464610	449949	5464568	4.0	13.2	6/13/2022	10:00	9.1	6/13/2022	13:00	8.9	0
161	Columbia Mainstem	GNLCR_071	449962	5464610	449949	5464568	4.0	13.2	6/13/2022	13:00	8.9	6/13/2022	15:10	9.0	0
162	Columbia Mainstem	GNLCR_072	450729	5464224	450718	5464269	1.0	5.7	6/13/2022	10:07	9.3	6/13/2022	13:11	9.0	0
163	Columbia Mainstem	GNLCR_072	450729	5464224	450718	5464269	1.0	5.7	6/13/2022	13:11	9.0	6/13/2022	15:17	9.1	0
164	Columbia Mainstem	GNLCR_073	450173	5464278	450173	5464326	1.9	11.5	6/13/2022	10:10	9.2	6/13/2022	13:28	9.1	0
165	Columbia Mainstem	GNLCR_073	450173	5464278	450173	5464326	1.9	11.5	6/13/2022	13:28	9.1	6/13/2022	15:28	9.1	0
166	Columbia Mainstem	GNLCR_074	449771	5464394	449811	5464391	2.8	7.5	6/13/2022	10:18	9.1	6/13/2022	13:50	9.0	1
167	Columbia Mainstem	GNLCR_074	449771	5464394	449811	5464391	2.8	7.5	6/13/2022	13:50	9.0	6/13/2022	16:10	9.0	0
168	Columbia Mainstem	GNLCR_075	448358	5464853	448401	5464866	2.5	13.0	6/13/2022	10:24	9.1	6/13/2022	14:20	9.0	0
169	Columbia Mainstem	GNLCR_075	448358	5464853	448401	5464866	2.5	13.0	6/13/2022	14:20	9.0	6/13/2022	16:30	9.3	0
170	Zuckerberg Pond	GNLCR_076	452221	5462631	452177	5462615	0.0	2.8	6/15/2022	10:12	11.7	6/15/2022	14:37	12.5	0

Set	Location	Site ID	Location (UTM Zone 11U)				Depth (m)		Set			Pull			# NP
			Start		End		Min	Max	Date	Time	Temp (°C)	Date	Time	Temp (°C)	
			Easting	Northing	Easting	Northing									
171	Zuckerberg Pond	GNLCR_077	452189	5462671	452141	5462666	0.0	2.9	6/15/2022	10:20	11.7	6/15/2022	14:58	12.5	0
172	Zuckerberg Pond	GNLCR_078	452185	5462749	452146	5462760	0.0	3.4	6/15/2022	10:33	11.7	6/15/2022	15:33	12.5	2
173	Zuckerberg Pond	GNLCR_079	452201	5462784	452162	5462808	0.0	3.5	6/15/2022	10:43	11.7	6/15/2022	15:56	12.5	0
174	Columbia Mainstem	GNLCR_080	452267	5462875	452302	5462855	0.0	2.3	6/15/2022	10:57	10.8	6/15/2022	13:11	12.5	0
175	Columbia Mainstem	GNLCR_081	452328	5462936	452348	5462899	0.0	2.8	6/15/2022	11:07	10.8	6/15/2022	13:21	12.5	0
176	Columbia Mainstem	GNLCR_082	452320	5462845	452340	5462869	0.0	3.4	6/15/2022	13:34	10.8	6/15/2022	16:29	12.5	0
177	Columbia Mainstem	GNLCR_083	452372	5462851	452389	5462888	0.0	3.2	6/15/2022	13:42	10.8	6/15/2022	16:50	12.5	0
178	Zuckerberg Pond	GNLCR_084	452193	5462590	452231	5462600	0.0	2.5	6/16/2022	10:04	11.2	6/16/2022	13:50	11.2	0
179	Zuckerberg Pond	GNLCR_085	452216	5462648	452185	5462624	0.0	3.1	6/16/2022	10:09	11.2	6/16/2022	14:05	11.3	0
180	Zuckerberg Pond	GNLCR_086	452196	5462685	452154	5462670	0.0	2.6	6/16/2022	10:15	11.2	6/16/2022	14:35	11.3	0
181	Zuckerberg Pond	GNLCR_087	452134	5462692	452173	5462713	0.0	2.9	6/16/2022	10:22	11.2	6/16/2022	15:10	11.2	0
182	Zuckerberg Pond	GNLCR_088	452190	5462755	452143	5462749	0.0	3.1	6/16/2022	10:29	11.2	6/16/2022	15:15	11.3	0
183	Zuckerberg Pond	GNLCR_089	452200	5462775	452162	5462802	0.0	3.6	6/16/2022	10:40	11.2	6/16/2022	15:20	11.3	0
184	Columbia Mainstem	GNLCR_090	450577	5464597	450592	5464554	2.9	8.7	6/17/2022	9:40	11.0	6/17/2022	11:52	10.3	0
185	Columbia Mainstem	GNLCR_090	450577	5464597	450592	5464554	2.9	8.7	6/17/2022	11:52	10.3	6/17/2022	14:25	10.9	0
186	Columbia Mainstem	GNLCR_091	450270	5464598	450276	5464552	1.8	10.9	6/17/2022	9:47	11.0	6/17/2022	12:10	11.0	0
187	Columbia Mainstem	GNLCR_091	450270	5464598	450276	5464552	1.8	10.9	6/17/2022	12:10	11.0	6/17/2022	14:36	11.1	0
188	Columbia Mainstem	GNLCR_092	450153	5464597	450162	5464556	2.9	10.6	6/17/2022	9:55	11.0	6/17/2022	12:23	11.0	0
189	Columbia Mainstem	GNLCR_092	450153	5464597	450162	5464556	2.9	10.6	6/17/2022	12:23	11.0	6/17/2022	14:41	11.1	0
190	Columbia Mainstem	GNLCR_093	450022	5464600	450042	5464553	2.9	11.7	6/17/2022	10:02	11.0	6/17/2022	12:42	11.1	0
191	Columbia Mainstem	GNLCR_093	450022	5464600	450042	5464553	2.9	11.7	6/17/2022	12:42	11.1	6/17/2022	14:45	11.0	0
192	Columbia Mainstem	GNLCR_094	450627	5464234	450641	5464268	2.7	5.6	6/17/2022	10:10	11.0	6/17/2022	12:58	11.1	0
193	Columbia Mainstem	GNLCR_095	449837	5464357	449870	5464397	2.4	12.2	6/17/2022	10:22	11.0	6/17/2022	13:10	11.1	0
194	Columbia Mainstem	GNLCR_096	450767	5464600	450825	5464591	6.2	9.4	6/17/2022	10:37	11.0	6/17/2022	13:25	11.0	0
195	Columbia Mainstem	GNLCR_096	450767	5464600	450825	5464591	6.2	9.4	6/17/2022	13:25	11.0	6/17/2022	14:52	11.1	0
196	Columbia Mainstem	GNLCR_097	450461	5464570	450519	5464562	2.6	6.1	6/17/2022	10:47	11.0	6/17/2022	13:40	11.0	0
197	Columbia Mainstem	GNLCR_097	450461	5464570	450519	5464562	2.6	6.1	6/17/2022	13:40	11.0	6/17/2022	14:57	11.0	0
198	Columbia Mainstem	GNLCR_098	450586	5464586	450631	5464574	3.0	8.1	6/20/2022	9:40	12.8	6/20/2022	11:59	12.9	0
199	Columbia Mainstem	GNLCR_098	450586	5464586	450631	5464574	3.0	8.1	6/20/2022	11:59	12.9	6/20/2022	14:49	12.8	0
200	Columbia Mainstem	GNLCR_099	450288	5464593	450284	5464546	1.8	11.2	6/20/2022	9:46	12.7	6/20/2022	12:22	12.9	0
201	Columbia Mainstem	GNLCR_099	450288	5464593	450284	5464546	1.8	11.2	6/20/2022	12:22	12.9	6/20/2022	14:58	13.0	0
202	Columbia Mainstem	GNLCR_100	450201	5464563	450238	5464539	1.7	11.4	6/20/2022	9:49	12.7	6/20/2022	12:37	12.9	0
203	Columbia Mainstem	GNLCR_100	450201	5464563	450238	5464539	1.7	11.4	6/20/2022	12:37	12.9	6/20/2022	13:19	13.1	0
204	Columbia Mainstem	GNLCR_101	450093	5464605	450087	5464564	2.3	10.4	6/20/2022	9:55	12.9	6/20/2022	12:52	13.0	0
205	Columbia Mainstem	GNLCR_101	450093	5464605	450087	5464564	2.3	10.4	6/20/2022	12:52	13.0	6/20/2022	15:26	13.0	0
206	Columbia Mainstem	GNLCR_102	450787	5464252	450784	5464298	2.1	5.3	6/20/2022	10:03	13.0	6/20/2022	13:09	13.1	0
207	Columbia Mainstem	GNLCR_102	450787	5464252	450784	5464298	2.1	5.3	6/20/2022	13:09	13.1	6/20/2022	15:47	13.4	0
208	Columbia Mainstem	GNLCR_103	450073	5464337	450081	5464375	1.4	14.2	6/20/2022	10:10	12.5	6/20/2022	13:26	13.1	0
209	Columbia Mainstem	GNLCR_103	450073	5464337	450081	5464375	1.4	14.2	6/20/2022	13:26	13.1	6/20/2022	16:07	13.3	0
210	Columbia Mainstem	GNLCR_104	448912	5464657	448946	5464678	1.7	11.3	6/20/2022	10:15	13.1	6/20/2022	13:59	13.0	1
211	Columbia Mainstem	GNLCR_104	448912	5464657	448946	5464678	1.7	11.3	6/20/2022	13:59	13.0	6/20/2022	16:42	13.1	0
212	Columbia Mainstem	GNLCR_105	448447	5464784	448465	5464826	1.1	7.0	6/20/2022	10:24	13.1	6/20/2022	14:32	13.1	1
213	Columbia Mainstem	GNLCR_105	448447	5464784	448465	5464826	1.1	7.0	6/20/2022	14:32	13.1	6/20/2022	17:02	13.2	1
214	Columbia Mainstem	GNLCR_106	449016	5464626	449058	5464643	1.4	11.1	6/20/2022	15:05	13.1	6/20/2022	17:21	13.1	0



Set	Location	Site ID	Location (UTM Zone 11U)				Depth (m)		Set			Pull			# NP
			Start		End		Min	Max	Date	Time	Temp (°C)	Date	Time	Temp (°C)	
			Easting	Northing	Easting	Northing									
215	Zuckerberg Pond	GNLCR_107	452223	5462616	452178	5462622	0.0	2.6	6/23/2022	9:36	15.8	6/23/2022	14:18	15.8	0
216	Zuckerberg Pond	GNLCR_108	452166	5462618	452186	5462663	0.0	3.5	6/23/2022	9:44	15.8	6/23/2022	14:48	15.8	0
217	Zuckerberg Pond	GNLCR_109	452194	5462709	452137	5462708	0.0	2.5	6/23/2022	9:49	15.8	6/23/2022	15:40	15.8	0
218	Zuckerberg Pond	GNLCR_110	452186	5462739	452142	5462756	0.0	2.8	6/23/2022	10:05	15.8	6/23/2022	15:56	15.8	0
219	Zuckerberg Pond	GNLCR_111	452198	5462779	452158	5462803	0.0	2.8	6/23/2022	10:15	15.8	6/23/2022	16:13	15.8	0
220	Zuckerberg Pond	GNLCR_112	452121	5462715	452133	5462764	0.0	2.6	6/23/2022	10:25	15.8	6/23/2022	15:25	15.8	0
221	Columbia Mainstem	GNLCR_113	450307	5464612	450303	5464569	2.3	5.8	6/28/2022	9:52	13.4	6/28/2022	12:10	13.9	0
222	Columbia Mainstem	GNLCR_114	450151	5464603	450167	5464566	3.0	6.8	6/28/2022	9:56	13.5	6/28/2022	12:22	13.7	0
223	Columbia Mainstem	GNLCR_115	450715	5464228	450710	5464266	3.2	5.6	6/28/2022	10:04	13.5	6/28/2022	12:33	13.8	0
224	Columbia Mainstem	GNLCR_116	450193	5464262	450229	5464283	2.0	7.5	6/28/2022	10:10	13.5	6/28/2022	12:50	13.9	0
225	Columbia Mainstem	GNLCR_117	450049	5464324	450065	5464360	2.2	8.8	6/28/2022	10:15	13.6	6/28/2022	13:00	13.8	0
226	Columbia Mainstem	GNLCR_118	449618	5464420	449632	5464461	1.5	4.2	6/28/2022	10:22	13.5	6/28/2022	13:10	13.9	0
227	Columbia Mainstem	GNLCR_119	448942	5464631	448925	5464671	2.1	5.3	6/28/2022	10:27	13.7	6/28/2022	13:20	13.9	0
228	Columbia Mainstem	GNLCR_120	448508	5464782	448503	5464830	1.8	8.0	6/28/2022	10:33	13.5	6/28/2022	13:40	13.9	0
229	Columbia Mainstem	GNLCR_121	448458	5464776	448452	5464820	2.6	5.6	6/28/2022	10:39	13.7	6/28/2022	13:50	14.0	1
230	Columbia Mainstem	GNLCR_122	448452	5464769	448477	5464806	1.4	3.4	6/29/2022	9:22	14.3	6/29/2022	12:04	14.5	0
231	Columbia Mainstem	GNLCR_122	448452	5464769	448477	5464806	1.4	3.4	6/29/2022	12:04	14.5	6/29/2022	15:20	14.8	0
232	Columbia Mainstem	GNLCR_123	448561	5464784	448588	5464825	2.0	4.4	6/29/2022	9:29	14.3	6/29/2022	12:13	14.4	0
233	Columbia Mainstem	GNLCR_123	448561	5464784	448588	5464825	2.0	4.4	6/29/2022	12:13	14.4	6/29/2022	15:30	14.7	0
234	Columbia Mainstem	GNLCR_124	448921	5464635	448963	5464654	1.7	7.8	6/29/2022	9:34	13.4	6/29/2022	12:30	14.4	1
235	Columbia Mainstem	GNLCR_124	448921	5464635	448963	5464654	1.7	7.8	6/29/2022	12:30	14.4	6/29/2022	15:39	14.8	0
236	Columbia Mainstem	GNLCR_125	449499	5464507	449494	5464538	2.1	3.2	6/29/2022	9:41	14.3	6/29/2022	12:45	14.6	1
237	Columbia Mainstem	GNLCR_125	449499	5464507	449494	5464538	2.1	3.2	6/29/2022	12:45	14.6	6/29/2022	15:49	14.8	0
238	Columbia Mainstem	GNLCR_126	449752	5464344	449775	5464386	1.8	3.1	6/29/2022	9:49	14.3	6/29/2022	13:01	14.4	0
239	Columbia Mainstem	GNLCR_126	449752	5464344	449775	5464386	1.8	3.1	6/29/2022	13:01	14.4	6/29/2022	15:55	14.8	0
240	Columbia Mainstem	GNLCR_127	450152	5464605	450150	5464556	1.7	11.0	6/29/2022	9:53	14.3	6/29/2022	13:10	14.5	0
241	Columbia Mainstem	GNLCR_127	450152	5464605	450150	5464556	1.7	11.0	6/29/2022	13:10	14.5	6/29/2022	16:04	14.8	0
242	Columbia Mainstem	GNLCR_128	450261	5464607	450277	5464561	2.6	6.7	6/29/2022	9:58	14.4	6/29/2022	13:22	14.5	0
243	Columbia Mainstem	GNLCR_128	450261	5464607	450277	5464561	2.6	6.7	6/29/2022	13:22	14.5	6/29/2022	16:12	14.8	0
244	Columbia Mainstem	GNLCR_129	453360	5456842	453322	5456823	2.8	5.2	6/29/2022	10:12	13.4	6/29/2022	13:50	13.2	0
245	Columbia Mainstem	GNLCR_130	453328	5456806	453286	5456821	3.0	3.4	6/29/2022	10:30	13.2	6/29/2022	14:05	13.5	0
246	Columbia Mainstem	GNLCR_131	448453	5464772	448464	5464818	2.0	5.4	7/5/2022	9:55	14.9	7/5/2022	12:04	14.3	0
247	Columbia Mainstem	GNLCR_131	448453	5464772	448464	5464818	2.0	5.4	7/5/2022	12:04	14.3	7/5/2022	14:10	14.4	0
248	Columbia Mainstem	GNLCR_132	448516	5464789	448502	5464837	2.5	10.1	7/5/2022	10:00	14.4	7/5/2022	12:18	14.1	0
249	Columbia Mainstem	GNLCR_132	448516	5464789	448502	5464837	2.5	10.1	7/5/2022	12:18	14.1	7/5/2022	14:17	14.2	0
250	Columbia Mainstem	GNLCR_133	448933	5464629	448937	5464677	2.2	11.4	7/5/2022	10:06	14.5	7/5/2022	12:34	14.3	0
251	Columbia Mainstem	GNLCR_133	448933	5464629	448937	5464677	2.2	11.4	7/5/2022	12:34	14.3	7/5/2022	14:28	14.2	0
252	Columbia Mainstem	GNLCR_134	449667	5464406	449658	5464448	2.0	4.0	7/5/2022	10:12	14.6	7/5/2022	12:47	14.4	0
253	Columbia Mainstem	GNLCR_134	449667	5464406	449658	5464448	2.0	4.0	7/5/2022	12:47	14.4	7/5/2022	14:43	14.6	0
254	Columbia Mainstem	GNLCR_135	450051	5464323	450056	5464364	2.2	8.7	7/5/2022	10:17	14.5	7/5/2022	12:54	14.5	0
255	Columbia Mainstem	GNLCR_135	450051	5464323	450056	5464364	2.2	8.7	7/5/2022	12:54	14.5	7/5/2022	14:52	14.2	0
256	Columbia Mainstem	GNLCR_136	450247	5464234	450235	5464281	2.2	11.1	7/5/2022	10:22	14.5	7/5/2022	13:02	14.4	0
257	Columbia Mainstem	GNLCR_136	450247	5464234	450235	5464281	2.2	11.1	7/5/2022	13:02	14.4	7/5/2022	15:06	14.3	0
258	Columbia Mainstem	GNLCR_137	450154	5464602	450153	5464559	3.3	9.0	7/5/2022	10:28	14.5	7/5/2022	13:19	14.1	0

Set	Location	Site ID	Location (UTM Zone 11U)				Depth (m)		Set			Pull			# NP
			Start		End		Min	Max	Date	Time	Temp (°C)	Date	Time	Temp (°C)	
			Easting	Northing	Easting	Northing									
259	Columbia Mainstem	GNLCR_137	450154	5464602	450153	5464559	3.3	9.0	7/5/2022	13:19	14.1	7/5/2022	15:16	14.0	0
260	Columbia Mainstem	GNLCR_138	450249	5464566	450300	5464569	5.5	6.5	7/5/2022	10:33	14.5	7/5/2022	13:33	14.1	0
261	Columbia Mainstem	GNLCR_138	450249	5464566	450300	5464569	5.5	6.5	7/5/2022	13:33	14.1	7/5/2022	15:22	13.9	0
262	Columbia Mainstem	GNLCR_139	448440	5464762	448454	5464807	2.0	3.5	7/12/2022	9:48	14.2	7/12/2022	12:15	14.2	2
263	Columbia Mainstem	GNLCR_139	448440	5464762	448454	5464807	2.0	3.5	7/12/2022	12:15	14.2	7/12/2022	14:19	14.4	0
264	Columbia Mainstem	GNLCR_140	448483	5464785	448512	5464823	2.2	4.6	7/12/2022	9:55	14.2	7/12/2022	12:33	14.1	0
265	Columbia Mainstem	GNLCR_140	448483	5464785	448512	5464823	2.2	4.6	7/12/2022	12:33	14.1	7/12/2022	14:33	14.0	0
266	Columbia Mainstem	GNLCR_141	448910	5464642	448949	5464666	1.4	7.2	7/12/2022	10:01	14.4	7/12/2022	12:41	14.0	0
267	Columbia Mainstem	GNLCR_141	448910	5464642	448949	5464666	1.4	7.2	7/12/2022	12:41	14.0	7/12/2022	14:45	14.2	0
268	Columbia Mainstem	GNLCR_142	449958	5464316	449957	5464363	1.2	11.2	7/12/2022	10:15	14.1	7/12/2022	12:55	14.1	0
269	Columbia Mainstem	GNLCR_142	449958	5464316	449957	5464363	1.2	11.2	7/12/2022	12:55	14.1	7/12/2022	14:58	14.0	0
270	Columbia Mainstem	GNLCR_143	450343	5464203	450317	5464200	0.8	7.4	7/12/2022	10:22	14.2	7/12/2022	13:06	14.1	0
271	Columbia Mainstem	GNLCR_143	450343	5464203	450317	5464200	0.8	7.4	7/12/2022	13:06	14.1	7/12/2022	15:05	14.1	0
272	Columbia Mainstem	GNLCR_144	450217	5464572	450283	5464561	3.3	7.2	7/12/2022	10:25	14.2	7/12/2022	13:18	13.9	0
273	Columbia Mainstem	GNLCR_144	450217	5464572	450283	5464561	3.3	7.2	7/12/2022	13:18	13.9	7/12/2022	15:13	13.9	0
274	Columbia Mainstem	GNLCR_145	450919	5464671	450946	5464653	1.0	7.3	7/12/2022	10:35	14.1	7/12/2022	13:32	14.0	0
275	Columbia Mainstem	GNLCR_145	450919	5464671	450946	5464653	1.0	7.3	7/12/2022	13:32	14.0	7/12/2022	15:25	14.1	0
276	Columbia Mainstem	GNLCR_146	452380	5462971	452395	5462926	2.1	4.4	7/12/2022	11:07	14.5	7/12/2022	13:45	14.8	0
277	Lower Kootenay	GNLKR_01	452896	5462476	452881	5462516	2.3	4.5	7/12/2022	11:18	14.7	7/12/2022	13:57	15.9	0
278	Columbia Mainstem	GNLCR_147	448441	5464764	448465	5464803	1.8	3.6	7/13/2022	9:56	13.9	7/13/2022	12:12	13.7	0
279	Columbia Mainstem	GNLCR_147	448441	5464764	448465	5464803	1.8	3.6	7/13/2022	12:12	13.7	7/13/2022	14:44	14.4	0
280	Columbia Mainstem	GNLCR_148	448721	5464719	448749	5464756	1.6	9.1	7/13/2022	9:59	13.8	7/13/2022	12:25	13.5	1
281	Columbia Mainstem	GNLCR_148	448721	5464719	448749	5464756	1.6	9.1	7/13/2022	12:25	13.5	7/13/2022	14:53	13.5	0
282	Columbia Mainstem	GNLCR_149	448966	5464625	448960	5464670	0.7	10.8	7/13/2022	10:06	13.6	7/13/2022	12:37	13.7	0
283	Columbia Mainstem	GNLCR_149	448966	5464625	448960	5464670	0.7	10.8	7/13/2022	12:37	13.7	7/13/2022	15:00	13.9	0
284	Columbia Mainstem	GNLCR_150	449478	5464505	449510	5464532	1.7	7.2	7/13/2022	10:10	13.7	7/13/2022	12:47	13.7	1
285	Columbia Mainstem	GNLCR_150	449478	5464505	449510	5464532	1.7	7.2	7/13/2022	12:47	13.7	7/13/2022	15:09	13.9	0
286	Columbia Mainstem	GNLCR_151	450232	5464230	450224	5464274	2.0	4.5	7/13/2022	10:18	13.8	7/13/2022	12:59	13.9	0
287	Columbia Mainstem	GNLCR_151	450232	5464230	450224	5464274	2.0	4.5	7/13/2022	12:59	13.9	7/13/2022	15:16	13.9	0
288	Columbia Mainstem	GNLCR_152	450228	5464573	450274	5464561	4.1	6.2	7/13/2022	10:23	13.4	7/13/2022	13:06	13.5	0
289	Columbia Mainstem	GNLCR_153	450989	5464708	451027	5464678	1.8	3.5	7/13/2022	10:30	13.5	7/13/2022	13:16	13.5	0
290	Columbia Mainstem	GNLCR_154	452415	5462912	452391	5462862	2.5	4.2	7/13/2022	10:40	13.8	7/13/2022	13:50	13.8	0
291	Lower Kootenay	GNLKR_02	452858	5462370	452833	5462405	2.0	3.3	7/13/2022	10:51	14.7	7/13/2022	14:19	15.5	0
292	Columbia Mainstem	GNLCR_155	450443	5464623	450480	5464591	1.7	4.9	7/13/2022	13:29	13.9	7/13/2022	15:20	13.9	0
293	Zuckerberg Pond	GNLCR_156	452179	5462615	452171	5462820	0.2	4.0	7/28/2022	9:33	18.9	7/28/2022	12:35	18.9	0
294	Zuckerberg Pond	GNLCR_157	452131	5462708	452132	5462756	0.3	2.5	7/28/2022	9:41	18.9	7/28/2022	13:05	18.9	0
295	Zuckerberg Pond	GNLCR_158	452145	5462788	452156	5462815	0.1	0.8	9/4/2022	13:30	19.9	9/4/2022	14:42	19.7	6
296	Zuckerberg Pond	GNLCR_159	452134	5462795	452122	5462760	0.1	0.7	9/4/2022	13:49	19.9	9/4/2022	14:45	19.7	20
297	Zuckerberg Pond	GNLCR_160	452138	5462797	452120	5462747	0.0	0.9	9/6/2022	9:49	17.8	9/6/2022	14:00	17.8	41
298	Zuckerberg Pond	GNLCR_161	452199	5462806	452184	5462762	0.0	2.4	9/6/2022	9:56	17.8	9/6/2022	15:25	17.8	24
299	Zuckerberg Pond	GNLCR_162	452137	5462700	452159	5462654	0.0	1.8	9/6/2022	10:03	17.8	9/6/2022	12:12	17.8	0
300	Zuckerberg Pond	GNLCR_163	452219	5462544	452211	5462591	0.0	1.5	9/6/2022	10:18	17.8	9/6/2022	12:30	17.8	4
301	Zuckerberg Pond	GNLCR_163	452219	5462544	452211	5462591	0.0	1.5	9/6/2022	12:30	17.8	9/6/2022	16:07	17.8	4
302	Zuckerberg Pond	GNLCR_164	452208	5462803	452184	5462765	0.0	2.2	9/7/2022	9:57	17.1	9/7/2022	13:10	17.1	14

Set	Location	Site ID	Location (UTM Zone 11U)				Depth (m)		Set			Pull			# NP
			Start		End		Min	Max	Date	Time	Temp (°C)	Date	Time	Temp (°C)	
			Easting	Northing	Easting	Northing									
303	Zuckerberg Pond	GNLCR_165	452122	5462763	452131	5462718	0.0	1.8	9/7/2022	10:03	17.1	9/7/2022	12:36	17.1	3
304	Zuckerberg Pond	GNLCR_166	452134	5462788	452180	5462793	0.0	2.4	9/7/2022	10:13	17.1	9/7/2022	12:14	17.1	2
305	Zuckerberg Pond	GNLCR_167	452188	5462739	452173	5462699	0.0	0.6	9/7/2022	10:23	17.1	9/7/2022	11:27	17.1	0
306	Zuckerberg Pond	GNLCR_168	452173	5462699	452195	5462662	0.3	0.6	9/7/2022	11:30	17.1	9/7/2022	14:21	17.1	0
307	Zuckerberg Pond	GNLCR_169	452158	5462806	452142	5462769	0.0	2.2	9/7/2022	12:11	17.1	9/7/2022	14:50	17.1	5
308	Zuckerberg Pond	GNLCR_170	452221	5462624	452182	5462653	0.0	1.6	9/7/2022	12:59	17.1	9/7/2022	15:15	17.1	4
309	Zuckerberg Pond	GNLCR_171	452214	5462542	452208	5462587	0.0	1.9	9/8/2022	9:31	16.7	9/8/2022	11:58	16.7	1
310	Zuckerberg Pond	GNLCR_172	452178	5462621	452176	5462668	0.0	2.4	9/8/2022	9:38	16.7	9/8/2022	12:30	16.7	1
311	Zuckerberg Pond	GNLCR_173	452214	5462807	452172	5462783	0.0	2.9	9/8/2022	9:47	16.7	9/8/2022	12:42	16.7	3
312	Zuckerberg Pond	GNLCR_174	452139	5462798	452122	5462754	0.0	1.1	9/8/2022	9:59	16.7	9/8/2022	12:58	16.7	0
313	Zuckerberg Pond	GNLCR_175	452192	5462802	452163	5462769	0.0	2.0	10/4/2022	11:00	14.8	10/4/2022	12:05	14.8	2
314	Zuckerberg Pond	GNLCR_176	452138	5462773	452176	5463766	0.0	2.0	10/4/2022	11:22	14.8	10/4/2022	12:15	14.8	0

## Appendix B-2: Backpack Electrofishing Sites

Table 18. 2022 backpack electrofishing sites in the Columbia River with coordinates, site depths (m), dates, start and end times, effort in seconds and the number of Northern Pike (NP) at the site.

Set	Location	Site ID	Location (UTM Zone 11U)				Electrofishing Specifications			Date	Time Start	Time End	Average Depth (m)	# NP
			Start		End		Time (s)	Voltage	HZ					
			Easting	Northing	Easting	Northing								
315	Zuckerberg Pond	EFLCR_1	452221	5462817	452195	5462816	1200	220	70	7/14/2022	10:20	10:40	0.4	0
316	Zuckerberg Pond	EFLCR_2	452175	5462839	452253	5462877	1800	225	70	7/14/2022	11:15	11:45	0.4	0
317	Zuckerberg Pond	EFLCR_3	452221	5462811	452195	5462816	12480	305	70	7/26/2022	9:00	12:28	0.4	8
318	Zuckerberg Pond	EFLCR_4	452195	5462816	452122	5462760	1800	305	70	7/26/2022	12:45	13:15	0.4	1
319	Lower Kootenay	EFLKR_1	453030	5462091	453099	5462087	2760	280	70	7/27/2022	9:41	10:27	0.3	0
320	Lower Kootenay	EFLKR_2	453112	5462101	453196	5462167	4140	300	70	7/27/2022	11:00	12:09	0.3	0
321	Zuckerberg Pond	EFLCR_5	452172	5462823	452150	5462658	5940	290	70	7/28/2022	10:15	11:54	0.3	1
322	Columbia Mainstem	EFLCR_6	453400	5456859	453368	546868	4200	305	70	7/29/2022	8:20	9:30	0.3	0
323	Columbia Mainstem	EFLCR_7	453368	5456868	453254	5456865	2400	305	70	7/29/2022	9:50	10:30	0.2	0
324	Columbia Mainstem	EFLCR_8	453302	5456733	453236	546745	2400	305	70	7/29/2022	10:30	11:10	0.3	0
325	Zuckerberg Pond	EFLCR_9	452209	5462808	452194	5462775	600	250	70	9/6/2022	10:22	10:32	0.3	0

## Appendix B-3: Trapping

Table 19. 2022 minnow and N-trap locations in the Columbia River by location with coordinates, site depths (m), dates, start and end times, and the number of Northern Pike (NP) at the site.

Set	Type	Location	Site ID	Location (UTM Zone 11U)				Date	Time Start	Date	Time End	Average Depth (m)	Temp (°C)	# NP
				Start		End								
				Easting	Northing	Easting	Northing							
326	Minnow Trap	Lower Kootenay	MTLKR_1	452754	5462590	452754	5462590	7/21/2022	20:35	7/22/2022	7:45	0.2	19	0
327	Minnow Trap	Lower Kootenay	MTLKR_2	452826	5462425	452826	5462425	7/21/2022	20:45	7/22/2022	7:55	0.2	19	0
328	Minnow Trap	Lower Kootenay	MTLKR_3	453030	5462090	453030	5462090	7/21/2022	21:15	7/22/2022	8:22	0.2	19	0
329	Minnow Trap	Lower Kootenay	MTLKR_4	453034	5462090	453034	5462090	7/21/2022	21:15	7/22/2022	8:24	0.2	19	0
330	Minnow Trap	Lower Kootenay	MTLKR_5	453059	5462084	453059	5462084	7/21/2022	21:20	7/22/2022	8:32	0.2	19	0
331	Minnow Trap	Zuckerberg Pond	MTLCR_1	452160	5462814	452160	5462814	7/25/2022	19:05	7/26/2022	8:19	0.3	18	0
332	Minnow Trap	Zuckerberg Pond	MTLCR_2	452222	5462796	452222	5462796	7/25/2022	19:08	7/26/2022	8:24	0.4	18	0
333	Minnow Trap	Zuckerberg Pond	MTLCR_3	452196	5462679	452196	5462679	7/25/2022	19:14	7/26/2022	8:31	0.3	18	0
334	Minnow Trap	Zuckerberg Pond	MTLCR_4	452228	5462644	452228	5462644	7/25/2022	20:33	7/26/2022	8:33	0.2	18	0
335	Minnow Trap	Zuckerberg Pond	MTLCR_5	452181	5462841	452181	5462841	7/25/2022	20:38	7/26/2022	8:38	0.4	18	0
336	Minnow Trap	Zuckerberg Pond	MTLCR_6	452132	5462804	452132	5462804	7/27/2022	19:50	7/28/2022	9:22	0.6	18	0
337	Minnow Trap	Zuckerberg Pond	MTLCR_7	452160	5462814	452160	5462814	7/27/2022	19:05	7/28/2022	8:46	0.2	18	0
338	Minnow Trap	Zuckerberg Pond	MTLCR_8	452142	5462812	452142	5462812	7/27/2022	19:12	7/28/2022	9:05	0.3	18	0
339	Minnow Trap	Zuckerberg Pond	MTLCR_9	452135	5462802	452135	5462802	7/27/2022	19:22	7/28/2022	9:07	0.2	18	0
340	Minnow Trap	Zuckerberg Pond	MTLCR_10	452132	5462796	452132	5462796	7/27/2022	19:32	7/28/2022	9:10	0.3	18	0
341	N-Trap	Zuckerberg Pond	NLTLCR_1	452114	5462766	452114	5462766	7/27/2022	19:42	7/28/2022	9:14	0.2	18	0
342	N-Trap	Zuckerberg Pond	NLTLCR_2	452226	5462792	452226	5462792	7/29/2022	20:14	7/29/2022	8:17	0.6	19	0
343	N-Trap	Zuckerberg Pond	NLTLCR_3	452132	5462804	452132	5462804	7/29/2022	20:16	7/29/2022	8:21	0.6	19	0
344	N-Trap	Zuckerberg Pond	NLTLCR_4	452196	5462664	452196	5462664	8/31/2022	19:42	8/31/2022	5:42	0.5	18	0

## Appendix B-4: Seine Net Sites

Table 20. 2022 seine net sites in the Columbia River with coordinates, sample depths (m), area (m<sup>2</sup>), dates, water temperatures (°C), and Northern Pike (NP) presence.

Set	Location	Site ID	Location (UTM Zone 11U)				Date	Time	Temp (°C)	Depth (m)		Area (m <sup>2</sup> )	# NP
			Start		End					Min	Max		
			Easting	Northing	Easting	Northing							
345	Columbia Mainstem	SNLCR_1	453343	5456866	453343	5456866	7/29/2022	9:45	18	0.2	0.4	1400	0
346	Zuckerberg Pond	SNLCR_2	452222	5462813	452222	5462813	9/4/2022	14:23	20	0.1	0.5	1225	1

## Appendix C – Maps of Suppression Effort

Appendix C-1: Gillnet Effort

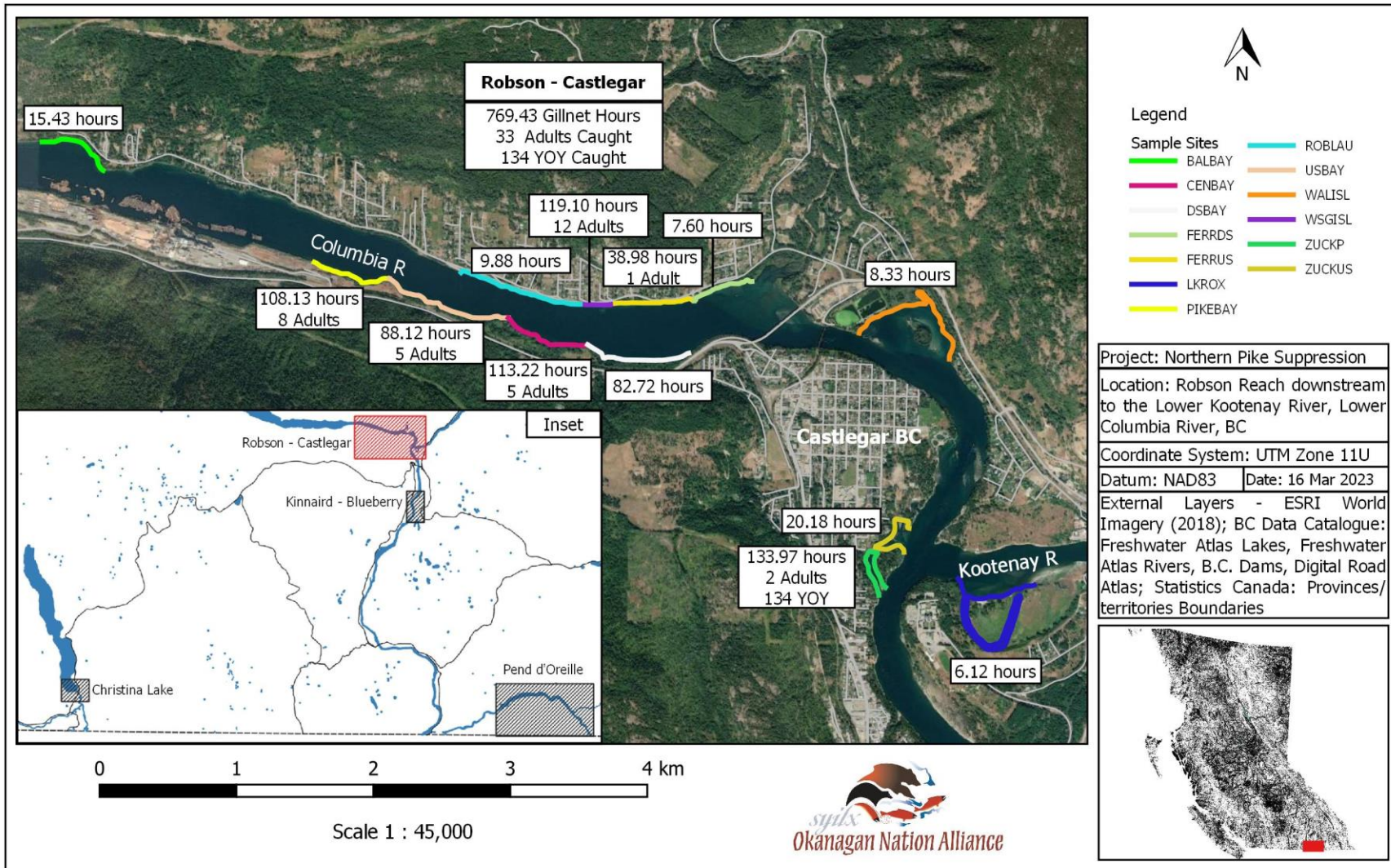


Figure 24. 2022 gillnet effort (soaking hours) by site and Northern Pike captures by stage – adult or young-of-year (YOY) in the Robson – Castlegar area during Northern Pike Monitoring and Suppression. Data collected by the Okanagan Nation Alliance.

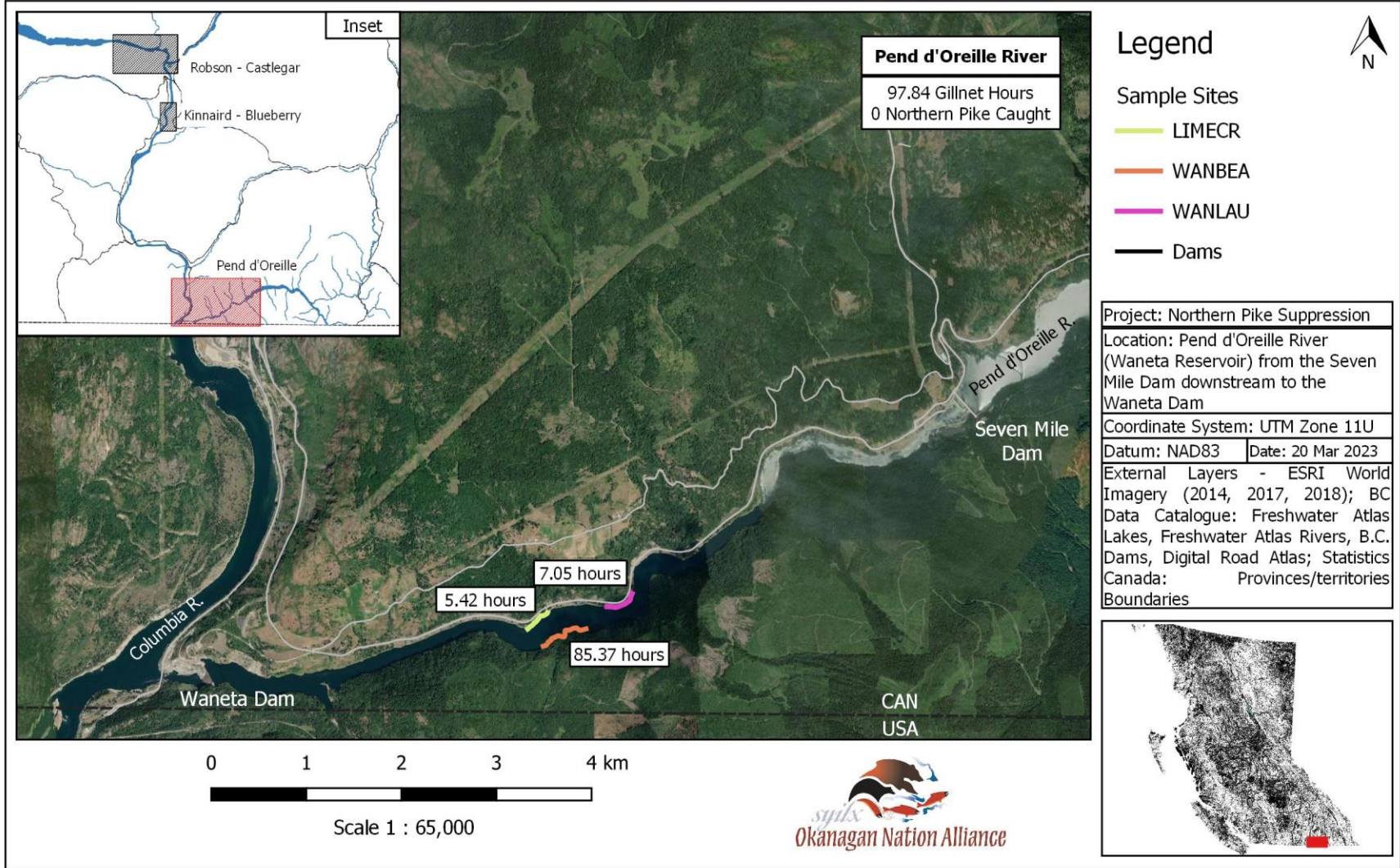


Figure 25. 2022 gillnet effort (soaking hours) by site and Northern Pike captures by stage – adult or young-of-year (YOY) in the Waneta Reservoir of the Pend d'Oreille River during Northern Pike Monitoring and Suppression. Data collected by the Okanagan Nation Alliance.

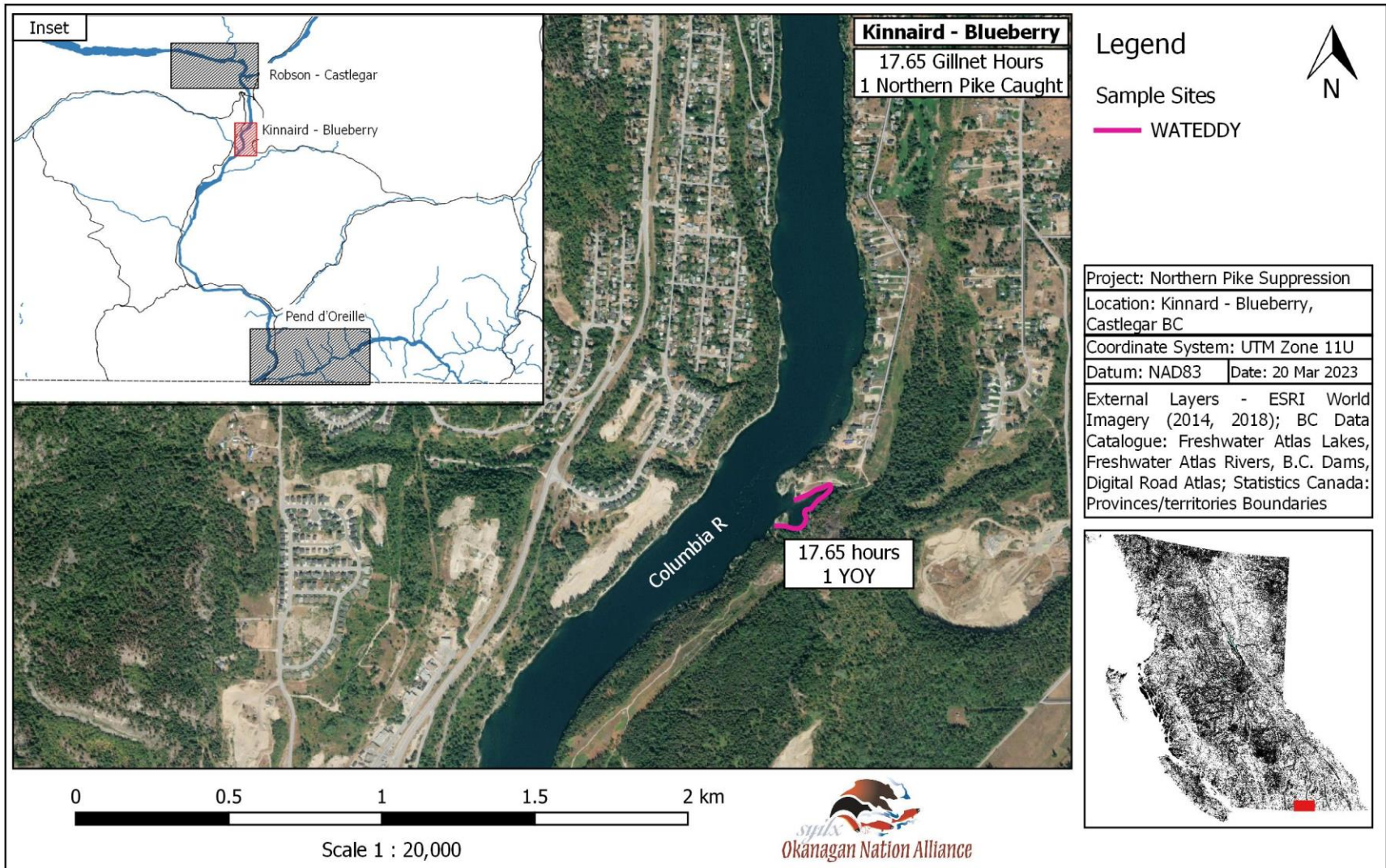


Figure 26. 2022 gillnet effort (soaking hours) by site in the Kinnaird – Blueberry area of the Lower Columbia River during Northern Pike Monitoring and Suppression. Data collected by the Okanagan Nation Alliance.



## Appendix C-2: Seine Net and Trapping Effort

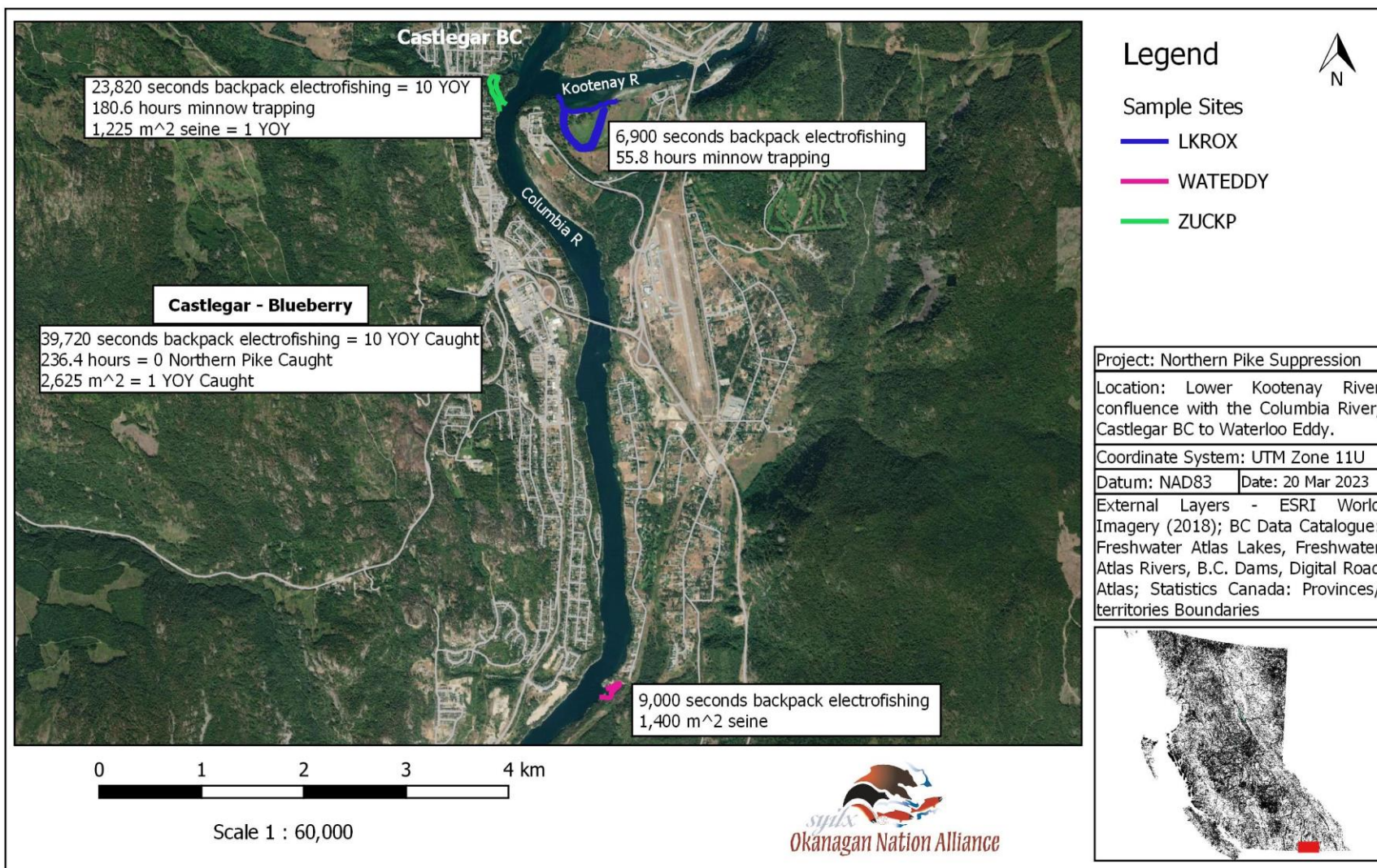


Figure 27. 2022 seine net and trapping effort (water volume sampled in m<sup>3</sup> and soak time in hours) by site in the Robson – Castlegar area during Northern Pike Monitoring and Suppression. Data collected by the Okanagan Nation Alliance.

## Appendix D – Summary of Gillnet Effort by Season, Location, and Gillnet Type

Table 21. Summary of gillnet effort in 2022 with the number of net checks and total net hours by location and season with resulting catch-per-unit-effort (CPUE) in Northern Pike (NP) per hour and NP per 8 net-hours. Darker green indicates higher values in respective columns.

	Watershed	Location	# of Net Checks	Total NP Caught	Total Net Hours	CPUE(NP/HR)	CPUE (NP/ 8 Net Hours)
<b>Spring (Apr 19-Jun 30)</b>	Lower Columbia River	Mainstem	198	28	522	0.05	0.43
		Zuckerberg Pond	16	2	78	0.03	0.21
	Pend d'Oreille River	Total	31	0	78	0	0
<b>Summer (Jul 01- Aug 19)</b>	Lower Columbia River	Mainstem	45	4	107	0.04	0.3
		Lower Kootenay River	2	0	6	0	0
		Zuckerberg Pond	2	0	6	0	0
<b>Fall (Aug 20-Oct 04)</b>	Lower Columbia River	Zuckerberg Pond	20	134	50	2.7	21.61
<b>Total (Apr 19-Oct 04)</b>	Lower Columbia River	Mainstem	243	32	629	0.05	0.41
		Lower Kootenay River	2	0	6	0	0
		Zuckerberg Pond	38	136	134	1.01	8.12
	Pend d'Oreille River	Total	31	0	98	0	0
	<b>All Sites</b>	<b>Total</b>	<b>314</b>	<b>168</b>	<b>867</b>	<b>0.19</b>	<b>1.55</b>

## Appendix E – Northern Pike Biological Data

Table 22. Northern Pike biological and sample information of individuals capture between May 12 and Nov 01 2022 including the project, site, date of capture, method of capture, fork length (mm), weight (g), stage (YOY = young-of-year), sex, and age. Data collected by Okanagan Nation Alliance during the Northern Pike Suppression program in 2022 and CLBMON 45 (BC Hydro unpublished data).

#	Project	Date	Method	Location	Site	UTM (Zone 11U)		Stage	Sex	Length (mm)	Weight (g)	Age
						Easting	Northing					
1	Suppression	05/31/22	gillnet	Columbia River	PIKEBAY	448491	5464792	Adult	Male	548	1434	1
2	Suppression	06/01/22	gillnet	Columbia River	CENBAY	449970	5464323	Adult	Female	682	3080	3
3	Suppression	06/01/22	gillnet	Columbia River	CENBAY	449799	5464352	Adult	Male	623	2144	2
4	Suppression	06/02/22	gillnet	Columbia River	PIKEBAY	448488	5464793	Adult	Female	690	3204	2
5	Suppression	06/02/22	gillnet	Columbia River	PIKEBAY	448488	5464793	Adult	Male	620	1870	2
6	Suppression	06/02/22	gillnet	Columbia River	CENBAY	449837	5464362	Adult	Female	684	3058	2
7	Suppression	06/02/22	gillnet	Columbia River	WSGISL	450132	5464294	Adult	Male	634	2455	2
8	Suppression	06/02/22	gillnet	Columbia River	WSGISL	450132	5464294	Adult	Male	648	2313	2
9	Suppression	06/02/22	gillnet	Columbia River	WSGISL	450132	5464294	Adult	Male	554	1585	2
10	Suppression	06/03/22	gillnet	Columbia River	WSGISL	450156	5464589	Adult	Male	625	2131	2
11	Suppression	6/6/2022	gillnet	Columbia River	WSGISL	450271	5464606	Adult	Female	675	3083	2
12	Suppression	6/6/2022	gillnet	Columbia River	WATEDDY	453338	5456814	Adult	Unknown	313	229	1
13	Suppression	6/6/2022	gillnet	Columbia River	CENBAY	449666	5464418	Adult	Female	627	1960	2
14	Suppression	6/7/2022	gillnet	Columbia River	WSGISL	450307	5464613	Adult	Female	690	3282	2
15	Suppression	6/7/2022	gillnet	Columbia River	WSGISL	450307	5464613	Adult	Male	520	1156	2
16	Suppression	6/8/2022	gillnet	Columbia River	WSGISL	450275	5464612	Adult	Male	634	2205	
17	Suppression	6/8/2022	gillnet	Columbia River	WSGISL	450275	5464612	Adult	Female	638	2308	2
18	Suppression	6/9/2022	gillnet	Columbia River	WSGISL	450279	5464607	Adult	Female	651	2654	2
19	Suppression	6/9/2022	gillnet	Columbia River	FERRUS	450422	5464589	Adult	Male	487	980	1
20	Suppression	6/13/2022	gillnet	Columbia River	WSGISL	450263	5464592	Adult	Male	645	2120	2
21	Suppression	6/13/2022	gillnet	Columbia River	WSGISL	450263	5464592	Adult	Male	640	2493	2
22	Suppression	6/13/2022	gillnet	Columbia River	CENBAY	449771	5464394	Adult	Male	502	1098	1
23	Suppression	6/15/2022	gillnet	Columbia River	ZUCKP	452185	5462749	Adult	Female	800	4500	3
24	Suppression	6/15/2022	gillnet	Columbia River	ZUCKP	452185	5462749	Adult	Male	735	3528	3
25	Suppression	6/20/2022	gillnet	Columbia River	USBAY	448912	5464657	Adult	Female	460	906	1
26	Suppression	6/20/2022	gillnet	Columbia River	PIKEBAY	448447	5464784	Adult	Male	633	2212	2
27	Suppression	6/20/2022	gillnet	Columbia River	PIKEBAY	5464784	448465	Adult	Male	503	1060	2
28	Suppression	6/28/2022	gillnet	Columbia River	PIKEBAY	448458	5464776	Adult	Male	645	2570	2
29	Suppression	6/29/2022	gillnet	Columbia River	USBAY	448921	5464635	Adult	Female	509	1181	2
30	Suppression	6/29/2022	gillnet	Columbia River	CENBAY	449499	5464507	Adult	Male	530	1470	2
31	Suppression	7/12/2022	gillnet	Columbia River	PIKEBAY	448440	5464762	Adult	Female	516	1235	2
32	Suppression	7/12/2022	gillnet	Columbia River	PIKEBAY	448440	5464762	Adult	Female	529	1254	2
33	Suppression	7/13/2022	gillnet	Columbia River	USBAY	448721	5464719	Adult	Female	493	1021	2
34	Suppression	7/13/2022	gillnet	Columbia River	CENBAY	449478	5464505	Adult	Male	507	1253	2
35	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452145	5462788	YOY	Unknown	162	37	0
36	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452145	5462788	YOY	Unknown	223	102	0
37	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452145	5462788	YOY	Unknown	219	95	0

#	Project	Date	Method	Location	Site	UTM (Zone 11U)		Stage	Sex	Length (mm)	Weight (g)	Age
						Easting	Northing					
38	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452145	5462788	YOY	Unknown	205	92	0
39	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452145	5462788	YOY	Unknown	146	34	0
40	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452145	5462788	YOY	Unknown	226	96	0
41	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	251	148	0
42	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	194	67	0
43	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	236	115	0
44	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	228	92	0
45	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	241	130	0
46	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	235	132	0
47	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	226	118	0
48	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	217	104	0
49	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	182	69	0
50	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	220	91	0
51	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	232	103	0
52	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	244	162	0
53	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	244	132	0
54	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	233	134	0
55	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	238	144	0
56	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	165	54	0
57	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	231	106	0
58	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	210	92	0
59	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	217	90	0
60	Suppression	9/4/2022	gillnet	Columbia River	ZUCKP	452134	5462795	YOY	Unknown	223	91	0
61	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452219	5462544	YOY	Unknown	174	32	0
62	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452219	5462544	YOY	Unknown	173	40	0
63	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452219	5462544	YOY	Unknown	151	25	0
64	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452219	5462544	YOY	Unknown	227	79	0
65	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	172	40	0
66	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	182	49	0
67	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	247	106	0
68	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	257	121	0
69	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	174	46	0
70	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	256	149	0
71	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	271	210	0
72	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	251	126	0
73	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	243	125	0
74	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	253	163	0
75	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	266	180	0
76	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	253	168	0
77	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	286	225	0
78	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	245	147	0
79	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	232	193	0

#	Project	Date	Method	Location	Site	UTM (Zone 11U)		Stage	Sex	Length (mm)	Weight (g)	Age
						Easting	Northing					
80	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	247	152	0
81	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	257	170	0
82	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	264	144	0
83	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	241	143	0
84	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	158	35	0
85	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	275	175	0
86	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	231	113	0
87	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	264	175	0
88	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	247	149	0
89	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	222	98	0
90	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	245	117	0
91	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	175	49	0
92	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	183	49	0
93	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	217	99	0
94	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	218	100	0
95	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	214	84	0
96	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	210	79	0
97	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	183	52	0
98	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	214	84	0
99	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	184	54	0
100	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	183	55	0
101	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	181	34	0
102	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	196	62	0
103	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	204	68	0
104	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	211	81	0
105	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452138	5462797	YOY	Unknown	174	48	0
106	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	216	86	0
107	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	203	65	0
108	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	216	81	0
109	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	211	82	0
110	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	260	152	0
111	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	264	170	0
112	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	251	170	0
113	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	266	197	0
114	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	254	163	0
115	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	277	248	0
116	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	225	87	0
117	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	238	126	0
118	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	201	66	0
119	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	264	186	0
120	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	192	55	0
121	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	247	144	0

#	Project	Date	Method	Location	Site	UTM (Zone 11U)		Stage	Sex	Length (mm)	Weight (g)	Age
						Easting	Northing					
122	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	243	113	0
123	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	203	72	0
124	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	213	93	0
125	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	229	98	0
126	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	183	57	0
127	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	177	36	0
128	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	176	43	0
129	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452199	5462806	YOY	Unknown	208	69	0
130	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452219	5462544	YOY	Unknown	168	34	0
131	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452219	5462544	YOY	Unknown	174	50	0
132	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452219	5462544	YOY	Unknown	157	30	0
133	Suppression	9/6/2022	gillnet	Columbia River	ZUCKP	452219	5462544	YOY	Unknown	172	43	0
134	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452134	5462788	YOY	Unknown	252	131	0
135	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452134	5462788	YOY	Unknown	225	106	0
136	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452122	5462763	YOY	Unknown	256	144	0
137	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452122	5462763	YOY	Unknown	264	149	0
138	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452122	5462763	YOY	Unknown	272	170	0
139	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	275	196	0
140	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	201	65	0
141	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	204	67	0
142	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	222	92	0
143	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	244	114	0
144	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	208	77	0
145	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	228	128	0
146	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	190	57	0
147	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	205	70	0
148	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	214	91	0
149	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	225	91	0
150	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	206	62	0
151	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	172	41	0
152	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452208	5462803	YOY	Unknown	186	52	0
153	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452158	5462806	YOY	Unknown	168	38	0
154	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452158	5462806	YOY	Unknown	169	42	0
155	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452158	5462806	YOY	Unknown	226	83	0
156	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452158	5462806	YOY	Unknown	252	130	0
157	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452158	5462806	YOY	Unknown	260	142	0
158	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452221	5462624	YOY	Unknown	164	38	0
159	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452221	5462624	YOY	Unknown	212	72	0
160	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452221	5462624	YOY	Unknown	202	70	0
161	Suppression	9/7/2022	gillnet	Columbia River	ZUCKP	452221	5462624	YOY	Unknown	219	90	0
162	Suppression	9/8/2022	gillnet	Columbia River	ZUCKP	452214	5462542	YOY	Unknown	239	105	0
163	Suppression	9/8/2022	gillnet	Columbia River	ZUCKP	452178	5462621	YOY	Unknown	207	78	0



#	Project	Date	Method	Location	Site	UTM (Zone 11U)		Stage	Sex	Length (mm)	Weight (g)	Age
						Easting	Northing					
164	Suppression	9/8/2022	gillnet	Columbia River	ZUCKP	452214	5462807	YOY	Unknown	170	31	0
165	Suppression	9/8/2022	gillnet	Columbia River	ZUCKP	452214	5462807	YOY	Unknown	190	40	0
166	Suppression	9/8/2022	gillnet	Columbia River	ZUCKP	452214	5462807	YOY	Unknown	223	86	0
167	Suppression	10/4/2022	gillnet	Columbia River	ZUCKP	452192	5462802	YOY	Unknown	264	144	0
168	Suppression	10/4/2022	gillnet	Columbia River	ZUCKP	452192	5462802	YOY	Unknown	296	212	0
169	Suppression	7/26/2022	Backpack electrofishing	Columbia River	ZUCKP	452221	5462811	YOY	Unknown	66	2	0
170	Suppression	7/26/2022	Backpack electrofishing	Columbia River	ZUCKP	452221	5462811	YOY	Unknown	64	2.1	0
171	Suppression	7/26/2022	Backpack electrofishing	Columbia River	ZUCKP	452221	5462811	YOY	Unknown	83	4.4	0
172	Suppression	7/26/2022	Backpack electrofishing	Columbia River	ZUCKP	452221	5462811	YOY	Unknown	67	2.4	0
173	Suppression	7/26/2022	Backpack electrofishing	Columbia River	ZUCKP	452221	5462811	YOY	Unknown	123	13.7	0
174	Suppression	7/26/2022	Backpack electrofishing	Columbia River	ZUCKP	452221	5462811	YOY	Unknown	112	12.3	0
175	Suppression	7/26/2022	Backpack electrofishing	Columbia River	ZUCKP	452221	5462811	YOY	Unknown	86	4.9	0
176	Suppression	7/26/2022	Backpack electrofishing	Columbia River	ZUCKP	452221	5462811	YOY	Unknown	98	7.2	0
177	Suppression	7/26/2022	Backpack electrofishing	Columbia River	ZUCKP	452221	5462811	YOY	Unknown	63	2	0
178	Suppression	7/28/2022	Backpack electrofishing	Columbia River	ZUCKP	452172	5462823	YOY	Unknown	101		0
179	Suppression	9/4/2022	seine	Columbia River	ZUCKP	452222	5462813	YOY	Unknown	156	44	0
180	CLBMON45	11/01/22	boat electrofishing	Columbia River	FERRDS			YOY	Unknown	266	151	0
181	CLBMON45	10/31/22	boat electrofishing	Columbia River	BRDRR			YOY	Unknown	311	245	0
182	CLBMON45	10/24/22	boat electrofishing	Columbia River	OLDTHTR			Adult	Unknown	610	1846	2
183	CLBMON45	10/18/22	boat electrofishing	Columbia River	BALLB			Adult	Female	433	696	2
184	Incentive	3/26/2022	Angling	Columbia River	DSBAY	450459	5464417	Adult	Male			2
185	Incentive	7/27/2022	Angling	Lower Kootenay River	LKRSELK	452738	5462618	Adult	Male			2
186	Incentive	10/3/2022	Angling	Columbia River	ZUCKP	452146	5462759	YOY	Unknown	253	118	0

## Appendix F – Bycatch Data

Table 23. Bycatch by species at a given set including the number of individuals captured at the set with the minimum and maximum fork lengths (mm), locations, and method. Blank spaces indicate data were not collected.

Waterbody	Site	Site	Method	Species	Stage	Number	Min Length	Max Length
Pend-d'Oreille River	WANBEA	GNPDO_001	gillnet	Yellow Perch	Adult	1	202	202
Pend-d'Oreille River	WANLAU	GNPDO_005	gillnet	Northern Pikeminnow	Adult	1	410	410
Pend-d'Oreille River	WANLAU	GNPDO_005	gillnet	Largescale Sucker	Adult	5	400	415
Pend-d'Oreille River	WANBEA	GNPDO_006	gillnet	Yellow Perch	Adult	1	190	190
Pend-d'Oreille River	WANBEA	GNPDO_007	gillnet	Yellow Perch	Adult	1	186	186
Pend-d'Oreille River	WANBEA	GNPDO_009	gillnet	Northern Pikeminnow	Adult	1	420	420
Pend-d'Oreille River	LIMECR	GNPDO_010	gillnet	Smallmouth Bass	Adult	1	370	370
Pend-d'Oreille River	WANBEA	GNPDO_011	gillnet	Brown Trout	Adult	1	595	595
Pend-d'Oreille River	WANBEA	GNPDO_012	gillnet	Smallmouth Bass	Adult	2	295	297
Pend-d'Oreille River	WANBEA	GNPDO_012	gillnet	Rainbow Trout	Adult	1	375	375
Pend-d'Oreille River	WANBEA	GNPDO_013	gillnet	Smallmouth Bass	Adult	1	305	305
Pend-d'Oreille River	WANBEA	GNPDO_014	gillnet	Largescale Sucker	Adult	1	485	485
Pend-d'Oreille River	WANBEA	GNPDO_019	gillnet	Smallmouth Bass	Adult	1	308	308
Pend-d'Oreille River	WANBEA	GNPDO_021	gillnet	Smallmouth Bass	Adult	1	290	290
Pend-d'Oreille River	WANBEA	GNPDO_027	gillnet	Smallmouth Bass	Adult	2	284	307
Pend-d'Oreille River	WANBEA	GNPDO_027	gillnet	Rainbow Trout	Adult	1	440	440
Pend-d'Oreille River	WANBEA	GNPDO_028	gillnet	Walleye	Adult	1	345	345
Pend-d'Oreille River	WANLAU	GNPDO_031	gillnet	Largescale Sucker	Adult	1	430	430
Kootenay River	LKROX	EFLKR_1	backpack electrofishing	Northern Pikeminnow	Juvenile	2	49	81
Kootenay River	LKROX	EFLKR_1	backpack electrofishing	Carp	Juvenile	3	39	49
Kootenay River	LKROX	EFLKR_2	backpack electrofishing	Northern Pikeminnow	Juvenile	1	29	29
Kootenay River	LKROX	EFLKR_2	backpack electrofishing	Carp	Juvenile	6	32	46
Kootenay River	KOOTOX	GNLKR_001	gillnet	White Sturgeon	Juvenile	2		
Kootenay River	KOOTOX	GNLKR_001	gillnet	Northern Pikeminnow	Adult	2	338	348
Kootenay River	KOOTOX	GNLKR_001	gillnet	Lake Whitefish	Adult	2	412	413
Kootenay River	KOOTOX	GNLKR_002	gillnet	Walleye	Adult	2	369	380
Kootenay River	KOOTOX	GNLKR_002	gillnet	Lake Whitefish	Adult	5	393	432
Kootenay River	KOOTOX	GNLKR_02	gillnet	Northern Pikeminnow	Adult	4	318	458
Kootenay River	LKRSELK	MTLKR_1	minnow trap	Sculpin (General)	Adult	1	110	110
Kootenay River	LKROX	MTLKR_4	minnow trap	Carp	Juvenile	1	40	40
Columbia River	ZUCKP	EFLCR_1	backpack electrofishing	Sucker (General)	Juvenile	1	76	76
Columbia River	ZUCKP	EFLCR_1	backpack electrofishing	Northern Pikeminnow	Juvenile	1	32	32
Columbia River	ZUCKP	EFLCR_3	backpack electrofishing	Yellow Perch	Adult	1	162	162
Columbia River	ZUCKP	EFLCR_3	backpack electrofishing	Tench	Juvenile	3	43	49
Columbia River	ZUCKP	EFLCR_3	backpack electrofishing	Sucker (General)	Juvenile	17	60	127
Columbia River	ZUCKP	EFLCR_3	backpack electrofishing	Sculpin (General)	Juvenile	5	25	81
Columbia River	ZUCKP	EFLCR_3	backpack electrofishing	Sculpin (General)	Adult	1	96	96
Columbia River	ZUCKP	EFLCR_3	backpack electrofishing	Redside Shiner	Juvenile	2	53	68
Columbia River	ZUCKP	EFLCR_3	backpack electrofishing	Northern Pikeminnow	Juvenile	7	66	106
Columbia River	ZUCKP	EFLCR_3	backpack electrofishing	Northern Pike	Juvenile	8	66	123
Columbia River	ZUCKP	EFLCR_4	backpack electrofishing	Northern Pike	Juvenile	1	63	63
Columbia River	ZUCKP	EFLCR_4	backpack electrofishing	Longnose Dace	Juvenile	1	46	46
Columbia River	ZUCKP	EFLCR_5	backpack electrofishing	Tench	Juvenile	1	65	65

Columbia River	ZUCKP	EFLCR_5	backpack electrofishing	Sucker (General)	Juvenile	16	79	123
Columbia River	ZUCKP	EFLCR_5	backpack electrofishing	Sculpin (General)	Juvenile	1	62	62
Columbia River	ZUCKP	EFLCR_5	backpack electrofishing	Redside Shiner	Juvenile	1	72	72
Columbia River	ZUCKP	EFLCR_5	backpack electrofishing	Northern Pikeminnow	Juvenile	1	102	102
Columbia River	ZUCKP	EFLCR_5	backpack electrofishing	Northern Pike	Juvenile	1	101	101
Columbia River	WATEDDY	EFLCR_6	backpack electrofishing	Sculpin (General)	Juvenile	2	34	42
Columbia River	WATEDDY	EFLCR_6	backpack electrofishing	Sculpin (General)	Juvenile	1	19	19
Columbia River	WATEDDY	EFLCR_6	backpack electrofishing	Longnose Dace	Adult	2	72	72
Columbia River	WATEDDY	EFLCR_7	backpack electrofishing	Umatilla Dace	Juvenile	1	47	47
Columbia River	WATEDDY	EFLCR_7	backpack electrofishing	Sucker (General)	Juvenile	1	104	104
Columbia River	WATEDDY	EFLCR_7	backpack electrofishing	Sculpin (General)	Juvenile	1	64	64
Columbia River	WATEDDY	EFLCR_7	backpack electrofishing	Longnose Dace	Juvenile	6	42	56
Columbia River	WATEDDY	EFLCR_7	backpack electrofishing	Carp	Juvenile	1	47	47
Columbia River	WATEDDY	EFLCR_8	backpack electrofishing	Sucker (General)	Juvenile	2	75	93
Columbia River	WATEDDY	EFLCR_8	backpack electrofishing	Longnose Dace	Adult	2	43	48
Columbia River	WATEDDY	EFLCR_8	backpack electrofishing	Carp	Juvenile	1	31	31
Columbia River	CENBAY	GNCLR_027	gillnet	Mountain Whitefish	Adult	4	343	380
Columbia River	CENBAY	GNCLR_027	gillnet	Longnose Sucker	Adult	1	395	395
Columbia River	CENBAY	GNCLR_027	gillnet	Lake Whitefish	Adult	3	406	455
Columbia River	CENBAY	GNCLR_027	gillnet	Lake Whitefish	Adult	2	385	424
Columbia River	PIKEBAY	GNCLR_001	gillnet	Mountain Whitefish				
Columbia River	PIKEBAY	GNCLR_001	gillnet	Lake Whitefish	Adult	1	405	405
Columbia River	PIKEBAY	GNCLR_001	gillnet	Lake Whitefish	Adult	1	469	469
Columbia River	PIKEBAY	GNCLR_002	gillnet	Rainbow Trout	Adult	1	388	388
Columbia River	PIKEBAY	GNCLR_002	gillnet	Northern Pike	Adult	1	548	548
Columbia River	PIKEBAY	GNCLR_002	gillnet	Mountain Whitefish	Adult	3	302	405
Columbia River	PIKEBAY	GNCLR_002	gillnet	Mountain Whitefish	Adult	1	352	352
Columbia River	PIKEBAY	GNCLR_002	gillnet	Lake Whitefish	Adult	1	455	455
Columbia River	PIKEBAY	GNCLR_002	gillnet	Lake Whitefish	Adult	2	414	451
Columbia River	USBAY	GNCLR_003	gillnet	Mountain Whitefish	Adult	1	319	319
Columbia River	USBAY	GNCLR_003	gillnet	Lake Whitefish	Adult	1	405	405
Columbia River	USBAY	GNCLR_003	gillnet	Lake Whitefish	Adult	1		
Columbia River	CENBAY	GNCLR_004	gillnet	Mountain Whitefish	Adult	1	309	309
Columbia River	CENBAY	GNCLR_004	gillnet	Lake Whitefish	Adult	1	430	430
Columbia River	CENBAY	GNCLR_004	gillnet	Lake Whitefish	Adult	2	399	426
Columbia River	DSBAY	GNCLR_005	gillnet	Lake Whitefish	Adult	1		
Columbia River	DSBAY	GNCLR_006	gillnet	Rainbow Trout	Adult	1	325	325
Columbia River	DSBAY	GNCLR_006	gillnet	Mountain Whitefish	Adult	1	360	360
Columbia River	PIKEBAY	GNCLR_009	gillnet	Rainbow Trout	Adult	1	350	350
Columbia River	PIKEBAY	GNCLR_009	gillnet	Rainbow Trout	Adult	1	360	360
Columbia River	PIKEBAY	GNCLR_010	gillnet	Mountain Whitefish	Adult	1	305	305
Columbia River	USBAY	GNCLR_011	gillnet	Mountain Whitefish	Adult	1		
Columbia River	USBAY	GNCLR_011	gillnet	Lake Whitefish	Adult	1	398	398
Columbia River	CENBAY	GNCLR_012	gillnet	Largescale Sucker	Adult	1	434	434
Columbia River	CENBAY	GNCLR_013	gillnet	Northern Pike	Adult	1	623	623
Columbia River	CENBAY	GNCLR_014	gillnet	Northern Pike	Adult	1	682	682
Columbia River	DSBAY	GNCLR_015	gillnet	Mountain Whitefish	Adult	1	377	377

Columbia River	DSBAY	GNLCR_015	gillnet	Lake Whitefish	Adult	2	418	437
Columbia River	PIKEBAY	GNLCR_017	gillnet	Mountain Whitefish	Adult	2	266	357
Columbia River	PIKEBAY	GNLCR_017	gillnet	Lake Whitefish	Adult	2	424	442
Columbia River	PIKEBAY	GNLCR_018	gillnet	Rainbow Trout	Adult	1	289	289
Columbia River	PIKEBAY	GNLCR_018	gillnet	Northern Pike	Adult	2	620	690
Columbia River	PIKEBAY	GNLCR_018	gillnet	Lake Whitefish	Adult	2	410	427
Columbia River	CENBAY	GNLCR_020	gillnet	White Sturgeon	Adult	1		
Columbia River	CENBAY	GNLCR_021	gillnet	White Sturgeon	Adult	1		
Columbia River	CENBAY	GNLCR_021	gillnet	Northern Pikeminnow	Adult	2	396	446
Columbia River	CENBAY	GNLCR_021	gillnet	Northern Pike	Adult	1	684	684
Columbia River	CENBAY	GNLCR_021	gillnet	Lake Whitefish	Adult	2	415	458
Columbia River	CENBAY	GNLCR_021	gillnet	Lake Whitefish	Adult	1	455	455
Columbia River	CENBAY	GNLCR_022	gillnet	White Sturgeon	Adult	1		
Columbia River	CENBAY	GNLCR_022	gillnet	Rainbow Trout	Adult	2	260	415
Columbia River	CENBAY	GNLCR_022	gillnet	Northern Pikeminnow	Adult	1	402	402
Columbia River	CENBAY	GNLCR_022	gillnet	Lake Whitefish	Adult	1	415	415
Columbia River	DSBAY	GNLCR_023	gillnet	Mountain Whitefish	Adult	1	287	287
Columbia River	DSBAY	GNLCR_023	gillnet	Mountain Whitefish	Adult	1	384	384
Columbia River	DSBAY	GNLCR_023	gillnet	Lake Whitefish	Adult	1	415	415
Columbia River	WSGISL	GNLCR_024	gillnet	Northern Pike	Adult	3	554	648
Columbia River	WSGISL	GNLCR_024	gillnet	Mountain Whitefish	Adult	1	355	355
Columbia River	PIKEBAY	GNLCR_025	gillnet	White Sturgeon	Adult	1		
Columbia River	PIKEBAY	GNLCR_025	gillnet	Lake Whitefish	Adult	3	414	441
Columbia River	USBAY	GNLCR_026	gillnet	White Sturgeon	Adult	1		
Columbia River	USBAY	GNLCR_026	gillnet	Rainbow Trout	Adult	1	450	450
Columbia River	USBAY	GNLCR_026	gillnet	Mountain Whitefish	Adult	1	390	390
Columbia River	USBAY	GNLCR_026	gillnet	Lake Whitefish	Adult	5	395	445
Columbia River	USBAY	GNLCR_026	gillnet	Lake Whitefish	Adult	2	394	415
Columbia River	CENBAY	GNLCR_028	gillnet	Lake Whitefish	Adult	2	405	415
Columbia River	WSGISL	GNLCR_030	gillnet	Northern Pike	Adult	1	625	625
Columbia River	WSGISL	GNLCR_030	gillnet	Mountain Whitefish	Adult	1	382	382
Columbia River	WSGISL	GNLCR_030	gillnet	Mountain Whitefish	Adult	1	280	280
Columbia River	WSGISL	GNLCR_030	gillnet	Lake Whitefish	Adult	1	392	392
Columbia River	WATEDDY	GNLCR_032	gillnet	White Sturgeon	Adult	1		
Columbia River	WATEDDY	GNLCR_032	gillnet	Lake Whitefish	Adult	4	415	450
Columbia River	WATEDDY	GNLCR_032	gillnet	Brook Trout	Juvenile	1	240	240
Columbia River	PIKEBAY	GNLCR_033	gillnet	Lake Whitefish	Adult	4	404	434
Columbia River	PIKEBAY	GNLCR_034	gillnet	Northern Pikeminnow	Adult	1	410	410
Columbia River	PIKEBAY	GNLCR_034	gillnet	Mountain Whitefish	Adult	2	354	395
Columbia River	PIKEBAY	GNLCR_034	gillnet	Lake Whitefish	Adult	4	416	459
Columbia River	CENBAY	GNLCR_036	gillnet	Northern Pike	Adult	1	627	627
Columbia River	CENBAY	GNLCR_036	gillnet	Lake Whitefish	Adult	1	417	417
Columbia River	CENBAY	GNLCR_036	gillnet	Lake Whitefish	Adult	1	454	454
Columbia River	CENBAY	GNLCR_037	gillnet	Mountain Whitefish	Adult	1	357	357
Columbia River	WSGISL	GNLCR_038	gillnet	Rainbow Trout	Adult	2	387	392
Columbia River	WSGISL	GNLCR_038	gillnet	Rainbow Trout	Adult	2	418	480
Columbia River	WSGISL	GNLCR_038	gillnet	Mountain Whitefish	Adult	2	382	390

Columbia River	WSGISL	GNLCR_038	gillnet	Lake Whitefish	Adult	1	469	469
Columbia River	WSGISL	GNLCR_039	gillnet	Northern Pike	Adult	1	675	675
Columbia River	WSGISL	GNLCR_039	gillnet	Mountain Whitefish	Adult	2	345	367
Columbia River	WSGISL	GNLCR_039	gillnet	Lake Whitefish	Adult	2	416	441
Columbia River	WSGISL	GNLCR_039	gillnet	Lake Whitefish	Adult	1	432	432
Columbia River	WALISL	GNLCR_040	gillnet	Rainbow Trout	Adult	1	335	335
Columbia River	WALISL	GNLCR_040	gillnet	Mountain Whitefish	Adult	1	370	370
Columbia River	WALISL	GNLCR_040	gillnet	Lake Whitefish	Adult	2	445	447
Columbia River	WATEDDY	GNLCR_041	gillnet	Northern Pikeminnow	Adult	1	371	371
Columbia River	WATEDDY	GNLCR_041	gillnet	Northern Pike	Juvenile	1	313	313
Columbia River	WATEDDY	GNLCR_041	gillnet	Lake Whitefish	Adult	2	422	445
Columbia River	WATEDDY	GNLCR_041	gillnet	Brook Trout	Adult	1	273	273
Columbia River	PIKEBAY	GNLCR_042	gillnet	Rainbow Trout	Adult	1	445	445
Columbia River	PIKEBAY	GNLCR_042	gillnet	Lake Whitefish	Adult	1	425	425
Columbia River	PIKEBAY	GNLCR_042	gillnet	Lake Whitefish	Adult	2		
Columbia River	USBAY	GNLCR_043	gillnet	Mountain Whitefish	Adult	1	340	340
Columbia River	CENBAY	GNLCR_044	gillnet	White Sturgeon	Juvenile	1		
Columbia River	CENBAY	GNLCR_044	gillnet	Lake Whitefish	Adult	2	425	435
Columbia River	CENBAY	GNLCR_045	gillnet	Northern Pikeminnow	Adult	2	433	451
Columbia River	DSBAY	GNLCR_046	gillnet	White Sturgeon	Juvenile	1		
Columbia River	DSBAY	GNLCR_046	gillnet	White Sturgeon	Adult	1		
Columbia River	WSGISL	GNLCR_047	gillnet	Rainbow Trout	Adult	1	408	408
Columbia River	WSGISL	GNLCR_047	gillnet	Mountain Whitefish	Adult	1	260	260
Columbia River	WSGISL	GNLCR_047	gillnet	Longnose Sucker	Adult	1	445	445
Columbia River	WSGISL	GNLCR_047	gillnet	Lake Whitefish	Adult	1	405	405
Columbia River	WSGISL	GNLCR_048	gillnet	Northern Pike	Adult	2	520	690
Columbia River	PIKEBAY	GNLCR_051	gillnet	Rainbow Trout	Adult	1	335	335
Columbia River	PIKEBAY	GNLCR_051	gillnet	Lake Whitefish	Adult	4	406	425
Columbia River	USBAY	GNLCR_052	gillnet	Lake Whitefish	Adult	6	422	478
Columbia River	USBAY	GNLCR_052	gillnet	Lake Whitefish	Adult	1	417	417
Columbia River	DSBAY	GNLCR_054	gillnet	Northern Pikeminnow	Adult	1	380	380
Columbia River	WSGISL	GNLCR_055	gillnet	Rainbow Trout	Adult	1	445	445
Columbia River	WSGISL	GNLCR_055	gillnet	Lake Whitefish	Adult	1	502	502
Columbia River	WSGISL	GNLCR_056	gillnet	Northern Pike	Adult	2	634	638
Columbia River	FERRUS	GNLCR_057	gillnet	Mountain Whitefish	Adult	1	404	404
Columbia River	WATEDDY	GNLCR_058	gillnet	Northern Pikeminnow	Adult	1	338	338
Columbia River	WATEDDY	GNLCR_058	gillnet	Lake Whitefish	Adult	2	395	418
Columbia River	FERRUS	GNLCR_059	gillnet	Lake Whitefish	Adult	1	448	448
Columbia River	PIKEBAY	GNLCR_060	gillnet	Rainbow Trout	Adult	1	364	364
Columbia River	PIKEBAY	GNLCR_060	gillnet	Lake Whitefish	Adult	1	397	397
Columbia River	USBAY	GNLCR_061	gillnet	Mountain Whitefish	Adult	1	359	359
Columbia River	DSBAY	GNLCR_063	gillnet	White Sturgeon	Juvenile	1		
Columbia River	WSGISL	GNLCR_064	gillnet	Mountain Whitefish	Adult	1	360	360
Columbia River	WSGISL	GNLCR_064	gillnet	Mountain Whitefish	Adult	1	305	305
Columbia River	WSGISL	GNLCR_064	gillnet	Lake Whitefish	Adult	1	405	405
Columbia River	WSGISL	GNLCR_065	gillnet	Northern Pike	Adult	1	651	651
Columbia River	WSGISL	GNLCR_065	gillnet	Mountain Whitefish	Adult	1	345	345

Columbia River	FERRUS	GNLCR_066	gillnet	Northern Pike	Adult	1	487	487
Columbia River	BALBAY	GNLCR_067	gillnet	Mountain Whitefish	Adult	4	295	340
Columbia River	BALBAY	GNLCR_067	gillnet	Lake Whitefish	Adult	2	430	435
Columbia River	BALBAY	GNLCR_067	gillnet	Lake Whitefish	Adult	5	400	440
Columbia River	FERRUS	GNLCR_068	gillnet	White Sturgeon	Adult	1		
Columbia River	FERRUS	GNLCR_068	gillnet	Longnose Sucker	Adult	1	365	365
Columbia River	FERRUS	GNLCR_068	gillnet	Lake Whitefish	Adult	9	365	445
Columbia River	FERRUS	GNLCR_068	gillnet	Lake Whitefish	Adult	5	402	475
Columbia River	WSGISL	GNLCR_069	gillnet	Rainbow Trout	Adult	1	430	430
Columbia River	WSGISL	GNLCR_069	gillnet	Northern Pikeminnow	Adult	1	377	377
Columbia River	WSGISL	GNLCR_069	gillnet	Northern Pike	Adult	2	640	645
Columbia River	WSGISL	GNLCR_069	gillnet	Mountain Whitefish	Juvenile	1	238	238
Columbia River	WSGISL	GNLCR_069	gillnet	Lake Whitefish	Adult	1	473	473
Columbia River	WSGISL	GNLCR_070	gillnet	Rainbow Trout	Adult	1	460	460
Columbia River	WSGISL	GNLCR_070	gillnet	Rainbow Trout	Adult	1	416	416
Columbia River	WSGISL	GNLCR_070	gillnet	Mountain Whitefish	Adult	1	385	385
Columbia River	WSGISL	GNLCR_070	gillnet	Longnose Sucker	Adult	1	408	408
Columbia River	WSGISL	GNLCR_070	gillnet	Longnose Sucker	Adult	1	428	428
Columbia River	WSGISL	GNLCR_070	gillnet	Lake Whitefish	Adult	2	425	430
Columbia River	ROBLAU	GNLCR_071	gillnet	Lake Whitefish	Adult	2	400	416
Columbia River	ROBLAU	GNLCR_071	gillnet	Lake Whitefish	Adult	1	360	360
Columbia River	DSBAY	GNLCR_072	gillnet	Rainbow Trout	Adult	1	430	430
Columbia River	DSBAY	GNLCR_072	gillnet	Lake Whitefish	Adult	2	410	462
Columbia River	DSBAY	GNLCR_073	gillnet	White Sturgeon	Juvenile	1		
Columbia River	DSBAY	GNLCR_073	gillnet	White Sturgeon	Juvenile	1		
Columbia River	DSBAY	GNLCR_073	gillnet	Rainbow Trout	Adult	2	318	364
Columbia River	DSBAY	GNLCR_073	gillnet	Mountain Whitefish	Adult	1	358	358
Columbia River	DSBAY	GNLCR_073	gillnet	Lake Whitefish	Adult	3	406	461
Columbia River	CENBAY	GNLCR_074	gillnet	Rainbow Trout	Adult	2	360	425
Columbia River	CENBAY	GNLCR_074	gillnet	Northern Pike	Adult	1	502	502
Columbia River	CENBAY	GNLCR_074	gillnet	Lake Whitefish	Adult	7	398	441
Columbia River	PIKEBAY	GNLCR_075	gillnet	White Sturgeon	Adult	1		
Columbia River	PIKEBAY	GNLCR_075	gillnet	White Sturgeon	Juvenile	2		
Columbia River	PIKEBAY	GNLCR_075	gillnet	Mountain Whitefish	Adult	2	318	358
Columbia River	PIKEBAY	GNLCR_075	gillnet	Mountain Whitefish	Adult	2	379	385
Columbia River	PIKEBAY	GNLCR_075	gillnet	Lake Whitefish	Adult	2	410	425
Columbia River	ZUCKP	GNLCR_076	gillnet	Walleye	Adult	3	388	436
Columbia River	ZUCKP	GNLCR_076	gillnet	Northern Pikeminnow	Adult	2	405	478
Columbia River	ZUCKP	GNLCR_076	gillnet	Mountain Whitefish	Adult	1	383	383
Columbia River	ZUCKP	GNLCR_076	gillnet	Lake Whitefish	Adult	3	393	426
Columbia River	ZUCKP	GNLCR_077	gillnet	Lake Whitefish	Adult	8	408	445
Columbia River	ZUCKP	GNLCR_078	gillnet	Tench	Adult	1	365	365
Columbia River	ZUCKP	GNLCR_078	gillnet	Northern Pike	Adult	2	735	800
Columbia River	ZUCKP	GNLCR_078	gillnet	Lake Whitefish	Adult	4	389	505
Columbia River	ZUCKP	GNLCR_079	gillnet	Walleye	Adult	1	424	424
Columbia River	ZUCKP	GNLCR_079	gillnet	Lake Whitefish	Adult	10	396	477
Columbia River	ZUCKUS	GNLCR_080	gillnet	Mountain Whitefish	Adult	1	349	349

Columbia River	ZUCKUS	GNLCR_082	gillnet	Lake Whitefish	Adult	5	365	439
Columbia River	ZUCKUS	GNLCR_083	gillnet	Largescale Sucker	Adult	1	391	391
Columbia River	ZUCKUS	GNLCR_083	gillnet	Lake Whitefish	Adult	15	388	478
Columbia River	ZUCKP	GNLCR_084	gillnet	Lake Whitefish	Adult	1	428	428
Columbia River	ZUCKP	GNLCR_085	gillnet	Rainbow Trout	Adult	2	425	495
Columbia River	ZUCKP	GNLCR_085	gillnet	Lake Whitefish	Adult	1	408	408
Columbia River	ZUCKP	GNLCR_087	gillnet	Northern Pikeminnow	Adult	1	326	326
Columbia River	FERRUS	GNLCR_090	gillnet	Mountain Whitefish	Adult	1	398	398
Columbia River	FERRUS	GNLCR_090	gillnet	Mountain Whitefish	Adult	1	394	394
Columbia River	FERRUS	GNLCR_090	gillnet	Longnose Sucker	Adult	2	363	440
Columbia River	FERRUS	GNLCR_090	gillnet	Lake Whitefish	Adult	1	455	455
Columbia River	FERRUS	GNLCR_090	gillnet	Lake Whitefish	Adult	3	396	418
Columbia River	WSGISL	GNLCR_091	gillnet	Northern Pikeminnow	Adult	2	457	461
Columbia River	WSGISL	GNLCR_091	gillnet	Longnose Sucker	Adult	1	355	355
Columbia River	WSGISL	GNLCR_091	gillnet	Lake Whitefish	Adult	1	503	503
Columbia River	WSGISL	GNLCR_092	gillnet	Rainbow Trout	Adult	2	340	425
Columbia River	WSGISL	GNLCR_092	gillnet	Mountain Whitefish	Adult	1	323	323
Columbia River	WSGISL	GNLCR_092	gillnet	Lake Whitefish	Adult	1	415	415
Columbia River	ROBLAU	GNLCR_093	gillnet	Mountain Whitefish	Adult	2	361	364
Columbia River	WSGISL	GNLCR_093	gillnet	Longnose Sucker	Adult	1	397	397
Columbia River	WSGISL	GNLCR_093	gillnet	Lake Whitefish	Adult	5	396	420
Columbia River	DSBAY	GNLCR_094	gillnet	Lake Whitefish	Adult	7	378	420
Columbia River	FERRUS	GNLCR_096	gillnet	White Sturgeon	Juvenile	1		
Columbia River	FERRUS	GNLCR_096	gillnet	Mountain Whitefish	Adult	2	335	375
Columbia River	FERRUS	GNLCR_096	gillnet	Lake Whitefish	Adult	3	386	398
Columbia River	FERRUS	GNLCR_097	gillnet	Mountain Whitefish	Adult	1	357	357
Columbia River	FERRUS	GNLCR_097	gillnet	Longnose Sucker	Adult	1	400	400
Columbia River	FERRUS	GNLCR_098	gillnet	Longnose Sucker	Adult	1	380	380
Columbia River	FERRUS	GNLCR_098	gillnet	Largescale Sucker	Adult	1	460	460
Columbia River	FERRUS	GNLCR_098	gillnet	Brook Trout	Adult	1	305	305
Columbia River	WSGISL	GNLCR_099	gillnet	Rainbow Trout	Adult	3	380	388
Columbia River	WSGISL	GNLCR_099	gillnet	Mountain Whitefish	Adult	1	300	300
Columbia River	WSGISL	GNLCR_099	gillnet	Longnose Sucker	Adult	2	378	416
Columbia River	WSGISL	GNLCR_099	gillnet	Longnose Sucker	Adult	1	392	392
Columbia River	WSGISL	GNLCR_099	gillnet	Lake Whitefish	Adult	1	410	410
Columbia River	WSGISL	GNLCR_099	gillnet	Lake Whitefish	Adult	1	435	435
Columbia River	WSGISL	GNLCR_100	gillnet	Mountain Whitefish	Adult	1	345	345
Columbia River	WSGISL	GNLCR_100	gillnet	Lake Whitefish	Adult	3	388	400
Columbia River	WSGISL	GNLCR_101	gillnet	White Sturgeon	Juvenile	1		
Columbia River	WSGISL	GNLCR_101	gillnet	Mountain Whitefish	Adult	2	355	360
Columbia River	WSGISL	GNLCR_101	gillnet	Kokanee	Adult	1	315	315
Columbia River	DSBAY	GNLCR_102	gillnet	White Sturgeon	Adult	1		
Columbia River	DSBAY	GNLCR_102	gillnet	White Sturgeon	Juvenile	2		
Columbia River	DSBAY	GNLCR_102	gillnet	Mountain Whitefish	Juvenile	1	245	245
Columbia River	DSBAY	GNLCR_102	gillnet	Mountain Whitefish	Adult	2	313	388
Columbia River	DSBAY	GNLCR_102	gillnet	Mountain Whitefish	Adult	2	318	355
Columbia River	DSBAY	GNLCR_102	gillnet	Longnose Sucker	Adult	1	394	394



Columbia River	DSBAY	GNLCR_102	gillnet	Lake Whitefish	Adult	4	355	420
Columbia River	DSBAY	GNLCR_102	gillnet	Lake Whitefish	Adult	2	406	420
Columbia River	DSBAY	GNLCR_102	gillnet	Brook Trout	Adult	1	294	294
Columbia River	CENBAY	GNLCR_103	gillnet	White Sturgeon	Adult	1		
Columbia River	CENBAY	GNLCR_103	gillnet	Walleye	Adult	1	452	452
Columbia River	CENBAY	GNLCR_103	gillnet	Mountain Whitefish	Adult	2	360	402
Columbia River	CENBAY	GNLCR_103	gillnet	Longnose Sucker	Adult	1	425	425
Columbia River	CENBAY	GNLCR_103	gillnet	Longnose Sucker	Adult	1	420	420
Columbia River	CENBAY	GNLCR_103	gillnet	Lake Whitefish	Adult	1	410	410
Columbia River	USBAY	GNLCR_104	gillnet	White Sturgeon	Juvenile	2		
Columbia River	USBAY	GNLCR_104	gillnet	White Sturgeon	Adult	3		
Columbia River	USBAY	GNLCR_104	gillnet	Northern Pike	Adult	1	460	460
Columbia River	USBAY	GNLCR_104	gillnet	Mountain Whitefish	Adult	1	320	320
Columbia River	USBAY	GNLCR_104	gillnet	Mountain Whitefish	Adult	2	358	390
Columbia River	USBAY	GNLCR_104	gillnet	Lake Whitefish	Adult	3	402	425
Columbia River	USBAY	GNLCR_104	gillnet	Lake Whitefish	Adult	1	480	480
Columbia River	PIKEBAY	GNLCR_105	gillnet	White Sturgeon	Adult	1		
Columbia River	PIKEBAY	GNLCR_105	gillnet	Rainbow Trout	Adult	1	388	388
Columbia River	PIKEBAY	GNLCR_105	gillnet	Northern Pike	Adult	1	633	633
Columbia River	PIKEBAY	GNLCR_105	gillnet	Northern Pike	Adult	1	503	503
Columbia River	PIKEBAY	GNLCR_105	gillnet	Lake Whitefish	Adult	1	412	412
Columbia River	PIKEBAY	GNLCR_105	gillnet	Lake Whitefish	Adult	2	404	418
Columbia River	USBAY	GNLCR_106	gillnet	White Sturgeon	Adult	2		
Columbia River	USBAY	GNLCR_106	gillnet	Longnose Sucker	Adult	1	375	375
Columbia River	USBAY	GNLCR_106	gillnet	Lake Whitefish	Adult	3	345	430
Columbia River	ZUCKP	GNLCR_107	gillnet	Walleye	Adult	1	408	408
Columbia River	ZUCKP	GNLCR_107	gillnet	Lake Whitefish	Adult	16	385	480
Columbia River	ZUCKP	GNLCR_108	gillnet	Walleye	Adult	1	388	388
Columbia River	ZUCKP	GNLCR_108	gillnet	Longnose Sucker	Adult	5	310	415
Columbia River	ZUCKP	GNLCR_108	gillnet	Lake Whitefish	Adult	18	383	495
Columbia River	ZUCKP	GNLCR_109	gillnet	Lake Whitefish	Adult	14	395	495
Columbia River	ZUCKP	GNLCR_110	gillnet	Lake Whitefish	Adult	4	385	408
Columbia River	ZUCKP	GNLCR_111	gillnet	Lake Whitefish	Adult	6	388	445
Columbia River	ZUCKP	GNLCR_112	gillnet	Rainbow Trout	Adult	1	353	353
Columbia River	ZUCKP	GNLCR_112	gillnet	Lake Whitefish	Adult	16	384	420
Columbia River	WSGISL	GNLCR_113	gillnet	Longnose Sucker	Adult	3	345	447
Columbia River	DSBAY	GNLCR_115	gillnet	Mountain Whitefish	Adult	1	368	368
Columbia River	DSBAY	GNLCR_115	gillnet	Longnose Sucker	Adult	1	375	375
Columbia River	DSBAY	GNLCR_115	gillnet	Lake Whitefish	Adult	7	399	424
Columbia River	DSBAY	GNLCR_116	gillnet	White Sturgeon	Adult	1		
Columbia River	DSBAY	GNLCR_116	gillnet	Rainbow Trout	Adult	2	300	406
Columbia River	DSBAY	GNLCR_116	gillnet	Mountain Whitefish	Adult	1	384	384
Columbia River	CENBAY	GNLCR_118	gillnet	Mountain Whitefish	Adult	1	320	320
Columbia River	CENBAY	GNLCR_118	gillnet	Lake Whitefish	Adult	2	416	420
Columbia River	USBAY	GNLCR_119	gillnet	Rainbow Trout	Adult	2	365	410
Columbia River	USBAY	GNLCR_119	gillnet	Lake Whitefish	Adult	3	374	440
Columbia River	PIKEBAY	GNLCR_120	gillnet	Rainbow Trout	Adult	2	430	466

Columbia River	PIKEBAY	GNLCR_120	gillnet	Lake Whitefish	Adult	7	405	440
Columbia River	PIKEBAY	GNLCR_121	gillnet	White Sturgeon	Adult	1		
Columbia River	PIKEBAY	GNLCR_121	gillnet	Rainbow Trout	Adult	1	293	293
Columbia River	PIKEBAY	GNLCR_121	gillnet	Northern Pike	Adult	1	645	645
Columbia River	PIKEBAY	GNLCR_121	gillnet	Mountain Whitefish	Juvenile	1	235	235
Columbia River	PIKEBAY	GNLCR_121	gillnet	Lake Whitefish	Adult	1	415	415
Columbia River	PIKEBAY	GNLCR_122	gillnet	Rainbow Trout	Adult	1	315	315
Columbia River	PIKEBAY	GNLCR_122	gillnet	Lake Whitefish	Adult	1	411	411
Columbia River	PIKEBAY	GNLCR_123	gillnet	White Sturgeon	Juvenile	1		
Columbia River	PIKEBAY	GNLCR_123	gillnet	Rainbow Trout	Adult	1	313	313
Columbia River	PIKEBAY	GNLCR_123	gillnet	Longnose Sucker	Adult	2	395	414
Columbia River	USBAY	GNLCR_124	gillnet	White Sturgeon	Adult	2		
Columbia River	USBAY	GNLCR_124	gillnet	Rainbow Trout	Adult	1	446	446
Columbia River	USBAY	GNLCR_124	gillnet	Rainbow Trout	Adult	2	408	438
Columbia River	USBAY	GNLCR_124	gillnet	Northern Pike	Adult	1	509	509
Columbia River	USBAY	GNLCR_124	gillnet	Lake Whitefish	Adult	6	389	442
Columbia River	USBAY	GNLCR_124	gillnet	Lake Whitefish	Adult	3	421	435
Columbia River	USBAY	GNLCR_125	gillnet	Northern Pike	Adult	1	530	530
Columbia River	CENBAY	GNLCR_126	gillnet	Longnose Sucker	Adult	1	465	465
Columbia River	CENBAY	GNLCR_126	gillnet	Lake Whitefish	Adult	2	400	445
Columbia River	CENBAY	GNLCR_126	gillnet	Lake Whitefish	Adult	3	384	442
Columbia River	WSGISL	GNLCR_127	gillnet	White Sturgeon	Adult	1		
Columbia River	WSGISL	GNLCR_127	gillnet	Mountain Whitefish	Adult	1	372	372
Columbia River	WSGISL	GNLCR_128	gillnet	Longnose Sucker	Adult	1	415	415
Columbia River	WSGISL	GNLCR_128	gillnet	Longnose Sucker	Adult	2	365	438
Columbia River	WATEDDY	GNLCR_129	gillnet	Lake Whitefish	Adult	3	412	480
Columbia River	WATEDDY	GNLCR_130	gillnet	White Sturgeon	Adult	2		
Columbia River	WATEDDY	GNLCR_130	gillnet	Lake Whitefish	Adult	3	398	475
Columbia River	PIKEBAY	GNLCR_131	gillnet	White Sturgeon	Juvenile	1		
Columbia River	PIKEBAY	GNLCR_131	gillnet	Mountain Whitefish	Adult	1	390	390
Columbia River	PIKEBAY	GNLCR_131	gillnet	Lake Whitefish	Adult	2	432	447
Columbia River	PIKEBAY	GNLCR_132	gillnet	Mountain Whitefish	Adult	2	287	343
Columbia River	PIKEBAY	GNLCR_132	gillnet	Longnose Sucker	Adult	2	378	380
Columbia River	PIKEBAY	GNLCR_132	gillnet	Lake Whitefish	Adult	3	385	437
Columbia River	USBAY	GNLCR_133	gillnet	Mountain Whitefish	Adult	3	328	370
Columbia River	USBAY	GNLCR_133	gillnet	Mountain Whitefish	Adult	3	274	391
Columbia River	USBAY	GNLCR_133	gillnet	Mountain Whitefish	Juvenile	1	194	194
Columbia River	USBAY	GNLCR_133	gillnet	Lake Whitefish	Adult	4	394	425
Columbia River	USBAY	GNLCR_133	gillnet	Lake Whitefish	Adult	1		
Columbia River	CENBAY	GNLCR_134	gillnet	White Sturgeon	Juvenile	1		
Columbia River	CENBAY	GNLCR_134	gillnet	Largescale Sucker	Adult	1	372	372
Columbia River	CENBAY	GNLCR_134	gillnet	Lake Whitefish	Adult	1	445	445
Columbia River	CENBAY	GNLCR_134	gillnet	Lake Whitefish	Adult	1	407	407
Columbia River	CENBAY	GNLCR_135	gillnet	Rainbow Trout	Adult	1	399	399
Columbia River	CENBAY	GNLCR_135	gillnet	Mountain Whitefish	Adult	2	259	385
Columbia River	DSBAY	GNLCR_136	gillnet	White Sturgeon	Juvenile	2		
Columbia River	DSBAY	GNLCR_136	gillnet	Mountain Whitefish	Adult	1	250	250

Columbia River	DSBAY	GNLCR_136	gillnet	Mountain Whitefish	Adult	3	320	378
Columbia River	DSBAY	GNLCR_136	gillnet	Lake Whitefish	Adult	2		
Columbia River	DSBAY	GNLCR_136	gillnet	Lake Whitefish	Adult	1	422	422
Columbia River	WSGISL	GNLCR_137	gillnet	White Sturgeon	Adult	2		
Columbia River	WSGISL	GNLCR_138	gillnet	White Sturgeon	Juvenile	1		
Columbia River	PIKEBAY	GNLCR_139	gillnet	White Sturgeon	Juvenile	1		
Columbia River	PIKEBAY	GNLCR_139	gillnet	Rainbow Trout	Adult	1	495	495
Columbia River	PIKEBAY	GNLCR_139	gillnet	Northern Pike	Adult	2	516	529
Columbia River	PIKEBAY	GNLCR_140	gillnet	Mountain Whitefish	Adult	1	418	418
Columbia River	PIKEBAY	GNLCR_140	gillnet	Mountain Whitefish	Adult	2	360	362
Columbia River	PIKEBAY	GNLCR_140	gillnet	Lake Whitefish	Adult	1	397	397
Columbia River	PIKEBAY	GNLCR_140	gillnet	Lake Whitefish	Adult	1	465	465
Columbia River	USBAY	GNLCR_141	gillnet	Mountain Whitefish	Adult	1	340	340
Columbia River	USBAY	GNLCR_141	gillnet	Mountain Whitefish	Adult	2	337	379
Columbia River	USBAY	GNLCR_141	gillnet	Largescale Sucker	Adult	1	402	402
Columbia River	USBAY	GNLCR_141	gillnet	Lake Whitefish	Adult	1	456	456
Columbia River	USBAY	GNLCR_141	gillnet	Lake Whitefish	Adult	1	435	435
Columbia River	CENBAY	GNLCR_142	gillnet	White Sturgeon	Adult	1		
Columbia River	CENBAY	GNLCR_142	gillnet	Mountain Whitefish	Adult	2	383	388
Columbia River	CENBAY	GNLCR_142	gillnet	Mountain Whitefish	Adult	2	265	385
Columbia River	CENBAY	GNLCR_142	gillnet	Lake Whitefish	Adult	1	388	388
Columbia River	DSBAY	GNLCR_143	gillnet	Rainbow Trout	Adult	1	420	420
Columbia River	DSBAY	GNLCR_143	gillnet	Mountain Whitefish	Adult	1	449	449
Columbia River	WSGISL	GNLCR_144	gillnet	Mountain Whitefish	Adult	2	335	362
Columbia River	WSGISL	GNLCR_144	gillnet	Mountain Whitefish	Adult	1	278	278
Columbia River	WSGISL	GNLCR_144	gillnet	Longnose Sucker	Adult	1	385	385
Columbia River	WSGISL	GNLCR_144	gillnet	Lake Whitefish	Adult	1	445	445
Columbia River	FERRDS	GNLCR_145	gillnet	Rainbow Trout	Adult	1	385	385
Columbia River	FERRDS	GNLCR_145	gillnet	Longnose Sucker	Adult	1	463	463
Columbia River	FERRDS	GNLCR_145	gillnet	Lake Whitefish	Adult	2	415	483
Columbia River	PIKEBAY	GNLCR_147	gillnet	Rainbow Trout	Adult	2	304	391
Columbia River	PIKEBAY	GNLCR_147	gillnet	Lake Whitefish	Adult	1	425	425
Columbia River	USBAY	GNLCR_148	gillnet	Northern Pike	Adult	1	493	493
Columbia River	USBAY	GNLCR_148	gillnet	Mountain Whitefish	Juvenile	1	236	236
Columbia River	USBAY	GNLCR_148	gillnet	Mountain Whitefish	Adult	1	377	377
Columbia River	USBAY	GNLCR_148	gillnet	Mountain Whitefish	Adult	1	329	329
Columbia River	USBAY	GNLCR_149	gillnet	Mountain Whitefish	Adult	2	344	345
Columbia River	USBAY	GNLCR_149	gillnet	Mountain Whitefish	Adult	2	345	372
Columbia River	USBAY	GNLCR_149	gillnet	Lake Whitefish	Adult	1	390	390
Columbia River	USBAY	GNLCR_150	gillnet	Northern Pike	Adult	1	507	507
Columbia River	FERRDS	GNLCR_153	gillnet	Brook Trout	Adult	1	255	255
Columbia River	ZUCKUS	GNLCR_154	gillnet	Walleye	Adult	1	398	398
Columbia River	ZUCKUS	GNLCR_154	gillnet	Mountain Whitefish	Adult	1	353	353
Columbia River	ZUCKUS	GNLCR_154	gillnet	Lake Whitefish	Adult	3	410	413
Columbia River	ZUCKP	GNLCR_156	gillnet	Lake Whitefish	Adult	1	430	430
Columbia River	ZUCKP	GNLCR_157	gillnet	Yellow Perch	Adult	2	177	181
Columbia River	ZUCKP	GNLCR_157	gillnet	Longnose Sucker	Juvenile	1	192	192

Columbia River	ZUCKP	GNLCR_158	gillnet	Northern Pike	Juvenile	6	146	226
Columbia River	ZUCKP	GNLCR_159	gillnet	Northern Pike	Juvenile	20	165	251
Columbia River	ZUCKP	GNLCR_160	gillnet	Northern Pike	Juvenile	41	158	286
Columbia River	ZUCKP	GNLCR_161	gillnet	Northern Pike	Juvenile	24	176	277
Columbia River	ZUCKP	GNLCR_163	gillnet	Northern Pike	Juvenile	4	151	227
Columbia River	ZUCKP	GNLCR_163	gillnet	Northern Pike	Juvenile	4	157	174
Columbia River	ZUCKP	GNLCR_164	gillnet	Northern Pike	Juvenile	14	186	275
Columbia River	ZUCKP	GNLCR_165	gillnet	Northern Pike	Juvenile	3	256	272
Columbia River	ZUCKP	GNLCR_166	gillnet	Northern Pike	Juvenile	2	225	252
Columbia River	ZUCKP	GNLCR_169	gillnet	Northern Pike	Juvenile	5	168	260
Columbia River	ZUCKP	GNLCR_170	gillnet	Northern Pike	Juvenile	4	164	219
Columbia River	ZUCKP	GNLCR_171	gillnet	Northern Pike	Juvenile	1	239	239
Columbia River	ZUCKP	GNLCR_172	gillnet	Northern Pike	Juvenile	1	207	207
Columbia River	ZUCKP	GNLCR_173	gillnet	Northern Pike	Juvenile	3	170	223
Columbia River	ZUCKP	GNLCR_175	gillnet	Northern Pike	Juvenile	2	264	296
Columbia River	ZUCKP	NLTLCR_1	n-trap	Tench	Adult	1	389	389
Columbia River	ZUCKP	NLTLCR_2	n-trap	Northern Pikeminnow	Juvenile	2	43	61
Columbia River	ZUCKP	NLTLCR_2	n-trap	Largescale Sucker	Juvenile	3	66	83
Columbia River	ZUCKP	NLTLCR_3	n-trap	Tench	Adult	1	380	380
Columbia River	ZUCKP	NLTLCR_4	n-trap	Tench	Juvenile	1	77	77
Columbia River	WATEDDY	SNLCR_1	seine net	Redside Shiner	Juvenile	217	35	52
Columbia River	WATEDDY	SNLCR_1	seine net	Northern Pikeminnow	Juvenile	2	68	73
Columbia River	WATEDDY	SNLCR_1	seine net	Longnose Sucker	Juvenile	4	46	71
Columbia River	ZUCKP	SNLCR_2	seine net	Tench	Adult	7	402	505
Columbia River	ZUCKP	SNLCR_2	seine net	Northern Pike	Juvenile	1	156	156

## Appendix G – White Sturgeon PIT Tag Information

Table 24. White Sturgeon capture data including date of capture, site, location, PIT tag number (if recorded), and length estimate (m). Data collected by the Okanagan Nation Alliance during the Northern Pike Monitoring and Suppression Program in 2022.

#	Date	UTM (Zone 11U)		Site	PIT Tag Number	Length Estimate (m)
		Easting	Northing			
1	6/2/2022	449586	5464453	CENBAY	-	1.14
2	6/2/2022	449837	5464362	CENBAY	985120019186547.00	0.86
3	6/2/2022	450068	5464340	CENBAY	-	1.43
4	6/3/2022	448330	5464838	PIKEBAY	-	1.29
5	6/3/2022	448731	5464725	USBAY	-	1.00
6	6/3/2022	453302	5456749	WATEDDY	-	1.14
7	6/7/2022	449675	5464417	CENBAY	-	0.86
8	6/7/2022	450205	5464260	DSBAY	-	0.86
9	6/7/2022	450205	5464260	DSBAY	-	1.14
10	6/9/2022	450334	5464221	DSBAY	-	0.86
11	6/13/2022	450411	5464570	FERRUS	-	1.71
12	6/13/2022	450173	5464278	DSBAY	-	0.71
13	6/13/2022	450173	5464278	DSBAY	-	0.57
14	6/13/2022	448358	5464853	PIKEBAY	-	1.71
15	6/13/2022	448358	5464853	PIKEBAY	-	0.86
16	6/17/2022	450767	5464600	FERRUS	-	0.86
17	6/20/2022	450093	5464605	WSGISL	-	0.71
18	6/20/2022	450787	5464252	DSBAY	-	1.00
19	6/20/2022	450787	5464252	DSBAY	-	0.71
20	6/20/2022	450073	5464337	CENBAY	-	1.00
21	6/20/2022	448912	5464657	USBAY	-	0.71
22	6/20/2022	448912	5464657	USBAY	-	0.86
23	6/20/2022	448447	5464784	PIKEBAY	-	2.00
24	6/20/2022	449016	5464626	CENBAY	-	0.86
25	6/28/2022	450193	5464262	DSBAY	985120019256282.00	1.00
26	6/28/2022	448458	5464776	PIKEBAY	-	1.14
27	6/29/2022	448561	5464784	PIKEBAY	985120029770710.00	0.71
28	6/29/2022	448921	5464635	USBAY	985120027009554.00	1.00
28	6/29/2022	448921	5464635	USBAY	-	1.00
29	6/29/2022	450152	5464605	WSGISL	-	0.86
30	6/29/2022	453328	5456806	WATEDDY	-	1.71
30	6/29/2022	453328	5456806	WATEDDY	985120016113233.00	0.00
31	7/5/2022	448453	5464772	PIKEBAY	985121030015557.00	0.71
32	7/5/2022	449667	5464406	CENBAY	985121030015557.00	0.57
33	7/5/2022	450247	5464234	DSBAY	985121006347696.00	0.71
34	7/5/2022	450247	5464234	WSGISL	985120026962456.00	0.71
35	7/5/2022	450154	5464602	WSGISL	985120019102242.00	1.14
36	7/5/2022	450154	5464602	WSGISL	985121006366320.00	0.86
37	7/5/2022	450249	5464566	WSGISL	-	0.71
38	7/12/2022	448440	5464762	PIKEBAY	-	0.86
39	7/12/2022	449958	5464316	CENBAY	-	1.57
40	7/12/2022	452896	5462476	KOOTOX	-	0.71

## Appendix H – Summary of Northern Pike Suppression Efforts 2014-2022

Table 25. Gillnet effort, catch-per-unit-effort (CPUE), and the number of Northern Pike (NP) removed by location (LCR = lower Columbia River; PDO = Pend d’Oreille River; XL = Christina Lake) in the Canadian Columbia Basin between 2014 – 2022 with respective sources. CPUE is calculated using number of Northern Pike captured, not Northern Pike removed.

Year	Location	Effort (hr)	NP Removed	CPUE (NP/hr)	Source
2014	LCR	475	133	0.19	Baxter 2016
2015	LCR	659	116	0.20	Baxter 2016
2016	LCR	407	39	0.13	Baxter and Doutaz 2017
	PDO*	130.1	0	-	Doutaz 2019
2017	LCR	676	35	0.05	Baxter and Lawrence 2018
	PDO*	61.88	43	-	Doutaz 2019
2018	LCR	525.3	22	0.04	Wood 2019
	PDO	308.4	15	0.05	
	LCR	11.2	0	0.00	ONA 2019
	PDO	36.6	0	0.00	
2019	LCR	357.8	34	0.10	ONA 2020
	PDO	625.7	10	0.02	
	XL	41.3	0	0.00	
2020	LCR	373.9	125	0.33	ONA 2021
	PDO	1,317.1	6	0.005	
2021	LCR	645.6	38	0.06	ONA 2022
	PDO	386.3	1	0.003	
	XL	63.32	0	0.00	
2022	LCR	769.4	168	0.21	Present
	PDO	97.8	0	0.00	
	XL	0	0	-	

\* Doutaz (2019) describes the capture of 43 Northern Pike in the Pend d’Oreille River between 2016 and 2017, but specific location data and captures by year are not available.

Table 26. Boat electrofishing effort, catch-per-unit-effort (CPUE), and the number of Northern Pike (NP) removed (specific to Northern Pike suppression programs) by location (LCR = lower Columbia River; PDO = Pend d’Oreille River; XL = Christina Lake) in the Canadian Columbia Basin between 2015 – 2022 with respective sources.

Year	Location	Effort (s)	NP Removed	CPUE (NP/hr)	Source
2015	No Sampling Conducted				
2016	No Sampling Conducted				
2017	No Sampling Conducted				
2018	LCR	19,867	5	0.91	Wood 2019
	LCR	3,032	0	0.00	ONA 2019
2019	LCR	832	0	0.00	ONA 2020
	PDO	10,714	0	0.00	
	XL	3,594	0	0.00	
2020	No Sampling Conducted				ONA 2021
2021	No Sampling Conducted				ONA 2022
2022	No Sampling Conducted				Present



Table 27. Backpack electrofishing effort, catch-per-unit-effort (CPUE), and the number of Northern Pike (NP) removed by location (LCR = Columbia River) in the Canadian Columbia Basin between 2015 – 2022 with respective sources.

Year	Location	Effort (s)	NP Removed	CPUE (NP/hour)	Source
2015	LCR	1,734	0	0.00	Golder 2015
2016	No Sampling Conducted				
2017	No Sampling Conducted				
2018	No Sampling Conducted				
2019	No Sampling Conducted				
2020	LCR	7,428	12	5.82	ONA 2021
2021	No Sampling Conducted				
2022	LCR	3,9240	10	0.92	Present

Table 28. Fyke net effort, catch-per-unit-effort (CPUE), and the number of Northern Pike (NP) removed by location (LCR = Columbia River) in the Canadian Columbia Basin between 2015 – 2022 with respective sources.

Year	Location	Effort (hr)	NP Removed	CPUE (NP/hr)	Source
2015	No Sampling Conducted				
2016	LCR	1,625	1	<0.001	ONA 2016
2017	No Sampling Conducted				
2018	No Sampling Conducted				
2019	No Sampling Conducted				
2020	LCR	21.52	0	0.00	ONA 2021
2021	No Sampling Conducted				
2022	No Sampling Conducted				

Table 29. Angling effort (by suppression crews), catch-per-unit-effort (CPUE), and the number of Northern Pike (NP) removed (specific to Northern Pike suppression programs) by location (LCR = lower Columbia River; PDO = Pend d’Oreille River) in the Canadian Columbia Basin between 2015 – 2022 with respective sources.

Year	Location	Effort (hr)	NP Removed	CPUE (NP/hr)	Source
2015	No Sampling Conducted				
2016	No Sampling Conducted				
2017	No Sampling Conducted				
2018	LCR	24	0	0.00	Wood 2019
	PDO	7.5	0	0.00	
2019	LCR	12	1	0.08	ONA 2020
	PDO	15	0	0.00	
2020	PDO	3	0	0.00	ONA 2021
2021	LCR	1	0	0.00	ONA 2022
	PDO	3	0	0.00	
2022	LCR	11.3	0	0.00	Present
	PDO	9.5	0	0.00	

Table 30. Minnow Trap effort, catch-per-unit-effort (CPUE), and the number of Northern Pike (NP) removed by location (LCR = Columbia River) in the Canadian Columbia Basin between 2015 – 2022 with respective sources.

Year	Location	Effort (hr)	NP Removed	CPUE (NP/hr)	Source
2015	LCR	74.4	0	0.00	Golder 2015
2016	No Sampling Conducted				
2017	No Sampling Conducted				
2018	No Sampling Conducted				
2019	No Sampling Conducted				
2020	LCR	277.6	1	0.004	ONA 2021
2021	No Sampling Conducted				
2022	LCR	236.4	0	0	Present

Table 31. Seine net effort, catch-per-unit-effort (CPUE), and the number of Northern Pike (NP) removed by location (LCR = Columbia River) in the Canadian Columbia Basin between 2015 – 2022 with respective sources.

Year	Location	Effort (m)	NP Removed	CPUE (NP/m)	Source
2015	No Sampling Conducted				
2016	LCR	300	0	0.00	ONA 2016
2017	No Sampling Conducted				
2018	No Sampling Conducted				
2019	LCR	60	0	0.00	ONA 2020
2020	No Sampling Conducted				
2021	LCR	296	0	0.00	ONA 2022
2022	LCR	200	1	.0005	Present

Table 32. Light trap effort, catch-per-unit-effort (CPUE), and the number of Northern Pike (NP) removed by location (LCR = Columbia River) in the Canadian Columbia Basin between 2015 – 2022 with respective sources.

Year	Location	Effort (hr)	NP Removed	CPUE (NP/hr)	Source
2015	LCR	136.2	0	0.00	Golder 2015
2016	No Sampling Conducted				
2017	No Sampling Conducted				
2018	No Sampling Conducted				
2019	No Sampling Conducted				
2020	LCR	48.0	0	0.00	ONA 2021
2021	No Sampling Conducted				
2022	No Sampling Conducted				

Table 33. Dip net effort, catch-per-unit-effort (CPUE), and the number of Northern Pike (NP) removed by location (LCR = Columbia River) in the Canadian Columbia Basin between 2015 – 2022 with respective sources.

Year	Location	Effort (m)	NP Removed	CPUE (NP/m)	Source
2015	LCR	460	0	0.00	Golder 2015

Table 34. Plankton tow effort, catch-per-unit-effort (CPUE), and the number of Northern Pike (NP) removed by location (LCR = Columbia River) in the Canadian Columbia Basin between 2015 – 2022 with respective sources.

<b>Year</b>	<b>Location</b>	<b>Effort (s)</b>	<b>NP Removed</b>	<b>CPUE (NP/hr)</b>	<b>Source</b>
2015	LCR	840	0	0.00	Golder 2015

Table 35. N-Trap effort, catch-per-unit-effort (CPUE), and the number of Northern Pike (NP) removed by location (LCR = Columbia River) in the Canadian Columbia Basin between 2015 – 2022 with respective sources.

<b>Year</b>	<b>Location</b>	<b>Effort (hr)</b>	<b>NP Removed</b>	<b>CPUE (NP/hr)</b>	<b>Source</b>
2022	LCR	48.8	0	0.00	Present