Peace Project Water Use Plan

Peace River Fish Index

Implementation Year 7

Reference: GMSMON-2

GMSMON-2 – Peace River Fish Index – 2014 Investigations

Study Period: August to October 2014

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PEACE PROJECT WATER USE PLAN

GMSMON-2 - Peace River Fish Index - 2014 Investigations

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Executive Summary

In 2007, BC Hydro implemented a Water Use Plan (WUP) for the Peace River. As part of the WUP, the Peace River Side Channel Plan was designed to improve fish habitat and productivity downstream of Peace Canyon Dam (PCD) by enhancing the quality and increasing the quantity of fish habitat available in side channel areas through in-stream physical works or by implementing an alternative minimum discharge regime. The Peace River Fish Index (GMSMON-2) was first implemented in 2008 and was designed to monitor and evaluate the effectiveness of the Side Channel Plan. GMSMON-2 represents a continuation of BC Hydro's Large River Fish Indexing Program, a similar program that was conducted in the Peace River from 2001 to 2007. Combined, these 2 programs provide 13 years of continuous fish population data for the Peace River.

GMSMON-2 will address the following key management question (BC Hydro 2008):

1. What is the population response of fish in the Peace River following the addition/modification of in-stream physical works or the implementation of an alternative minimum discharge regime?

The primary hypothesis to be tested by GMSMON-2 is as follows:

- Abundance, spatial distribution, body condition, and growth rates (length-at-age) of target fish populations in the Peace River are changing over time.

Target fish species included Arctic Grayling (*Thymallus arcticus*), Bull Trout (*Salvelinus confluentus*), and Mountain Whitefish (*Prosopium williamsoni*). These 3 species have been studied each year since 2002. Incidental catch and life history data were collected for all other species encountered.

Sampling within the GMSMON-2 study area was conducted in 3 different sections. Section 1 extended from near the outlet of PCD (RKm 20.4 as measured from WAC Bennett Dam) downstream to near the confluence of Lynx Creek (RKm 34). Section 3 extended from just downstream of the Halfway River confluence (RKm 65.8) to just upstream of Cache Creek (RKm 82.1). Section 5 extended from near the Moberly River confluence (RKm 104.9) to near the Canadian National Railway bridge (RKm 117.7). Sections 2 and 4 were delineated during previous studies but were not sampled under the current contract.

Fish were sampled by boat electroshocking within nearshore habitats (less than 2.0 m depth). Length, weight, and ageing structures were collected from all captured target species fish. All healthy target species fish caught were marked with a 13 mm food-safe polymer shell Passive Integrated Transponder (PIT) tag. Data for each target species were analyzed using a variety of different metrics. Population abundance of each target species was estimated using a Bayes sequential model (conducted by W.J. Gazey Research). These metrics were compared to results from 2002 to 2013 and some environmental parameters, such as discharge levels and water temperatures.

The key findings of the 2014 GMSMON-2 survey are summarized as follows:

- In 2014, discharge for the Peace River was low for most of the year when compared to discharges recorded between 2002 and 2013. During the 2014 study period, discharge generally decreased over Session 1, increased over Sessions 2 and 3, decreased over Session 4, and varied over Sessions 5 and 6.

- In 2014, water temperatures for the Peace River were similar to water temperatures recorded between 2008 and 2013 in Section 1 and 3. Slightly warmer than average water temperatures were noted in Section 5 from late spring to mid-summer and slightly cooler than average water temperatures were noted in Section 5 from mid-summer to early fall.
- Only 10 Arctic Grayling were recorded during the 2014 survey, the fewest since the program began in 2002. Two of those 10 fish were recaptured during subsequent sessions. Their low numbers prevented the generation of abundance estimates.
- The number of Bull Trout recorded during the 2014 survey was similar to most previous study years. Population abundance was estimated for this species for all 3 sections for the first time since the program began. In 2014, Bull Trout abundance was estimated at 240 in Section 1, 231 in Section 3, and 59 in Section 5 (530 Bull Trout for all sections combined).
- Fewer Mountain Whitefish were recorded in 2014 than during all previous study years. Capture numbers for this species have generally declined since 2011; however, abundance estimates for this species were similar to most previous study years. Tag recoveries for this species were inconsistent in Section 3 relative to Sections 1 and 5. In 2014, Mountain Whitefish abundance was estimated at approximately 11 000 individuals in Section 1, 9000 individuals in Section 3, and 14 315 individuals in Section 5 (35 000 Mountain Whitefish for all sections combined).
- In 2014, Mountain Whitefish abundance was highest in Section 5. During all previous study years, Mountain Whitefish abundance was highest in Section 1.
- Body condition and age data for the 10 Arctic Grayling recorded in 2014 were similar to previous study years.
- For Bull Trout, 2014 estimates of body condition and length-at-age were similar to previous study years.
- Several age-classes of Mountain Whitefish were underrepresented in the 2014 age-frequency histograms, most notably the age-3 cohort (i.e., the 2010/2011 spawning/incubation season). This cohort also was underrepresented in 2013 (as age-2) and 2012 (as age-1). They would have been too small to capture during the 2011 survey.
- The body condition of Mountain Whitefish increased substantially between 2012 and 2014, particularly in Section 1.
- Ageing Bull Trout scales was inaccurate due to fewer annuli relative to fin rays samples collected from the same fish. The precision of ages assigned to Bull Trout using fin ray samples likely decreases with increased age.
- Two of the 176 Rainbow Trout captured during the 2014 survey had been previously marked during the 2013 survey.
- Three of the 35 Walleye captured during the 2014 survey had been previously marked. One of those 3 was previously marked during the 2011 survey. The other 2 were marked during BC Hydro's 2010 Peace River Fish Inventory program.

In its current format, the program can successfully monitor changes in fish populations over time. However, it is unlikely to estimate most of the selected metrics with enough precision to adequately link changes in those metrics to work conducted under the Peace River Side Channel Plan.

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1.0 INTRODUCTION

BC Hydro recognizes the importance of defining impacts of the operation of its dams and reservoirs on fish populations in flow regulated watersheds to ensure that operations are both environmentally and economically sustainable. In recognition of this need and of the challenges associated with monitoring fish populations in large rivers, BC Hydro initiated the Large River Fish Indexing Program in 2001 in the Peace and Columbia River watersheds (P&E 2002). For the Peace River, the Large River Fish Indexing Program was designed to describe the effects of Peace Canyon Dam (PCD) operations on downstream Arctic Grayling (*Thymallus arcticus*), Bull Trout (*Salvelinus confluentus*), and Mountain Whitefish (*Prosopium williamsoni)* populations. The program occurred annually from 2001 to 2007. During that time period, the objective of the program was to collect data that could allow the calculation of fish population parameters at a level of resolution that could identify changes to fish populations and assist in the determination of the biological and statistical significance of those changes.

In 2007, BC Hydro implemented a Water Use Plan (WUP; BC Hydro 2007) for the Peace River. As part of the Peace WUP, the Peace River Side Channel Plan was designed and implemented to improve fish habitat and productivity downstream of PCD. A brief summary of the Peace River Side Channel Plan is provided in the Peace WUP (BC Hydro 2007) and in the GMSMON-2 Terms of Reference (BC Hydro 2008). Briefly, the Peace River Side Channel Plan will improve fish habitat by enhancing the quality and increasing the quantity of fish habitat available in side channel areas downstream of PCD through in-stream physical works or by implementing an alternative minimum discharge regime. The Peace River Fish Index (GMSMON-2) was first implemented in 2008 and was designed to monitor and evaluate the effectiveness of the Peace River Side Channel Plan. GMSMON-2 represents a continuation of data collection and analytic techniques developed under the Large River Fish Indexing Program.

1.1 Key Management Question

GMSMON-2 will address the following key management question (BC Hydro 2008):

1. What is the population response of fish in the Peace River following the addition/modification of in-stream physical works or the implementation of an alternative minimum discharge regime?

1.2 Management Hypotheses

As detailed in the Terms of Reference (BC Hydro 2008), the primary hypothesis to be tested for each target fish species is as follows:

- Abundance, spatial distribution, body condition, and growth rates (length-at-age) of target fish populations in the Peace River are changing over time.

This primary hypothesis can be broken down into the following null hypotheses for each target fish species:

- Ho_1: There is no change in the population levels of each target fish species in the Peace River over the monitoring period.

- Ho_{1a}: There is no change in the abundance of each target fish species in the Peace River over the monitoring period.
- Ho_{1b}: There is no change in the spatial distribution of each target fish species in the Peace River over the monitoring period.
- Ho_{1c}: There is no change in the body condition of each target fish species in the Peace River over the monitoring period.
- Ho_{1d}: There is no change in the growth rate (length-at-age) of each target fish species in the Peace River over the monitoring period.

For the purposes of this study, target fish species include Arctic Grayling, Bull Trout, and Mountain Whitefish. These 3 species have a large continuous dataset within the study area, as their populations have been monitoring annually since 2001 under either the Large River Fish Indexing Program (P&E 2002, P&E and Gazey 2003, Mainstream and Gazey 2004, 2005, 2006, 2007, 2008) or the Peace River Fish Index (GMSMON-2; Mainstream and Gazey 2009, 2010, 2011, 2012, 2013, 2014).

1.3 Study Objectives

The objectives of GMSMON-2 include the following (BC Hydro 2008):

1. Collect a time series of data on the abundance, spatial distribution, and biological characteristics of nearshore and shallow water fish populations in the Peace River that will build upon previously collected data.
2. Build upon earlier investigations for further refinement of the sampling strategy, sampling methodology, and analytical procedures required to establish a long-term monitoring program for fish populations.
3. Identify gaps in data and understanding of current knowledge about fish populations and procedures for sampling.

1.4 Study Area and Study Period

The GMSMON-2 study area includes an approximately 97 km section of the Peace River from the outlet of PCD (River kilometre [RKm] 20.4 as measured downstream from WAC Bennett Dam) downstream to near the Canadian National Railway bridge (RKm 117.7) that crosses the Peace River near the community of Old Fort (Figure 1).

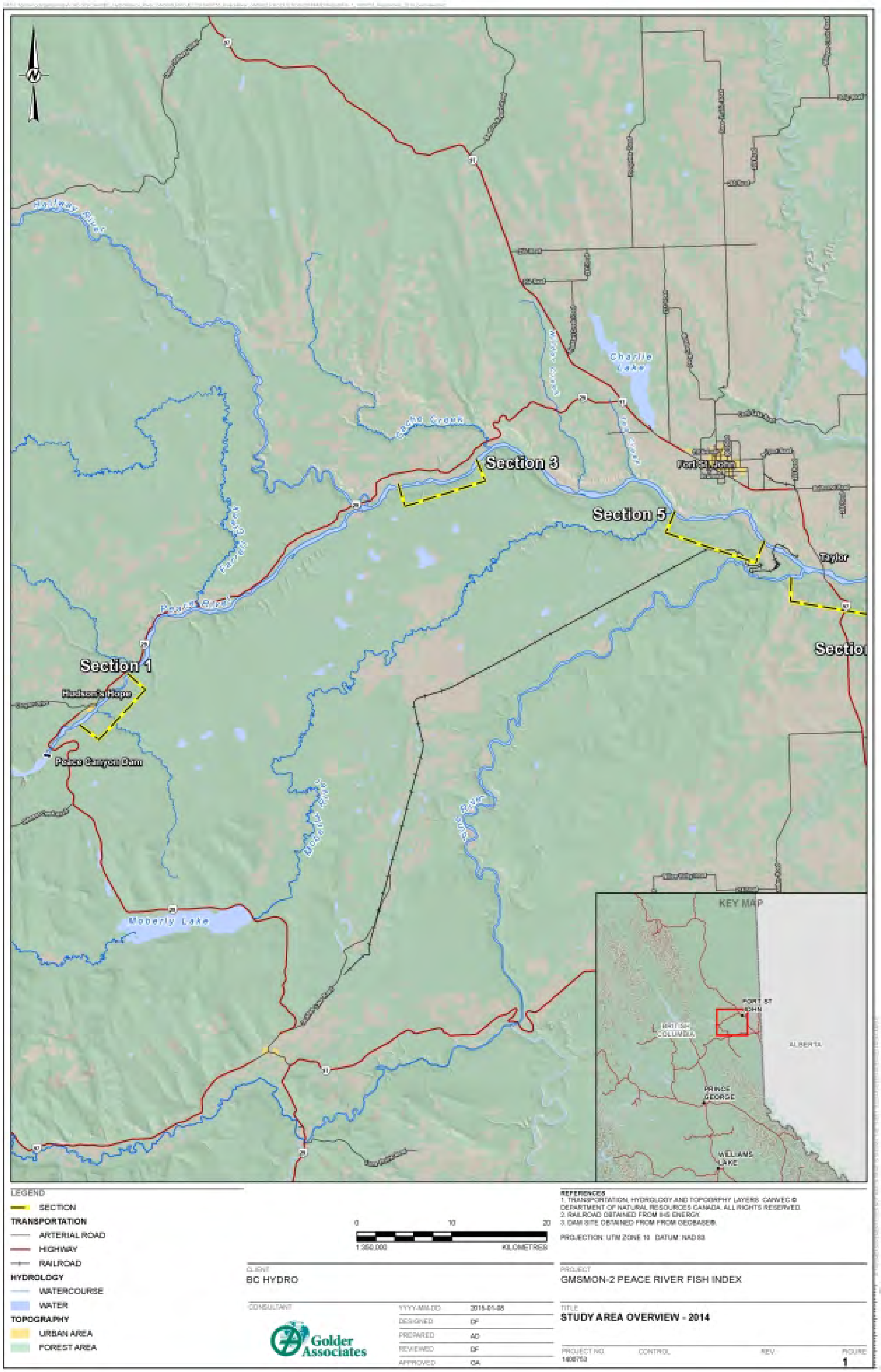

Figure 1: Overview of the Peace River Fish Index study area, 2014.

The study area was divided into 3 different sections that were previously delineated by P&E and Gazey (2003; Sections 1 and 3) and Mainstream and Gazey (2005; Section 5). Section 1 extends from near the outlet of PCD downstream to near the confluence of Lynx Creek (RKm 34). Section 3 extends from just downstream of the Halfway River confluence (RKm 65.8) to just upstream of Cache Creek (RKm 82.1). Section 5 extends from near the Moberly River confluence (RKm 104.9) to near the Canadian National Railway bridge. The location of BC Hydro's proposed Site C Dam (RKm 105.3) is located near the upstream end of Section 5. Other sections of the Peace River have been delineated and sampled under various programs (e.g., Sections 2 and 4 [P&E and Gazey 2003], Sections 6 and 7 [Mainstream 2010]); however, these areas were not sampled under the current program.

Overall, 15 sites were sampled within each of the 3 sections (45 sites in total; Appendix A, Figures A1 to A3). The locations of individual sites were established during early study years (Mainstream and Gazey 2014). The length of sites varied between 500 and 1900 m and consisted of the nearshore area along either the left or right bank of the Peace River. Site descriptions and UTM locations for all 45 sites are included in Appendix A, Table A1. Lengths of each site by habitat type are provided in Appendix C, Table C1. Habitat types were assigned using the Bank Habitat Classification System summarized in Appendix C, Table C2 (R.L.&L. 2001).

With the exception of Site 0104 and Site 0105 (Appendix A, Figure A1), each site was sampled 6 times (i.e., 6 sessions) over the study period (Table 1). During Session 2, low mainstem Peace River water levels prevented the field crew from accessing the side channel in which Sites 0104 and 0105 were located. A sample is defined as a single pass through a site while boat electroshocking (see Section 2.1.4).

Table 1: Summary of boat electroshocking sample sessions conducted in Sections 1, 3, and 5 of the Peace River under GMSMON-2, 2014.

Session	Start Date	End Date	Section		
			1	3	5
1	25-Aug	30-Aug	25, 26 Aug.	27, 28 Aug.	29, 30 Aug.
2	31-Aug	7-Sep	31 Aug., 1 Sep.	3, 4, 5 Sep.	6, 7 Sep.
3	8-Sep	14-Sep	8, 9 Sep.	10, 11, 12 Sep.	13, 14 Sep.
4	16-Sep	21-Sep	16, 17 Sep.	17, 18, 19 Sep.	20, 21 Sep.
5	22-Sep	24-Sep	22 Sep.	23 Sep.	24 Sep.
6	25-Sep	4-Oct	25 Sep., 4 Oct.	26 Sep., 4 Oct.	3 Oct.

Generally, sampling during Sessions 1 to 4 took approximately 6 days to complete and sampling during Sessions 5 and 6 took approximately 3 days to complete (see Section 2.1.5 regarding the different methods employed for each session). During Session 6, mechanical problems postponed sampling for portions of Sections 3 and 5 by approximately 6 days.

2.0 METHODS

2.1 Data Collection

2.1.1 Discharge

Hourly discharge data for the mainstem Peace River were obtained from BC Hydro (discharge through PCD). Unless indicated otherwise, discharges throughout this report are daily averages presented as cubic metres per second (m^3/s).

2.1.2 Water Temperature

Water temperatures for the Peace River near Sections 1, 3, and 5 were obtained at hourly intervals from BC Hydro's Peace River Baseline TGP/Temperature program (GMSWORKS-2; DES 2014, DES in prep.). These data were collected using Onset Tidbit™ temperature data loggers (Model #UTBI-001; accuracy ± 0.2°C). Water temperature data were summarized to provide daily average temperatures when necessary.

Spot measurements of water temperature were obtained at all sample sites at the time of sampling using a handheld Oakton ECTestr 11 (accuracy ± 0.5°C).

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2.1.3 Habitat Conditions

Habitat variables recorded at each site (Table 2) included variables recorded during previous GMSMON-2 study years (Mainstream and Gazey 2014) and variables recorded as part of other, similar BC Hydro programs (i.e., CLBMON-16 [ONA et al. 2014] and CLBMON-45 [Golder and Poisson 2014]). These data were collected to provide a means of detecting gross changes in habitat availability or suitability in the sample sites among study years. The data collected were not intended to quantify habitat availability or imply habitat preferences.

The type and amount of instream cover for fish were qualitatively estimated at all sites. Water velocities were visually estimated and categorized at each site as low (less than 0.5 m/s), medium (0.5 to 1.0 m/s), or high (greater than 1.0 m/s). Water clarity was visually estimated and categorized at each site as low (less than 1.0 m depth), medium (1.0 to 3.0 m depth), or high (greater than 3.0 m depth). Where water depths were sufficient, water clarity also was estimated using a "Secchi Bar" that was manufactured based on the description provided by Mainstream and Gazey (2014). Mean and maximum sample depths were estimated by the boat operator based on the boat's sonar depth display.

Table 2: Habitat variables recorded at each site during each session of the Peace River Fish Index, 2014.

Variable	Description
Date	The date the site was sampled
Time	The time the site was sampled
Estimated Flow Category	A categorical ranking of PCD discharge (high; low; transitional) at the time of sampling
Air Temp	Air temperature at the time of sampling (to the nearest 1°C)
Water Temp	Water temperature at the time of sampling (to the nearest 1°C)
Conductivity	Water conductivity at the time of sampling (to the nearest 10 µS/cm)
Secchi Bar Depth	The Secchi Bar depth recorded at the time of sampling (to the nearest 0.1 m)
Cloud Cover	A categorical ranking of cloud cover (Clear = 0-10% cloud cover; Partly Cloudy = 10-50% cloud cover; Mostly Cloudy = 50-90% cloud cover; Overcast = 90-100% cloud cover)
Weather	A general description of the weather at the time of sampling (e.g., comments regarding wind, rain, smoke, or fog)
Water Surface Visibility	A categorical ranking of water surface visibility (low = waves; medium = small ripples; high = flat surface)
Boat Model	The model of boat used during sampling
Range	The range of voltage used during sampling (high or low)
Percent	The estimated duty cycle (as a percent) used during sampling
Amperes	The average amperes used during sampling
Mode	The mode (AC or DC) and frequency (in Hz) of current used during sampling
Length Sampled	The length of shoreline sampled (to the nearest 1 m)
Time Sampled	The duration of electroshocker operation (to the nearest 1 second)
Netter Skill	A categorical ranking of each netters skill level (1 = few misses; 2 = misses common for difficult fish; 3 = misses are common for difficult and easy fish; 4 = most fish are missed)
Observer Skill	A categorical ranking of each observers skill level (1 = few misses; 2 = misses common for difficult fish; 3 = misses are common for difficult and easy fish; 4 = most fish are missed)
Mean Depth	The mean water depth sampled (to the nearest 0.1 m)
Maximum Depth	The maximum water depth sampled (to the nearest 0.1 m)
Effectiveness	A categorical ranking of sampling effectiveness (1 = good; 2 = moderately good; 3 = moderately poor; 4 = poor)
Water Clarity	A categorical ranking of water clarity (High = greater than 3.0 m visibility; Medium = 1.0 to 3.0 m visibility; Low = less than 1 m visibility)
Instream Velocity	A categorical ranking of water velocity (High = greater than 1.0 m/s; Medium = 0.5 to 1.0 m/s; Low = less than 0.5 m/s)
Instream Cover	The type (i.e., Interstices; Woody Debris; Cutbank; Turbulence; Flooded Terrestrial Vegetation; Aquatic Vegetation; Shallow Water; Deep Water) and amount (as a percent) of available instream cover
Recent Flow Variations	A general description of recent flow changes
Crew	The field crew that conducted the sample
Sample Comments	Any additional comments regarding the sample

2.1.4 Fish Capture

Boat electroshocking was conducted at all sites along the channel margin, typically within a range of 0.5 to 2.0 m water depth. Boat electroshocking employed a Smith-Root Inc. high-output Generator Powered Pulsator (GPP 5.0) electroshocker operated out of a 140 HP outboard jet-drive riverboat manned by a 3-person crew. The electroshocking procedure consisted of manoeuvring the boat downstream along the shoreline of each sample site. Field crews sampled large eddies (i.e., eddies longer than approximately 2 boat lengths) while travelling with the direction of water flow. The 2 crew members positioned on a netting platform at the bow of the boat netted stunned fish, while a third individual operated the boat and electroshocking unit. The 2 netters attempted to capture all fish >150 mm Fork Length (FL) that were stunned by the electrical field. Captured fish were immediately placed into a 175 L onboard live-well equipped with a freshwater pump. To prevent electroshocking-induced injuries, fish were netted one at a time (i.e., fish were not double-netted). Fish that were positively identified but avoided capture were enumerated and recorded as “observed”. Netters attempted to collect a random sample of fish species and sizes; however, netters focussed their effort on rare fish species (e.g., Arctic Grayling) or life stages (e.g., adult Bull Trout) when they were observed. This approach was employed during previous study years (Mainstream and Gazey 2014) and may cause an overestimate of the catch of these species and life stages; however, by maintaining this approach the bias remains constant among study years.

Both the time sampled (seconds of electroshocker operation) and length of shoreline sampled (kilometres) were recorded for each sample. The start and end location of each site was previously established by Mainstream and Gazey (2014); however, if a complete site could not be sampled, the difference in distance between what was sampled and the established site length was estimated, recorded on the site form, and used as the sampled length in the subsequent analyses. In 2014, reasons for field crews not being able to sample an entire site’s length included BC Hydro personnel working along the shoreline, beavers swimming in a site, and shallow water depths preventing boat access. Sites lengths ranged from 500 to 1900 m and were generally longer in Section 3 when compared to Sections 1 and 5 (Table 3).

Table 3: Number and lengths of sites sampled by boat electroshocking during the Peace River Fish Index, 2014.

Section	Number of Sites	Site Length (m)		
		Minimum	Average	Maximum
1	15	500	860	1200
3	15	950	1338	1900
5	15	560	915	1280

Amperage output was set at 2.0 A, at a frequency of 30 Hz direct current. These settings are substantially different than the settings employed by Mainstream and Gazey (2014) during previous study years. The settings used in 2014 were proven to result in less electroshocking-induced injuries on larger-bodied fish, particularly Rainbow Trout (*Oncorhynchus mykiss*; Golder 2004, 2005) and are recommended by Snyder (2003). Reducing the impacts of sampling will help ensure the long-term sustainability of the program. Although electrical output varies with water conductivity, water depth, and water temperature, field crews attempted to maintain electrical output at similar levels for all sites over all sessions.

2.1.5 Fish Processing

A site form was completed at the end of each sampled site. Site habitat conditions and the number of fish observed were recorded before the start of fish processing for life history data (Table 4). All captured fish were enumerated and identified to species, and their physical condition and general health recorded (i.e., any abnormalities were noted). Data collected from each fish were consistent with previous study years (e.g., Mainstream and Gazey 2014).

Table 4: Variables recorded for each fish encountered during the Peace River Fish Index (GMSMON-2), 2014.

Variable	Description
Species	The species of fish
Size Class	A general size class for the fish (e.g., Bull Trout will be categorized as YOY for age-0 fish, Immature for fish <250 mm FL, and Adult for fish >250 mm FL)
Length	The fork length of the fish to the nearest 1 mm
Weight	The weight of the fish to the nearest 1 g
Sex and Maturity	The sex and maturity of the fish (determined where possible through external examination)
Ageing Method	The type of ageing structure collect if applicable (i.e., scale, fin ray, otolith)
Tag Colour/Type	The type (i.e., T-bar anchor or PIT tag) or colour (for T-bar anchor tags only) of tag applied or present at capture
Tag Number	The number of the applied tag or tag present at capture
Tag Scar	The presence of a scar from a previous tag application
Fin Clip	The presence of an adipose fin clip (only recorded if present without a tag)
Condition	The general condition of the fish (e.g., alive, dead, unhealthy, etc.)
Preserve	Details regarding sample collection (if applicable)
Comments	Any additional comments regarding the fish

Fish were measured for fork length (FL) or total length (TL) depending on the species to the nearest 1 mm and weighed to the nearest 1 g using an A&D Weighing™ digital scale (Model SK-5001WP; accuracy ±1 g). Life history data were entered directly into the Peace River Fish Index Database, which is included in the CD-ROM attached to this report (referred to as Attachment A) using a laptop computer. All sampled fish were automatically assigned a unique identifying number by the database that provided a method of cataloguing associated ageing structures.

All Arctic Grayling, Burbot (*Lota lota*), Bull Trout, Lake Trout (*Salvelinus namaycush*), Mountain Whitefish, Northern Pike (*Esox lucius*), Rainbow Trout, and Walleye (*Sander vitreus*) that were in good condition following processing were marked with a 13 mm food-safe polymer-shelled full duplex ISO-type 134.2 kHz Passive Integrated Transponder (PIT) tag (SP128, Hallprint Pty Ltd., Australia). PIT tags were read using an AVID PowerTracker VIII. For Mountain Whitefish, only individuals longer than 250 mm FL were implanted with a tag; individuals less than 250 mm FL did not receive a tag.

PIT tags were inserted with a single shot 12 mm polymer PIT tag applicator gun (Hallprint Pty Ltd., Australia) into the dorsal musculature on the left side below the dorsal fin near the pterygiophores. All tags and tag applicators were immersed in an antiseptic (Super Germiphene™) and rinsed with distilled water prior to insertion.

Tags were checked to ensure they were inserted securely and the tag number was recorded in the Peace River Fish Index Database (Attachment A).

During Sessions 5 and 6, captured Mountain Whitefish that did not have a PIT tag at capture were assigned a categorical length (i.e., <250 mm FL or ≥250 mm FL) and released without further processing (i.e., fork lengths and weights were not recorded, scale samples were not collected, and PIT tags were not implanted). All other fish were sampled using the same methods employed during Sessions 1 through 4. This method was employed during previous study years by Mainstream and Gazey (2014) and allows field crews to conduct multiple sessions over a shorter time period.

To reduce the possibility of capturing the same fish at multiple sites in one session, fish were released near the middle of the site where they were captured.

2.1.6 Ageing

Scale samples were collected from all captured Arctic Grayling, Bull Trout, Kokanee (*Oncorhynchus nerka*), Mountain Whitefish (with the exceptions detailed in Section 2.1.5), and Rainbow Trout. Fin ray samples were collected from all initially captured Bull Trout, Lake Trout, Northern Pike, and Walleye. Otoliths were opportunistically collected from Mountain Whitefish that succumbed to sampling. Ageing structures (i.e., scales, fin rays, and otoliths) were collected in accordance with the methods outlined in Mackay et al. (1990). All ageing structure samples were stored in appropriately labelled coin envelopes and prepared for long-term storage.

Scales were assigned an age by counting the number of growth annuli present on the scale following procedures outlined by Mackay et al. (1990). Scales were temporarily mounted between 2 slides and examined using a digital microscope. Where possible, several scales were examined and the highest quality scale was photographed using a 3.1-megapixel digital macro camera and saved as a JPEG-type picture file. All scale images were appended to the Peace River Fish Index Database (Attachment A). All scales were examined independently by 2 experienced individuals and ages assigned. If the assigned ages differed between the 2 examiners, the sample was re-examined jointly by both examiners to establish a final age.

Fin rays were aged by counting the number of growth annuli present on the fin ray following procedures outlined in Mackay et al. (1990). Fin rays were coated in epoxy and allowed to dry. Once the epoxy dried, a jeweler's saw was used to create multiple cross-sections of each fin ray sample. The cross-sections were permanently mounted on a microscope slide using a clear coat nail polish and examined using a digital microscope. Where possible, several fin ray cross-sections were examined, and the cross-section with the most visible annuli was aged. All fin rays were examined independently by 2 experienced technicians. If the assigned ages differed between the 2 examiners, the sample was re-examined jointly by both examiners to establish a final age.

Ageing structures collected in 2014 from Kokanee, Northern Pike, Rainbow Trout, and Walleye were not aged under the current contract but are available for future analysis if required. All ageing structures collected during the 2014 field season were provided to BC Hydro for long-term storage.

When applicable, ages assigned to Mountain Whitefish during the current study were compared to ages assigned to the same individual during earlier study years (i.e., a fish aged in previous years between 2001 and 2013 and recaptured in 2014). If the age assigned in 2014 was not the correct number of years older than the age previously assigned as reported by Mainstream and Gazey (2014), the younger age was deemed to be correct and the 2014 age was adjusted accordingly.

To confirm the accuracy of scale-based Bull Trout ages, scale samples collected from 15 Bull Trout in 2014 that had fin ray samples collected during earlier study years (i.e., inter-year recaptured individuals) were aged without input from the fin ray samples. The scale-based ages from all 15 Bull Trout were between 1 and 3 years younger than their corresponding fin ray-based ages. Based on the poor precision of scale-based ages from Peace River Bull Trout, analyses for this species were limited to ages assigned using fin ray samples.

Data from Mainstream and Gazey (2013), Ford et al. (2011), and Golder (2010a) indicate that the accuracy of ages assigned to Bull Trout, Mountain Whitefish, and Rainbow Trout in regulated systems is typically low, particularly for older individuals, when ages are assigned using non-lethal ageing structures (i.e., fin ray or scale samples). For this reason, ages assigned during the current program may be younger than the true age for some individuals.

Overall, 10 Arctic Grayling (100 % of all Arctic Grayling encountered), 130 Bull Trout (approximately 92% of all Bull Trout encountered), and 494 Mountain Whitefish (approximately 15% of all Mountain Whitefish encountered) were assigned ages. During the 2014 survey, 2 Lake Trout were captured; these fish also were aged using fin ray samples collected at the time of capture.

2.2 Data Analyses

2.2.1 Data Compilation and Validation

Prior to the 2014 field season, historical data collected under the Large River Fish Indexing Program (P&E 2002; P&E and Gazey 2003; Mainstream and Gazey 2004, 2005, 2006, 2007, 2008) and the Peace River Fish Index (GMSMON-2; Mainstream and Gazey 2009, 2010, 2011, 2012, 2013, 2014) were imported into the Peace River Fish Index Database (Attachment A). The Peace River Fish Index Database is a Microsoft® Access database developed using the same format as BC Hydro's Middle Columbia River Fish Population Indexing Database (CLBMON-16; ONA et al. 2014). The database is designed to allow data to be entered directly by the crew while out in the field using Microsoft® Access 2010 software. It contains several integrated features to ensure that data are entered correctly, consistently, and completely.

Various input validation rules programmed into the database checked each entry to verify that the data met specific criteria for that particular field. For example, all species codes were automatically checked upon entry against a list of accepted species codes that were saved as a reference table in the database; this feature forced the user to enter the correct species code for each species (e.g., Rainbow Trout had to be entered as "RB"; the database would not accept "RT" or "rb"). Combo boxes were used to restrict data entry to a limited list of choices, which kept data consistent and decreased data entry time. For example, a combo box limited the choices for Cloud Cover to: Clear; Partly Cloudy; Mostly Cloudy; or Overcast. The user had to select 1 of these choices, which decreased data entry time (e.g., by eliminating the need to type out "Partly Cloudy") and ensured consistency in the data (e.g., by forcing the user to select "Partly Cloudy" instead of typing "Part Cloud" or "P.C."). The database contained input masks that required the user to enter data in a pre-determined manner. For example, an input mask required the user to enter Sample Time in 24-hour short-time format (i.e., HH:mm:ss). Event procedures ensured data conformed to underlying data in the database. For example, after the user entered life history information for a particular fish, the database automatically calculated the body condition of that fish. If the body condition was outside a previously determined range for that species (based on the measurements of other fish in the database), a message box appeared on the screen informing the user of a possible data entry error. This allowed the user to double-check the species, length, and weight of the fish before it was released. The database also allowed a direct connection between the PIT tag reader (AVID PowerTracker VIII) and the data entry form, which eliminated transcription errors associated with manually recording the 15-digit PIT tag numbers.

The database also included tools that allowed field crews to quickly query historical encounters of marked fish while the fish was in-hand. This allowed the crew to determine if ageing structures, such as fin rays, had been previously collected from a fish or comment on the status of previously noted conditions (e.g., whether a damaged fin had properly healed).

Various metrics were used to provide background information and to help set initial parameter value estimates for some analyses. Although these summaries are important, not all of them are presented or specifically discussed in detail in this report. However, these metrics are provided in the Appendices for reference purposes and are referred to when necessary to support or discount results of various analyses. Metrics presented in the appendices include the following:

- captured and observed fish count data by site, 2014 (Appendix C, Table C4);
- percent composition of sportfish and non-sportfish by study year, 2002 to 2014 (Appendix D, Table D1);
- catch rates for all sportfish (Appendix D, Table D2) and non-sportfish (Appendix D, Table D3), 2014;
- summary of captured, marked, and recaptured target species fish by session, 2014 (Appendix D, Table D4).
- length-frequency histograms (Appendix E, Figure E1), age-frequency histograms (Appendix E, Figure E2), and length-weight regressions (Appendix E, Figure E3) by year for Arctic Grayling, 2002 to 2014.
- length-frequency histograms (Appendix E, Figure E4), age-frequency histograms (Appendix E, Figure E5), and length-weight regressions (Appendix E, Figure E6) by year for Bull Trout, 2002 to 2014.
- catch curve mortalities for Bull Trout by section (Appendix E, Figure E7) and year (Appendix E, Figure E8), 2003 to 2014.
- length-frequency histograms (Appendix E, Figure E9), age-frequency histograms (Appendix E, Figure E10), length-weight regressions (Appendix E, Figure E11), and body condition at age (Appendix E, Figure E12) by year for Mountain Whitefish, 2002 to 2014.
- catch curve mortalities for Mountain Whitefish by section (Appendix E, Figure E13) and year (Appendix E, Figure E14), 2003 to 2014.

For all figures in this report, sites are ordered by increasing distance from WAC Bennett Dam (RKm 0.0) based on the upstream boundary of each site.

2.2.2 Population Estimates

A mark-recapture program was conducted on Arctic Grayling, Bull Trout, and Mountain Whitefish over the 41 day study period. During this period, 3 sections were sampled (Appendix A, Figures A1 to A3) over 6 sequential sessions (Table 1).

In the text that follows, frequent reference is made to the terms "capture probability" and "catchability". Capture probability is defined as the probability of detecting (i.e., encountering) an individual fish given that it is alive during a sampling event (Otis et al. 1978). For the current study, a sampling event is a sampling day or session within a section (1-3 sampling days, see Table 1), dependent on the estimation model used. Catchability is defined as the fraction of the population that is caught by a defined unit of effort (Ricker 1975). Under these classical definitions, the 2 terms are not synonymous. For example, if the number of fish sampled was directly related to the level of effort employed, then sessions with different levels of effort on the same population may have exhibited similar catchabilities but different capture probabilities.

Overall, the program was successful in terms of the number of tags applied and recaptured for Mountain Whitefish, but was less successful for Arctic Grayling and Bull Trout. Therefore, methodologies described (diagnostics, population estimation, catchability, and sampling power analyses) were comprehensively applied to Mountain Whitefish. Due to sparse data, only the closed population estimation methodologies without empirical diagnostics for model selection were applied for Arctic Grayling and Bull Trout.

2.2.2.1 Factors that Impact Population Estimates

The sampling program had some characteristics that must be considered with reference to the population estimation methodology and limitations of the subsequent estimates:

- The capture probability was likely heterogeneous (i.e., some fish were more likely to be caught than others) because of their spatial distribution or their reaction to the boat electroshocker.
- For Mountain Whitefish, marks were applied only to fish greater than or equal to 250 mm FL; therefore, estimates for this species are only applicable to that portion of the population.
- Fish grew over the study period such that new fish recruited into the study population (i.e., Mountain Whitefish greater than or equal to 250 mm FL) after the study commenced. However, given the short duration of the study period (41 days), growth would be small and only a small (negligible) proportion of the population would be recruited into the study population.
- Marked fish moved to sections where capture probabilities may have been different due to possible differences in sample size (sampling effort), catchability, number of marks available for recapture, or the size of the population.
- Capture probability within a section may have varied over time due to differences in catchability generated by physical-biological interactions. For instance, fish are typically collected throughout the day from depths between approximately 0.5 and 2 m; the distribution of fish within this area may vary throughout a typical day.

To investigate these characteristics, capture behaviours of marked Mountain Whitefish were examined. T-bar anchor tags were applied to fish between 2002 and 2004 under the Large River Fish Indexing Program; PIT tags were applied from 2004 through 2014 under the Large River Fish Indexing Program and GMSMON-2. For marks applied prior to 2014, the fish had to be captured in 2014 to qualify as a released mark. The proportion of marks recaptured in 2014 by tag type (T-bar anchor tag or PIT tag) and initial year of release were compared (G-test, Sokal and Rohlf 1969), as well as the time-at-large for each type of tag released. The frequencies of multiple recaptured fish also were compared following Seber (1982). Length-frequency histograms of marked and recaptured fish were examined for evidence of selectivity patterns generated by the presence of a tag. These patterns were further evaluated by combining measured fish into 25 mm fork length intervals and conducting tests of independence (G-test) for each section. Growth over the 41-day study period was examined by regressing the time at large (days) of a recaptured fish on the increment in growth (i.e., differences in fork lengths measured at the time of initial release and the time of recapture).

The movements of fish between sections during the 2014 study period as well as the movements of fish that were at-large for over a year (i.e., marked between 2002 and 2013 and recaptured in 2014) were assessed through weighting the number of recaptured fish by sampling intensity. The distance travelled upstream or downstream between initial release and recapture were determined using the upstream River Km value for each of the 45 sample sites.

2.2.2.2 Empirical Model Selection

The apparent survival (i.e., fish that survive and have not left the study area) of Mountain Whitefish over the study period was estimated using a Cormack-Jolly-Seber (CJS) model using MARK software (White 2006). Unlike other open population models (e.g., Jolly-Seber), the CJS model allows time-varying capture probabilities. Only marked fish were used in the model because their encounter histories were known. The encounter histories of individual fish were assigned to the section (i.e., Section 1, 3, or 5) that they were first encountered in. The model grouped fish by their initial capture section, regardless of their actual recapture location. The CJS model was applied to several aggregations of survival and capture probabilities over time and section. The best fit model for survival is reported here and applied to the population estimation models (see below).

The large number of recaptured Mountain Whitefish also allowed an empirical evaluation of homogeneous, heterogeneous, and time-varying capture probabilities by employing MARK (closed population capture-recapture models) software (White 2006) to calculate delta Akaike's information criteria (ΔAIC), adjusted to account for the number of parameters, and the associated model likelihoods for each section. The model notation follows that of Otis et al. (1978):

- M_o No variation in capture probability among individuals or across sample sessions;
- M_t Each individual has the same capture probability during any given session, but capture probability can vary from one session to the next;
- M_b Behavioural response in capture probability (initial capture and recapture probabilities are not the same); and
- M_h Heterogeneous capture probability among individuals.

The MARK program requires the encounter history for each fish to be known. A violation occurs when captured fish are returned to the river without being marked. This type of violation occurred for Mountain Whitefish during Sessions 5 and 6 (Section 2.1.5). The MARK program, using the same capture probabilities for all sessions, assumes that sample intensity is identical over all sessions in order for the comparison of ΔAIC's to be valid. Therefore, only the first 4 sample sessions were used for this analysis; the few fish that were returned to the river unmarked during Sessions 1 to 4 were treated as dead to approximate the assumptions that MARK requires.

A maximum likelihood estimation procedure using all the data was employed to examine changes in catchability over the 2014 study period. For each model using different assumptions about catchability changes over time or space, separate AIC values were calculated and ΔAIC values were values for comparison of the different models. The computation of AIC for the constant capture probability model using MARK may be misinterpreted because variation in sample size results in associated variation in the capture probability; however, the underlying catchability of marks may be consistent throughout the study period. If catchability is constant then the probability that an encountered fish is marked at sequence *t* (p_t) depends only on the proportion of the population that is marked, as follows:

(1) $$p_t = \frac{M_t}{M_t + U_t} = \frac{M_t}{N},$$

where M_t is the cumulative marks applied that are available for recapture at time *t*, U_t is the number of unmarked fish in the population at time *t*, and *N* is the population size that is to be estimated. The number of cumulative marks available at time *t* was adjusted (estimated) for mortality following procedures detailed below (see Equation 6). Note that if catchability varied over time, but equally for marked and unmarked fish for each sequence *t*, then p_t did not change and still reflected the proportion of the population that was marked. This is the formulation that is used in the Bayes Sequential model presented below. If the catchability of marked and unmarked fish varied over the study period, then the probability that an encountered fish was marked can be characterized as follows:

(2) $$p_t = \frac{M_t}{N \exp(b_t)} \text{ with the constraint that } \sum_t b_t = 0,$$

and where b_t is the logarithmic population deviation. Unless indicated otherwise, all reference to "time-varying catchability" in this report are characterized by Equation 2. Equation 2 also was consistent with a change in population size (population change and time-varying catchability are confounded). Log-likelihoods (*L*) were computed for these models with an assumed binomial sampling distribution:

(3) $$L \propto \sum_t \left[R_t \log_e(p_t) + (C_t - R_t)\log_e(1 - p_t) \right],$$

where R_t is the number of recovered tags in the sample of C_t fish taken at time *t*. Parameter estimates, standard deviations, and AIC values were calculated through the maximization of Equation 3 using AD Model Builder (Fournier et al. 2012) to implement the model. For these estimates, each sample day after the first session was used as a sequence.

2.2.2.3 Bayes Sequential Model for a Closed Population

A Bayesian mark-recapture model for closed populations (Gazey and Staley 1986; Gazey 1994) was applied to the mark-recapture data. The Bayesian model was adapted to accommodate adjustments for apparent mortality, movement between river sections, to allow for stratified capture probabilities, and to cope with sparse recapture data characteristic of the Arctic Grayling and Bull Trout catch. The major assumptions of the model were as follows:

1) The population size in the study area did not change or was subject to apparent mortality over the study period. Any apparent mortality was assumed to be constant over the study period and was specified (instantaneous daily mortality). Fish could move within the study area (i.e., to different sections); however, the movement was fully determined by the history of recaptured fish.

2) All fish in a stratum (i.e., sample day and section), whether marked or unmarked, had the same probability of being captured.

3) Fish did not lose their marks over the study period.

4) All marks were reported when encountered.

The following data were used by the Bayes model to generate population estimates:

- m_{ti} the number of marks applied in 2014, or marked during a previous study year and encountered in 2014 during day *t* in section *i;*
- c_{ti} the number of fish examined for marks during day *t* in section *i*;
- r_{ti} the number of recaptured fish in the sample c_{ti}; and
- d_{ti} the number of fish removed or killed at recapture r_{ti}.

For Mountain Whitefish, a fish had to be greater than or equal to 250 mm FL to be a member of m_{ti}. A fish was counted as examined (a member of c_{ti}) only if it was captured and examined for the presence of a mark and was greater than or equal to 250 mm FL. A fish was counted as a recapture (r_{ti}) only if it was a member of the sample (c_{ti}), was a member of marks applied (m_{ti}), and was recaptured in a session after its initial capture session. A fish was counted as removed (d_{ti}) if it was not returned to the river or the fish was deemed to be unlikely to survive after release.

The number of marks available for recapture, adjusted for movement, was determined by first estimating the proportion of marks released in section *i* moving to section *j* (p_{ij}). Note by the following definition:

$$\sum_j p_{ij} = 1 \cdot$$

The movements of marked fish were determined by their recapture history corrected for sampling intensity as follows:

$$\hat{p}_{ij} = \frac{\dfrac{w_{ij}}{\sum_t c_{tj}}}{\sum_j \dfrac{w_{ij}}{\sum_t c_{tj}}} \quad (4)$$,

where w_{ij} is the total number of recaptures that were released in section *i* and captured in section *j* over the study period. The maximum number of released tags available for recapture during day *t* in section *j* (m^*_{tj}) is as follows:

$$m^*_{tj} = \sum_i \hat{p}_{ij} m_{ti} \quad (5)$$.

The typical closed population model assumptions (e.g., Gazey and Staley 1986) can be adjusted for mortality, emigration of fish from the study area, and the non-detection of a mark when a fish is recaptured. Thus, the number of marks available for recapture at the start of day *t* in section *i* (M_{ti}) consists of released tags in each section adjusted for removals (mortality and emigration) summed over time:

$$M_{ti} = \sum_{v=1}^{t-h} (m^*_{vi} - d_{vi}) \exp\{(v + h - t) Q_i\} \quad (6)$$,

where Q_i is the instantaneous daily rate of apparent mortality in the *i*'th region and *h* is the number of lags or mixing days (nominally set to 3 days). The number of fish examined during day *t* in the *i*'th region (C_{ti}) does not require correction:

$$C_{ti} = c_{ti} \quad (7)$$.

Recaptured fish (R_{ti}) in the sample, C_{ti}, however, needed to be adjusted for the proportion of undetected marks (*u*) as follows:

$$R_{ti} = (1 + u) r_{ti} \quad (8)$$.

The corrected number of marks available, sampled, and recaptured (Equations 6, 7, and 8) were used in the model (Gazey and Staley 1986) to form the population estimates. If apparent mortality is assumed (Q_i>0 in Equation 6), then the population estimates represented the mean population size weighted by the information (i.e., the likelihood of recapture) contained in each sampling event during the study period.

Population size was estimated using a Microsoft Excel© spreadsheet model with macros coded in Visual Basic. The model has 2 phases. First, mark-recapture data were assembled by section under the selection criteria of minimum time-at-large (i.e., days) and minimum fork length (mm) specified by the user. Second, the user specified the sections to be included in the estimate, an annual instantaneous mortality rate, the proportion of undetected marked fish, and the confidence interval percentage desired for the output. The model then assembled the adjusted mark-recapture data (Equations 6, 7, and 8) and followed Gazey and Staley (1986) using the replacement model to compute population estimates. Output included posterior distributions, the

Bayesian mean, standard deviation, median, mode, symmetric confidence interval, and the highest probability density (HPD) interval.

Population estimates were generated for the 3 sections using marks applied in 2014, a minimum length of 250 mm FL, daily instantaneous removal rates (represents natural mortality, unobserved removals, and emigration) estimated using the CJS model, and an undetected mark rate of 0% for both Bull Trout and Mountain Whitefish. The total population estimates for the study area were obtained by summing the section estimates. For Bull Trout and Mountain Whitefish, confidence interval for the total study area estimates were calculated invoking a normal distribution under the central limit theorem with a variance equal to the sum of the variances for the sections. For Arctic Grayling, all marked fish were used to increase the available data; however, population estimates were not produced because of very sparse recoveries (0 in Section 1, 1 in Section 3, and 1 in Section 5). Minimal population estimates (i.e., the probability of *x* that the population size is at least *y*) were computed for Arctic Grayling following Gazey and Staley (1986).

2.2.3 Catchability

A key quantity of interest during the current study was catchability. If catchability was constant across years and sections, then indices of abundance, such as catch rate (i.e., the number of fish sampled per unit effort, CPUE), were comparable. Handling time to process fish, gear saturation, size selectivity by the sample gear, and other variations in physical conditions can cause systematic bias in the relationship between CPUE and abundance (Hilborn and Walters 1992). Catchability coefficients (a parameter relating abundance indices to actual abundance; Ricker 1975) were calculated using closed population assumptions, possibly subject to apparent mortality. If an index of abundance is applicable, then the coefficients should remain constant over study years and river sections. In 2014, testing catchability was of particular importance due to possible changes in sampling efficiency related to a different consultant, and, therefore, a different set of equipment, crew members, and sampling processes relative to previous study years.

An estimate for the catchability coefficient for the *i*'th section was calculated following Ricker (1975) as follows:

(9) $$\hat{q}_i = \frac{\sum_t C_{ti}}{E_i \cdot N_i},$$

where C_{ti} is from Equation 7, E_i is electroshocking effort (measured as hours of electroshocking or length of shoreline sampled) and N_i is the Bayes population estimate for Section *i*, as described in Section 2.2.2.3. Given the number of fish sampled and effort data, the variance of catchability coefficient is defined as follows:

(10) $$Var(\hat{q}_i) = \left(\frac{\sum_t C_{ti}}{E_i} \right)^2 Var\left(\frac{1}{N_i} \right),$$

where the reciprocal of estimated abundance is distributed normally and can be estimated using the following expression (Ricker 1975, p 97):

(11) $$Var\left(\frac{1}{N_i}\right)=\frac{\sum_t R_{ti}}{\left(\sum_t M_{ti}C_{ti}\right)^2}.$$

The catchability coefficient also was examined using catch rate weighted for habitat type. This metric was employed during previous study years by Mainstream and Gazey (2014). Catch rates of all captured Mountain Whitefish were calculated for each physical habitat type (i.e., physical cover present or absent as assigned by P&E and Gazey 2003; Appendix A, Table A1; Appendix C, Tables C1 and C2) within each section and year combination by dividing the total number of fish captured in the habitat type by the total length of shoreline sampled within each habitat type. Weighted catch rates per habitat type were then calculated by multiplying the habitat-specific catch rates by the number of sites within each habitat and dividing by the total number of sites sampled within each section. The sum of the weighted catch rates by section provided the overall weighted average catch rate per section. The relationship between section-specific weighted average catch rates and estimated population abundance was estimated using linear regression, yielding mean estimates and 95% prediction intervals. Estimates from the 2010 study year were excluded from the regression (Mainstream and Gazey 2011); however, these data were included in the plot.

2.2.4 Effort Required to Detect Change

To explore the precision that may be obtained under alternative sampling intensities, a simple power analysis was conducted on Mountain Whitefish sampled from Section 1. The analysis was limited to Section 1 because it was the only section sampled each year between 2002 and 2014. The analysis assumed that the Bayesian mean estimate ($\overline{N}$) was the actual population size and adjusted the data for an altered sampling factor for any sequence as follows:

(12) $$M_t'=\left[1-\left(1-\frac{M_t}{\overline{N}}\right)^f\right]\cdot\overline{N},$$

(13) $$C_t'=\left[1-\left(1-\frac{C_t}{\overline{N}}\right)^f\right]\cdot\overline{N},$$

(14) $$R_t'=R_t\cdot\frac{M_t'}{M_t}\cdot\frac{C_t'}{C_t},$$

where f is the sampling factor (e.g., f = 2 represents a doubling of sampling effort), M_t is the number of marks applied at the start of the t^{th} sampling sequence, C_t is the total number of fish examined for marks, and R_t is the number of recaptured marks. The prime notation represents the data generated for a specified sampling factor. Since the number of fish sampled is small in relation to the population size, a sampling factor of 2 nearly doubles the marks applied and quadruples the recoveries.

For the purposes of this analysis, precision was defined as half of the 80% HPD expressed as a percentage of the mean. If the posterior distribution was perfectly symmetrical, then the precision definition would equate to the plus/minus 80% confidence interval.

2.2.5 Catch and Life History Data

Unless stated otherwise, catch rates were calculated based on the number of fish captured plus observed fish (i.e., fish that were observed and positively identified to species but avoided the netter). Catch rates for each site were expressed as the number of fish captured and observed per kilometre of shoreline sampled per hour of electroshocker operation (CPUE = no. fish/km/h). The CPUE for each session was the sum of the number of fish captured and observed per kilometre of shoreline sampled per hour of electroshocker operation for all sites within a section. The average CPUE was estimated for each section by averaging the CPUE from all sites for all sessions within the section. The standard error of the mean CPUE was calculated by using the square root of the variance of the CPUE from all sites for all sessions within the section divided by the number of sampling events.

Length-frequencies were implemented using the statistical environment R, v. 3.1.0 (R Development Core Team 2014). Frequency plots were constructed for fork lengths by year, for all years combined, by section within 2014, and for all sections combined within 2014. Fork lengths were plotted using 10 mm bins. Plotting was performed using the package ggplot2 (Wickham 2009).

Similar to length-frequency, age-frequency plots were constructed by year, for all years combined, by section within 2014, and for all sections combined within 2014. Plotting was performed using the package ggplot2 (Wickham 2009).

Fulton's body condition index (*K*; Murphy and Willis 1996) was calculated as follows:

(15) $K = \left(\frac{Wt}{L^3}\right) \times 100\,000$

Where *Wt* was a fish's weight (g) and *L* was a fish's fork length (mm). Frequency plots of body condition estimates for 2014 were constructed for Bull Trout and Mountain Whitefish only, since only 10 Arctic Grayling were captured during 2014 sampling. In addition to the 2014-only plots, body condition was plotted for all previous years, by section. Mean condition values were estimated for each year and section combination, along with their respective 95% confidence intervals. These plots were constructed for all 3 target species.

Length-at-age data were used to construct 3-parameter von Bertalanffy models (Quinn and Deriso 1999) for each species:

(16) $L(t) = L_{\infty} \times (1 - exp^{-K(t-t0)})$,

where L_{∞} is the asymptotic length of each species, *K* is the curvature parameter (i.e., growth rate), and *t0* is the theoretical time when a fish has length zero. For Arctic Grayling and Mountain Whitefish, non-linear modeling in R was used to evaluate all 3 parameters of interest. For Bull Trout, the asymptotic length could not be evaluated due to lack of fish along the flat portion of the curve. Hence, L_{∞} was fixed at 900 mm FL. This length was estimated based on previous capture data (Attachment A). Only 10 Arctic Grayling were captured in 2014, resulting in insufficient data to construct a von Bertalanffy curve for the current study year. Instead, year-specific curves were estimated for all preceding years, and 2014 data were overlaid as individual data points. In addition to growth curves, length-at-age data were used to determine change in length-at-age among sampling years. For each sampling year *i*, the mean fork length of all sample years excluding Year *i* was estimated, and the estimated mean was subtracted from the individual fork lengths sampled in Year *i*. The mean and 95% confidence intervals of the estimated differences in fork lengths were then calculated for each year.

Length-weight regressions (Murphy and Willis 1996) were calculated for all 3 species of interest as follows:

(17) $W = a \times L^b$

Where *W* is weight (g) and *L* is fork length (mm).

Catch curves (Ricker 1975) were estimated for Arctic Grayling, Bull Trout, and Mountain Whitefish using year-specific data (with all sections combined). In addition, 2014 data were used to construct section-specific catch curves; this was performed for Bull Trout and Mountain Whitefish only, due to scarce data for Arctic Grayling in 2014. Instantaneous total mortality (*Z*) was estimated using ordinary least squares regression of natural logarithm-transformed counts of fish at age, performed on the descending arm of the age distribution:

(18) $\ln(N_t) = \ln(N_0) - Z \times t,$

where N_0 is the number of fish at the first age-class included in the catch curve analysis, *Z* is instantaneous total mortality, and *t* is years. Survival was then estimated as $S = e^{-Z}$. Annual mortality (*A*) was calculated as 1-*S*. Confidence intervals (95%) around the annual mortality estimates were calculated using the confidence interval estimated during regression around *Z*, converting it to confidence interval around *A* as described above.

3.0 RESULTS

3.1 Physical Parameters

3.1.1 Discharge

Overall, discharge for the Peace River (i.e., discharge through PCD) was low in 2014 when compared to average discharge values recorded over all other study years combined (i.e., 2002 to 2013; Figure 2). Mean daily discharge in the Peace River at PCD was greater than average from mid-January to early March, but lower than average for the remainder of the year. For most of the year, discharges remained within the range of discharges recorded between 2002 and 2013 (Appendix B, Figure B1). During a typical year, discharge through PCD gradually decreases from January to early June, increases from early June to mid-July (due to freshet flows), remains near stable from mid-July to early October, and increases from early October to late December (associated with increased hydropower generation). In 2014, discharge decreased from January to early June, remained low for most of the period from early June to early November, increased from early to mid-November, and remained low, relative to previous study years, from mid-November to the end of December.

During the 2014 study period, discharge generally decreased over Session 1, increased over Sessions 2 and 3, decreased over Session 4, and was variable over Sessions 5 and 6 (Figure 2).

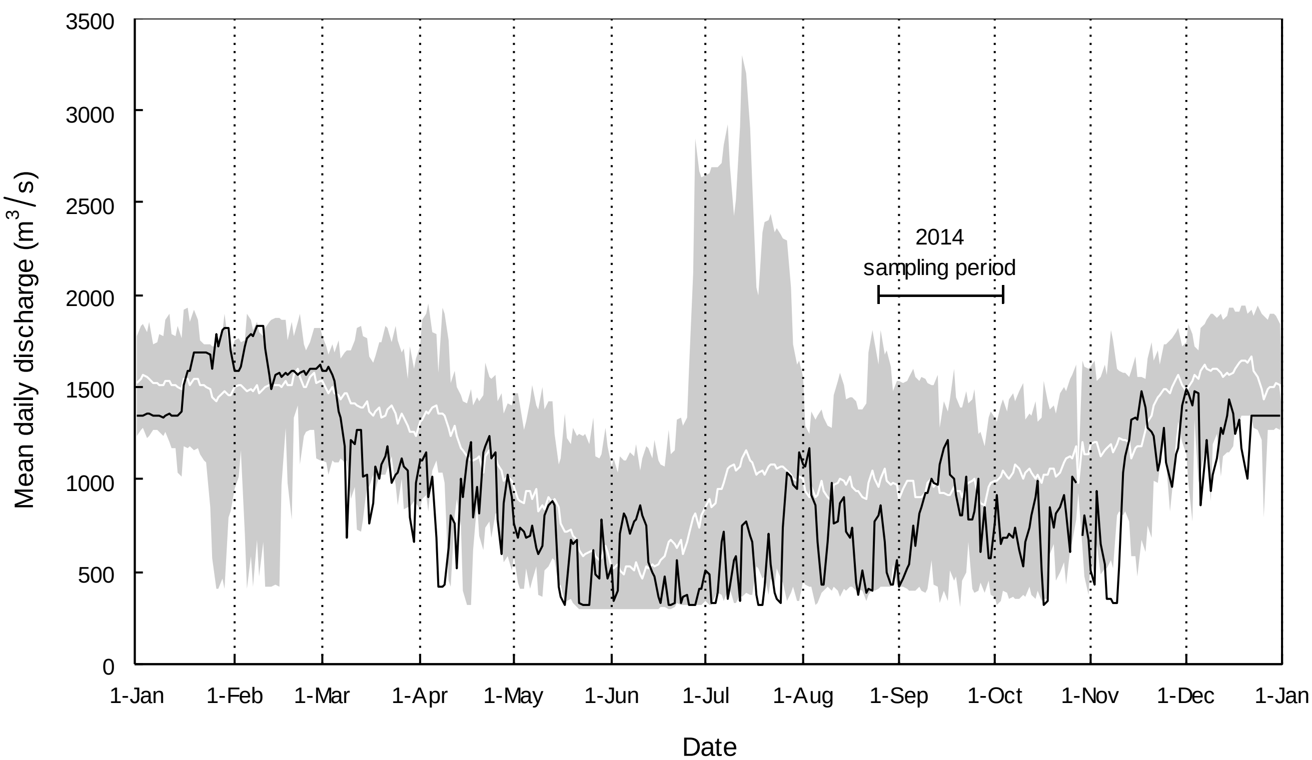

Figure 2: Mean daily discharge (m^3/s) for the Peace River at Peace Canyon Dam, 2014 (black line). The shaded area represents minimum and maximum mean daily discharge values recorded at the dam from 2002 to 2013. The white line represents average mean daily discharge values over the same time period.

3.1.2 Water Temperature

During a typical study year, water temperatures are generally lower in Section 1 during the spring and summer and generally higher in Section 1 during the fall and winter when compared to Sections 3 and 5 (Appendix B, Figure B2; DES 2014, DES in prep.). Also during a typical year, Peace River water temperatures remain low (generally less than 2°C) from January to early April, gradually increase from early April to early September, and gradually decrease from early September to late December (Appendix B, Figures B3 to B5).

In 2014, Peace River water temperatures were similar to temperatures recorded between 2008 and 2013 for all 3 sections for most of the year. Water temperatures for Section 3 (i.e., the middle of the study area) are provided in Figure 3; water temperatures for Section 1 and 5 are provided in Appendix B, Figures B3 and B5, respectively. In Section 5, water temperatures were warmer than normal from May to mid-July and colder than normal from early August to mid-September (Appendix B, Figure B5). During the 2014 study period (i.e., August 25 to October 4), water temperatures in Section 1 varied between a low of 8.3°C on 27 August and a high of 12.9°C on September 8 (Appendix B, Figure B3). In Section 3, water temperatures varied between a low of 8.8°C on October 2 and a high of 13.6°C on September 4 (Appendix B, Figure B4). In Section 5, water temperatures varied between a low of 8.3°C on October 1 and a high of 12.4°C on September 6 (Appendix B, Figure B5). Spot temperature readings for the Peace River taken at the time of sampling ranged between 8.7°C and 12.5°C and were warmer in Section 1 when compared to Sections 3 and 5 (Appendix C, Table C1).

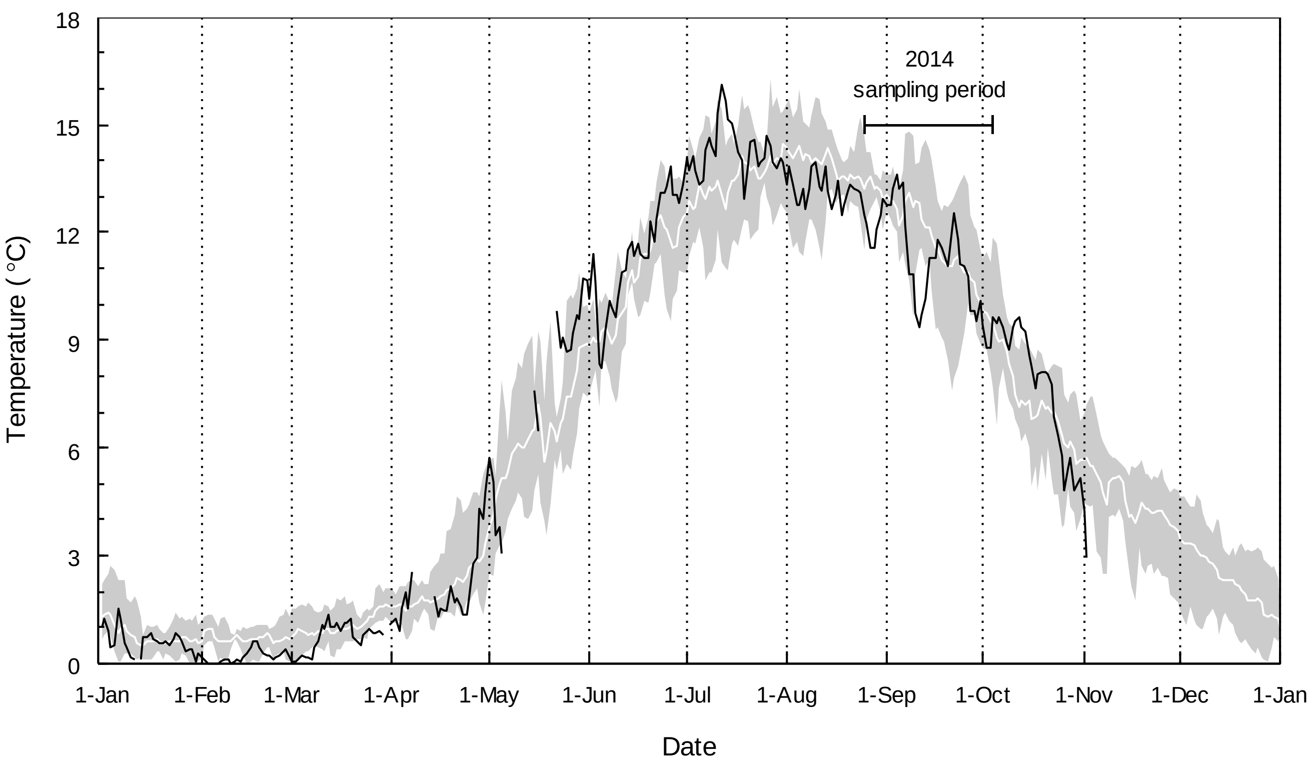

Figure 3: Mean daily water temperature (°C) for the Peace River recorded near the Halfway River confluence, 2014 (black line). The shaded area represents the minimum and maximum mean daily water temperature values recorded at that location between 2008 and 2013. The white line represents the average mean daily water temperature during the same time period. Data were collected under GMSWORKS-2 (DES 2014).

3.1.3 Habitat Variables

A thorough description of fish habitat available in the study area is provided by Mainstream (2012). Habitat variables collected at each site during the present study are provided in Appendix C, Table C3 and are also included in the Peace River Fish Index Database (Attachment A). Each site was categorized into various habitat types using their bank habitat type as assigned by R.L.&L. (2001) and the presence or absence of physical cover as assigned by P&E and Gazey (2003). The Bank Habitat Type Classification System is summarized in Appendix C, Table C2. Sampling locations within Sections 1, 3, and 5, along with their habitat classifications, are illustrated in Appendix A, Figures A1, A2, and A3, respectively. Site lengths were calculated using ArcView® GIS software and are summarized by bank habitat type and physical cover in Appendix C, Table C1. Fish counts by species for each habitat type are summarized in Appendix C, Table C4. Overall, habitat data recorded during the survey did not suggest any substantially changes to fish habitat between the 2013 and 2014 study periods.

3.2 General Characteristics of the Fish Community

In 2014, 33 382 fish from 16 different species were recorded in the Peace River (sculpin and sucker groups were not identified to species or were combined for this analysis; Table 5). This includes captured and observed fish that were identified to species. Of those 16 species, 10 were classified as sportfish and 6 were classified as non-sportfish (4 cyprinids, sculpin spp., and sucker spp.), Catch was greatest in Section 3 (42% of the total catch), followed by Section 5 (40%), and Section 1 (18%) (Table 5).

Mountain Whitefish were the most common species encountered, representing 83% of the total catch. Sucker spp. and sculpin spp. were the next most abundant species, representing 12% and 3% of the total catch, respectively, followed by Bull Trout (1%) and Rainbow Trout (1%). The remaining 11 species combined accounted for less than 1% of the total catch and included the following species in decreasing order of abundance: Northern Pikeminnow (*Ptychocheilus oregonensis*; *n* = 50), Kokanee (*n* = 48), Walleye (*n* = 35), Lake Whitefish (*Coregonus clupeaformis; n* = 32), Northern Pike (*n* = 22), Arctic Grayling (*n* = 12), Lake Chub (*Couesius plumbeus; n* = 4), Lake Trout (*n* = 2), Longnose Dace (*Rhinichthys cataractae; n* = 2), Burbot (*n* = 1), and Redside Shiner (*Richardsonius balteatus; n* = 1).

In general, cold-water species (as defined by Mainstream 2012), such as Bull Trout, Mountain Whitefish, and Rainbow Trout, were found throughout all 3 sections of the study area. Cool-water species (Mainstream 2012), such as Northern Pike and Walleye, were typically more common in the downstream portions of the study area (Table 5).

Arctic Grayling catch rates declined between 2011 and 2014; however, confidence intervals overlapped for most estimates. The 2014 catch rate was the lowest on record since sampling procedures were standardized in 2002 (P&E and Gazey 2003; Figure 4). The 2014 catch rate (5 fish/km/h) was approximately 28% of the highest catch rate recorded for this species in 2004 (18 fish/km/h). The declining trend over multiple study years (2011 to 2014) suggests that the trend is real and is not an artifact of changes in annual sampling efficiency. Reasons for the decline are not known.

Table 5: Number of fish caught and observed by boat electroshocking and their frequency of occurrence in sampled sections of the Peace River, 25 August to 4 October 2014.

Species	Section 1		Section 3		Section 5		All Sections	
	n[a]	%[b]	*n*[a]	%[b]	*n*[a]	%[b]	*n*[a]	%[b]
Sportfish								
Arctic Grayling			6	<1	6	<1	**12**	**<1**
Bull Trout	67	1	122	1	36	<1	**225**	**<1**
Burbot					1	<1	**1**	**<1**
Kokanee	37	<1	10	<1	1	<1	**48**	**<1**
Lake Trout	2	<1					**2**	**<1**
Lake Whitefish			32	<1			**32**	**<1**
Mountain Whitefish	5270	97	11 297	97	11 009	99	**27 576**	**98**
Northern Pike			14	<1	8	<1	**22**	**<1**
Rainbow Trout	34	<1	127	1	15	<1	**176**	**<1**
Walleye	1	<1	1	<1	33	<1	**35**	**<1**
Sportfish Subtotal[c]	**5411**	**19**	**11 609**	**41**	**11 109**	**39**	**28 129**	**100**
Non-sportfish								
Lake Chub			3	<1	1	<1	**4**	**<1**
Longnose Dace					2	<1	**2**	**<1**
Northern Pikeminnow	9	1	32	1	9	<1	**50**	**<1**
Redside Shiner					1	<1	**1**	**<1**
Sculpin spp.[d]	415	64	325	14	179	9	**919**	**18**
Sucker spp.[d]	226	35	1906	84	1898	91	**4030**	**81**
Non-Sportfish Subtotal[c]	**650**	**13**	**2266**	**45**	**2090**	**42**	**5006**	**100**
All Species	**6061**		**13 875**		**13 199**		**33 135**	

[a] Includes fish observed and identified to species; does not include recaptured fish.

[b] Percent composition of sportfish or non-sportfish catch.

[c] Percent composition across sections.

[d] Not identified to species or combined for analysis.

Bull Trout catch rates in 2014 were similar to other study years (Figure 4). However, catch rates for this species generally declined each year after reaching a high in 2012.

Mountain Whitefish catch rates were near stable between 2002 and 2010, increased substantially in 2011, and decreased during each successive year between 2011 and 2014 (Figure 4). Catch rates for this species were lower in 2014 than during any other study year. Catch rates declined an average of approximately 20% each year between 2011 and 2014. Reasons for the decline are not known.

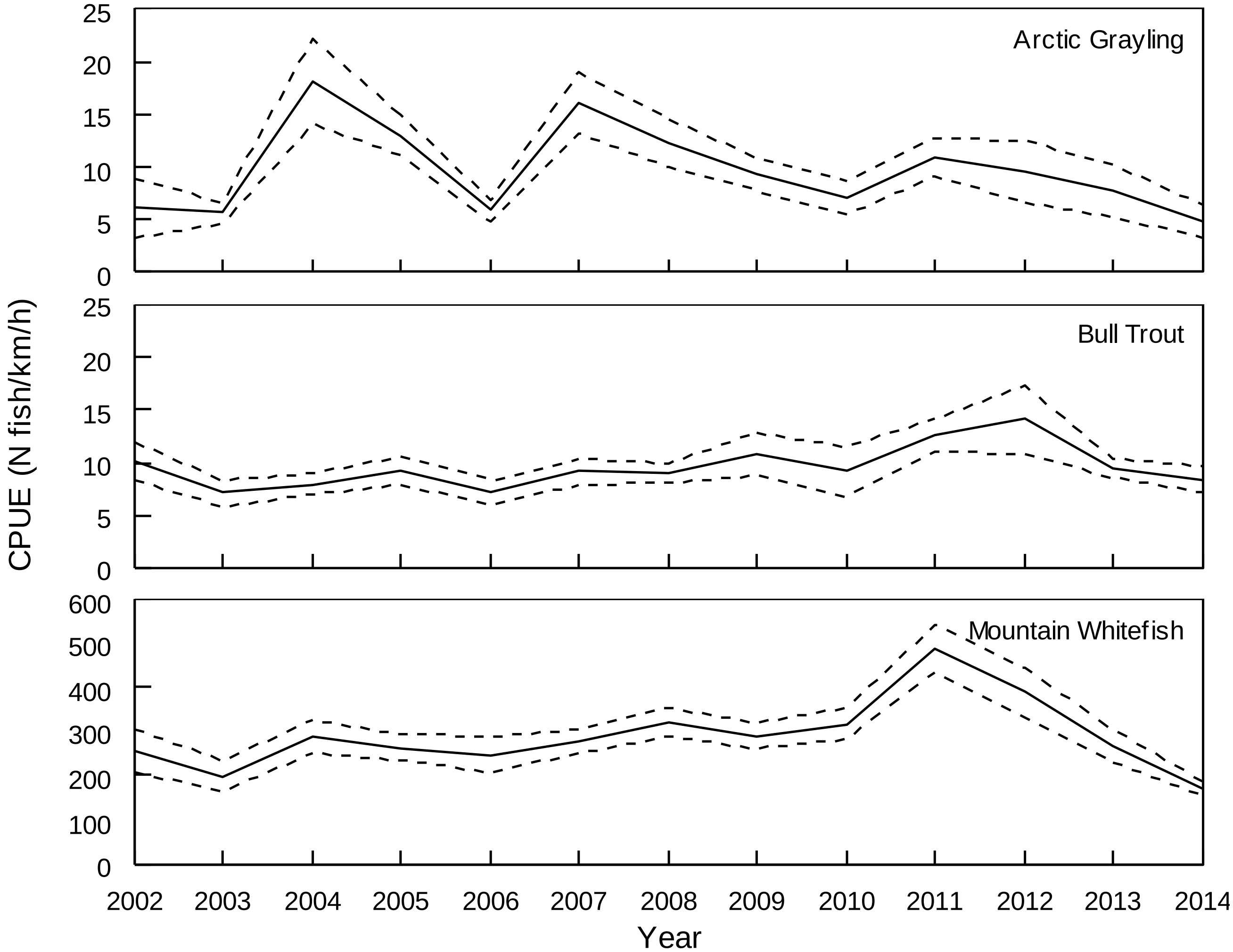

Figure 4: Mean annual catch rates for Arctic Grayling, Bull Trout, and Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, 2002 to 2014. The dashed lines denote 95% confidence intervals. Analysis included captured fish only; all size-cohorts combined.

3.3 Arctic Grayling

3.3.1 Biological Characteristics

During the 2014 survey, 10 Arctic Grayling were initially captured (i.e., excludes recaptured fish); 5 were captured in Section 3 and 5 were captured in Section 5 (Table 6). Arctic Grayling were not recorded in Section 1 during the 2014 survey. Fork lengths ranged between 215 and 380 mm; weights ranged between 132 and 758 g. Scale samples were analyzed from all 10 individuals; ages ranged between age-1 and age-4. All 5 of the Arctic Grayling recorded in Section 5 were age-1.

The low number of Arctic Grayling captured in 2014 precluded a detail interpretation of length-frequencies by sample section for this species (Figure 5). The low number of capture Arctic Grayling in 2014 also hindered comparisons to previous years' length-frequency histograms (Appendix E, Figure E1); however, fork lengths for all 10 of the Arctic Grayling captured in 2014 were consistent with previous study years.

Table 6: Age, fork length, weight, and body condition data for Arctic Grayling captured during boat electroshocking surveys in the Peace River, 2014.

Section 3					Section 5				
Sample Number	**Age**	**Fork Length (mm)**	**Weight (g)**	**Body Condition (*K*)**	**Sample Number**	**Age**	**Fork Length (mm)**	**Weight (g)**	**Body Condition (*K*)**
4602	1	215	132	1.33	7093	1	228	143	1.21
328	2	296	338	1.30	1180	1	232	176	1.41
4222	2	302	374	1.36	5092	1	245	188	1.28
5671	2	304	390	1.39	2794	1	251	219	1.39
775	4	380	758	1.38	6582	1	252	228	1.43

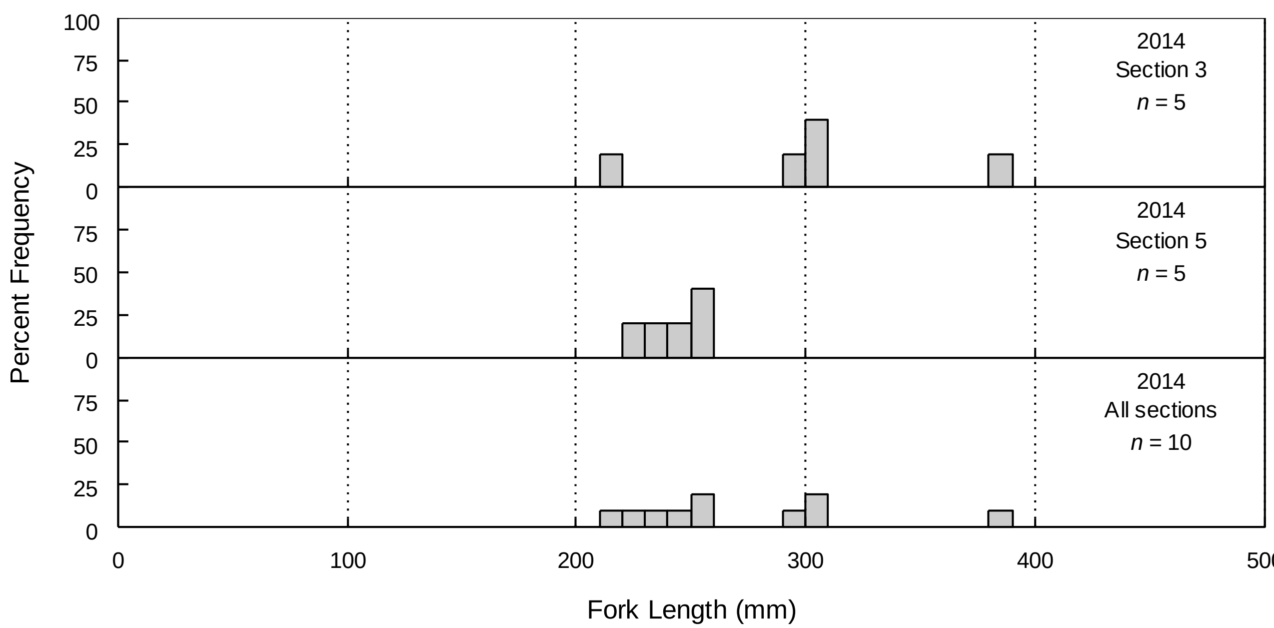

Figure 5: Length-frequency distribution for Arctic Grayling captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014. In 2014, Arctic Grayling were not recorded in Section 1.

The interpretation of age-frequency distributions for Arctic Grayling in 2014 was limited due to the low number of captured and aged individuals (Figure 6). Age-3 Arctic Grayling were not recorded during the 2014 survey. Age-1 and age-2 Arctic Grayling were underrepresented in the 2012 and 2013 study years, respectively

(Appendix E, Figure E2). Although based on few captures, these data suggest low Arctic Grayling recruitment from the 2011 spawning season.

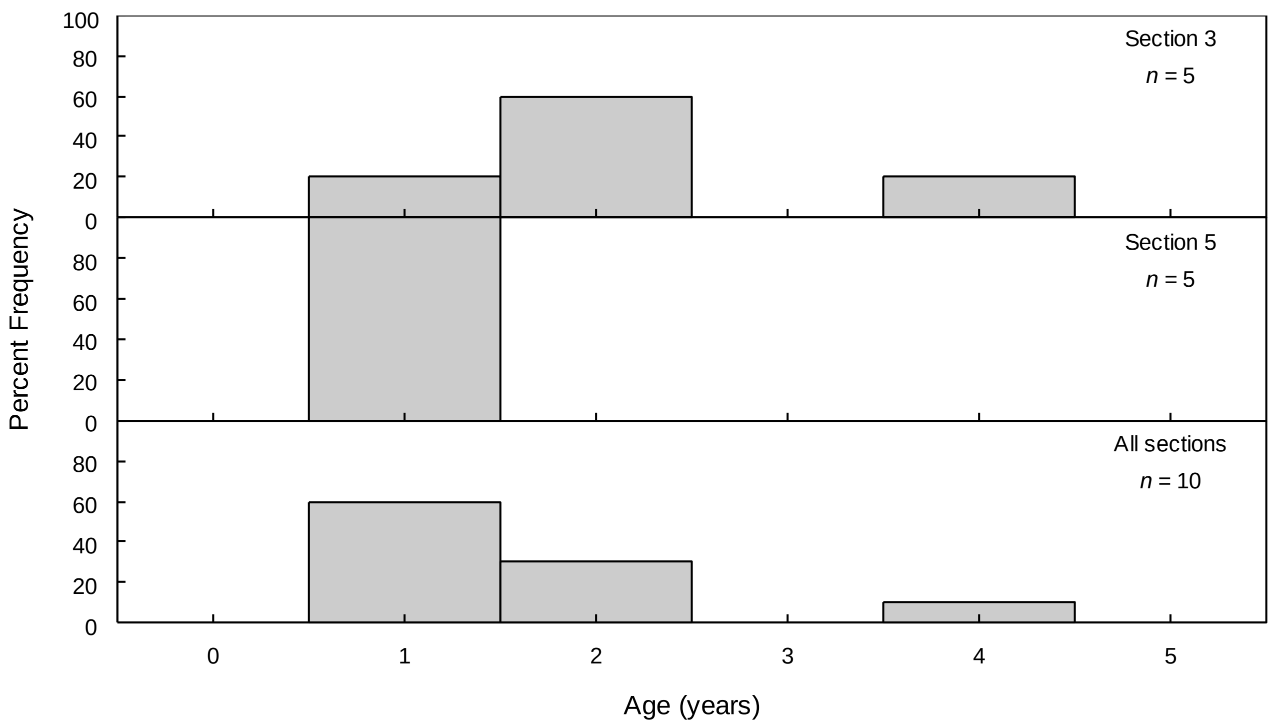

Figure 6: Age-frequency distributions for Arctic Grayling captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014.

The low number of Arctic Grayling captured and aged during the 2014 survey prevented the generation of an accurate von Bertalanffy growth curve for this species. To provide a basic measure of growth for this species in 2014, length-at-age data for the 10 Arctic Grayling that were encountered in 2014 was overlaid with von Bertalanffy growth curves generated using data from earlier study years (Figure 7). Overall, the 10 Arctic Grayling recorded in 2014 were large relative to historical data. The change in length-at-age analysis for this species (Figure 8) supports this theory, particularly for the age-1 cohort, which was approximately 40 mm longer than a typical study year, but based on only 6 fish. The length of the age-1 cohort increased during each successive year between 2011 and 2014, although confidence intervals overlapped for some estimates.

The body condition (*K*) of the 10 Arctic Grayling captured during the 2014 study period ranged between 1.207 and 1.425 (Table 6). In 2014, body condition was similar in Section 3 and Section 5 for this species; Arctic Grayling were not recorded in Section 1 in 2014. In Section 5, average body condition was higher in 2014 when compared to 2013 estimates (Figure 9). In Section 3, average body condition also was higher in 2014 when compared to 2013 estimates; however, confidence intervals overlapped for these estimates. Overall (all sections), Arctic Grayling body condition generally increased each year between 2011 and 2014.

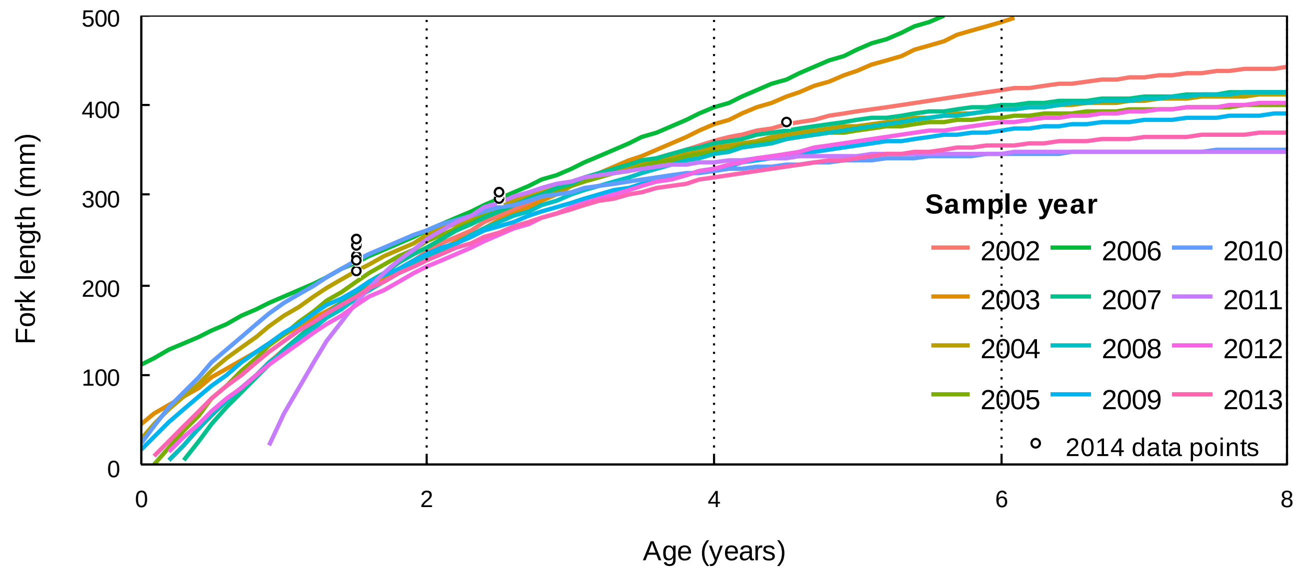

Figure 7: von Bertalanffy growth curves for Arctic Grayling captured by boat electroshocking in sampled sections of the Peace River, 2002 to 2014. Data points represent Arctic Grayling captured in 2014. Lines represent growth curves generated using 2002 to 2013 data.

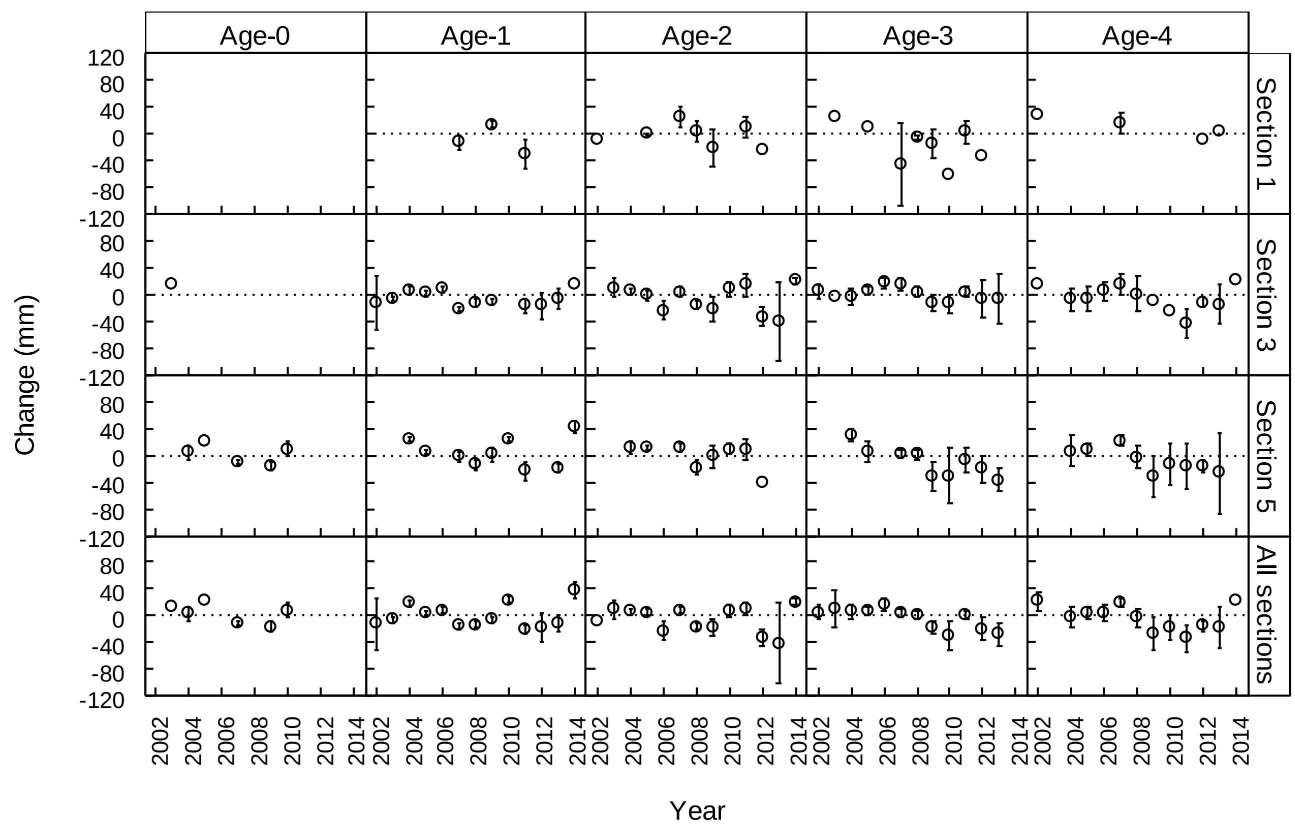

Figure 8: Change in mean length-at-age for Arctic Grayling captured by boat electroshocking in the Peace River, 2002 to 2014. Change is defined as the difference between the annual estimate and the estimate of all years combined. Vertical lines represent 95% confidence intervals.

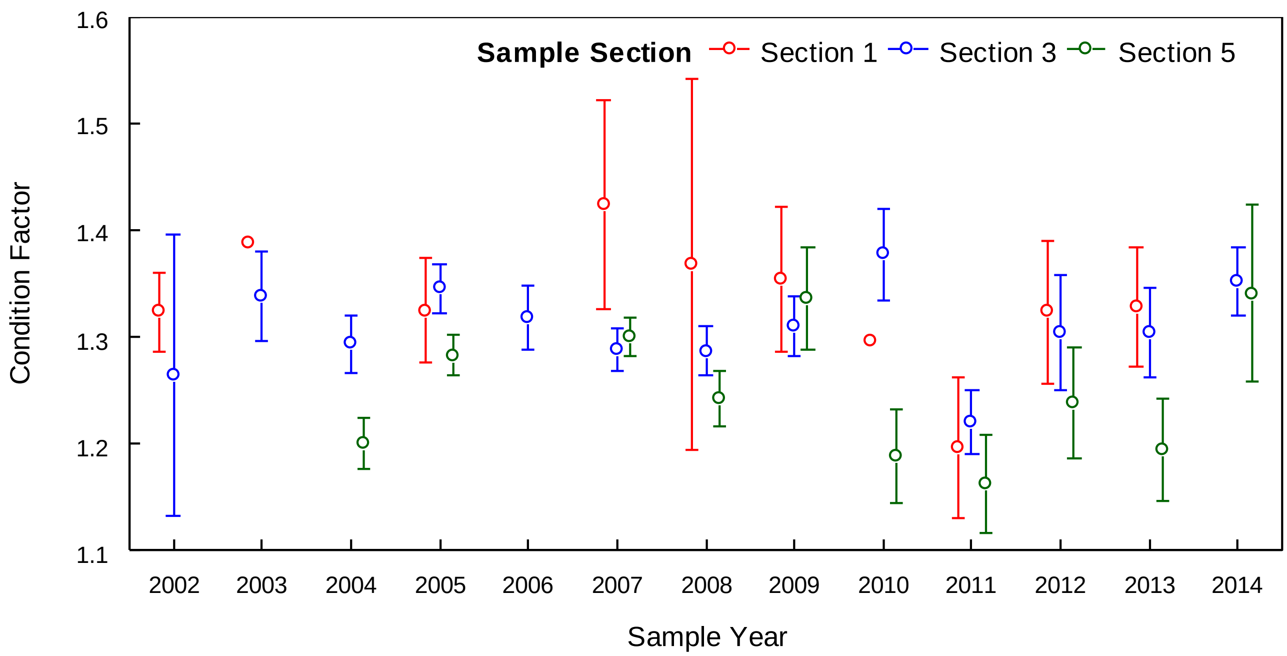

Figure 9: Mean body condition with 95% confidence intervals for Arctic Grayling captured by boat electroshocking in sampled sections of the Peace River, 2002 to 2014.

Interpreting results of the length-weight regression analysis was difficult for Arctic Grayling in 2014 due to the low number measured individuals (Figure 10); however, results were consistent when compared to previous study years (Appendix E, Figure E3).

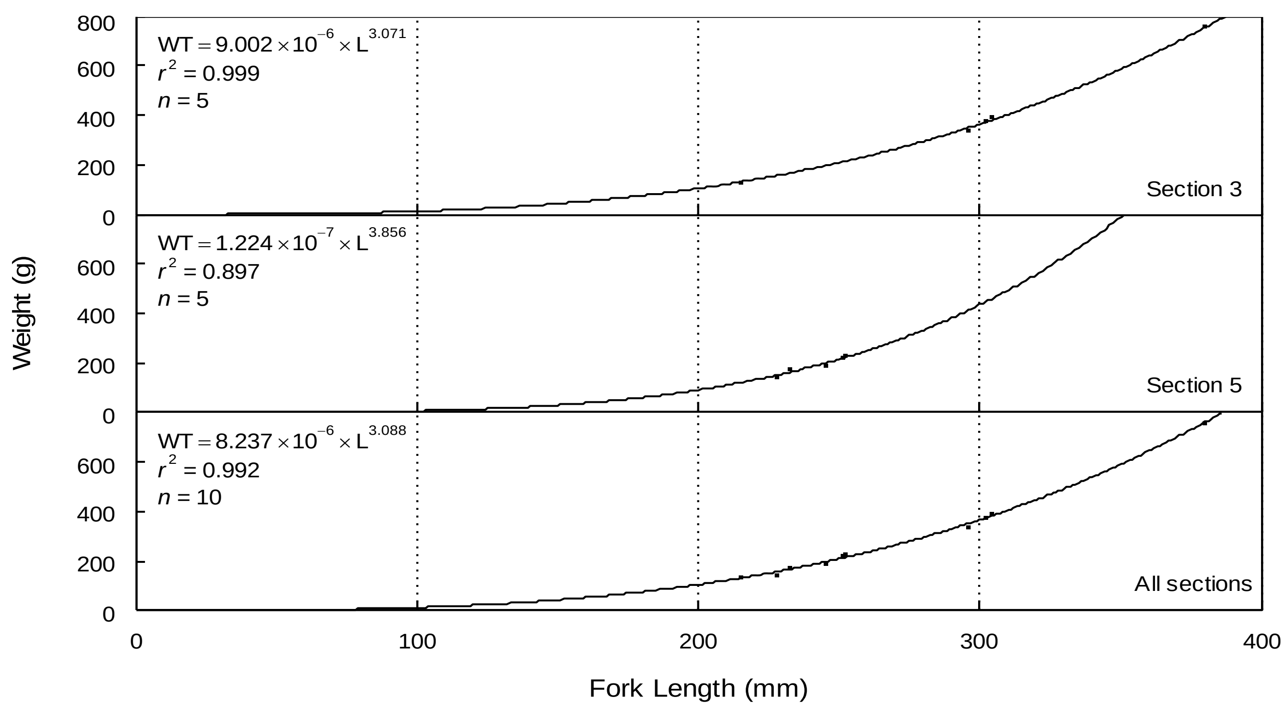

Figure 10: Length-weight regressions for Arctic Grayling captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014.

3.3.2 Abundance and Spatial Distribution

Of the 14 Arctic Grayling recorded during the 2014 survey (includes captured, recaptured, and observed fish), 11 (79%) were recorded in sites that contained physical cover as assigned by P&E and Gazey (2003). This distribution is likely more of a reflection of the length of each type of shoreline sampled (i.e., physical cover versus no physical cover) than a specific habitat preference for this species, as more shoreline containing physical cover was sampled than shoreline that did not contain physical cover (Appendix B, Table B1).

Arctic Grayling were not recorded in Section 1 during the 2014 study period. In 2014, 5 Arctic Grayling were captured in Section 3, and 5 Arctic Grayling were captured Section 5. All 10 of these fish were marked and of those, 2 were subsequently recaptured (1 in each Section). The Arctic Grayling recaptured in Section 3 was recorded in the same site during both encounters (Site 0301; Appendix A, Figure A2). The Arctic Grayling recaptured in Section 5 was initially released in Site 0501 and recaptured in Site 0507 (i.e., the site immediately downstream from its initial capture site; Appendix A, Figure A3).

The lack of any capture data for Arctic Grayling in Section 1 prevented the generation of a population abundance estimate for this species in this section in 2014. Extremely sparse capture data in Sections 3 and 5 allowed only minimal population estimates to be calculated in these sections. There was a 0.95 probability of at least 11 Arctic Grayling being present in Section 3 and 13 Arctic Grayling being present in Section 5.

3.4 Bull Trout

3.4.1 Biological Characteristics

During the 2014 survey, 144 Bull Trout were initially captured (i.e., excludes recaptured fish) and measured for length and weight. Fork lengths ranged between 176 and 890 mm, and weights ranged between 53 and 4664 g. Fin ray samples were analyzed from 115 individuals. An additional 15 Bull Trout were assigned ages in 2014 based on their encounter histories and ages assigned to them during previous study years by Mainstream and Gazey (2014; Attachment A). Overall, 90% of all Bull Trout captured during the 2014 survey were assigned ages. Fin ray samples were collected and analyzed for the remaining 10% of the Bull Trout catch; however, ages were not assigned to these individuals due to inconsistent or unreliable annuli development on collected fin rays samples. Assigned ages for Bull Trout ranged between age-1 and age-9 (Table 7).

Limited data coupled with the wide range of size classes present in the study area hindered the identification of meaningful patterns or trends in Bull Trout length-frequency histograms (Figure 11). The majority (67%) of Bull Trout sampled were between 200 and 400 mm FL, which is consistent with historical results (Appendix E, Figure E4) and indicative of the use of the area primarily by subadult cohorts during the study period. Smaller Bull Trout (i.e., less than approximately 200 mm FL) rear in select Peace River tributaries (Mainstream 2012) and are generally not present in the mainstem. During the late summer to early fall (i.e., the GMSMON-2 study period), larger, sexually mature Bull Trout, are not present in the Peace River mainstream because they are spawning in select tributaries (mainly in the Halfway River watershed; DES and Mainstream 2011).

Table 7: Average fork length, weight, and body condition by age for Bull Trout captured by boat electroshocking in sampled sections of the Peace River, August 25 to October 4, 2014.

Age-Class	Fork Length (mm)		Weight (g)		Body Condition (*K*)		*n*[a]
	Average ± SD	Range	Average ± SD	Range	Average ± SD	Range	
0							0
1	222 ±28	187 – 278	116 ±44	73 – 211	1.03 ±0.06	0.94 - 1.12	8
2	291 ±40	235 – 362	267 ±111	122 – 477	1.02 ±0.09	0.81 - 1.25	27
3	339 ±44	252 – 481	439 ±235	151 – 1593	1.05 ±0.12	0.86 - 1.43	40
4	448 ±108	323 – 721	1260 ±1109	323 – 4664	1.16 ±0.17	0.91 - 1.65	31
5	513 ±92	402 – 730	1758 ±1118	877 – 4500	1.20 ±0.22	0.90 - 1.47	9
6	498 ±120	352 – 738	1134 ±574	372 – 2100	1.01 ±0.14	0.83 - 1.28	10
7	570	-	1875	-	1.01	-	1
8	662 ±21	647 – 677	3379 ±1117	2589 – 4168	1.15 ±0.27	0.96 - 1.34	2
9[b]	805 ±120	720 – 890	3717	-	1.00	-	2

[a] Number of individuals sampled.

[b] Only 1 age-9 Bull Trout was weighed.

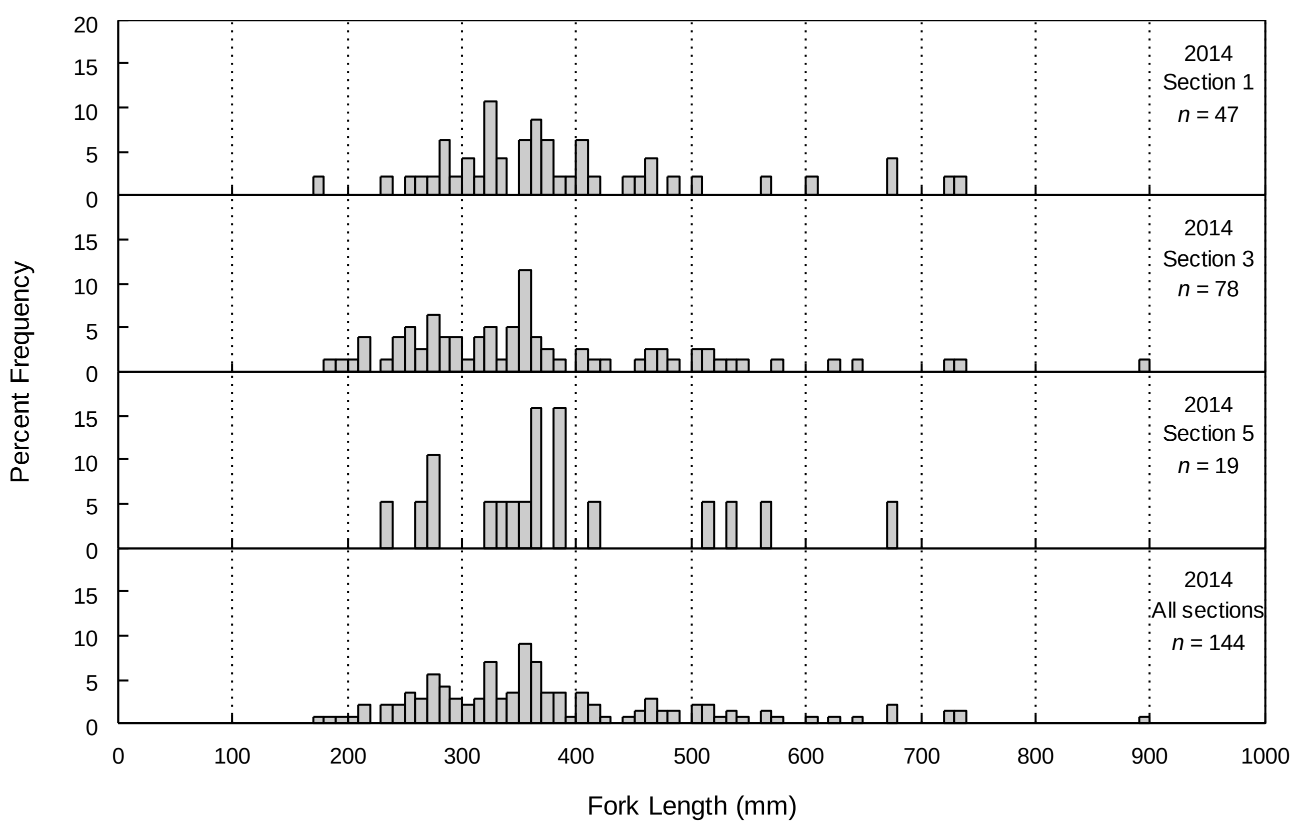

Figure 11: Length-frequency distributions for Bull Trout captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014.

Bull Trout age-frequency histograms from the 2014 survey showed poor resolution (Figure 12). Age-frequency data indicate that most juvenile Bull Trout do not enter the Peace River mainstem until age-2 to age-3 (Appendix E, Figure E5). The few age-1 Bull Trout that were captured during the 2014 survey (*n* = 8) were of suitable size to recruit to the boat electroshocker (the smallest Bull Trout recorded was 187 mm FL), indicating that this cohort is not simply being missed by the sampling gear but is present in low numbers. For age cohorts present in the study area, they showed little preference for specific sections of the study area or habitat type, with most age-classes being present in most sections and habitats during the 2014 survey.

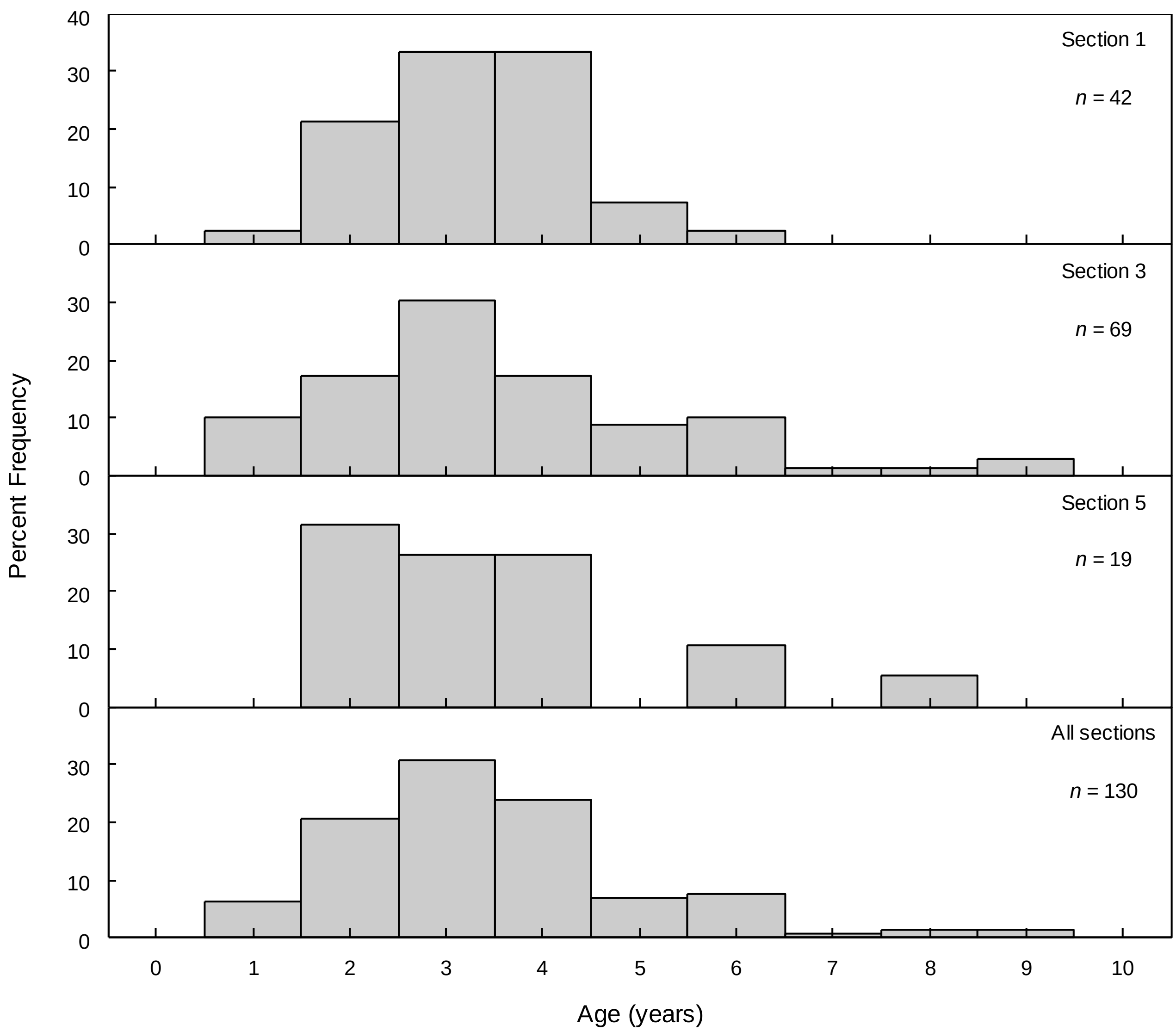

Figure 12: Age-frequency distributions for Bull Trout captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014.

The absence of distinct modes in the length-frequency histograms (Figure 11, Appendix E, Figure E4) suggests that Bull Trout grow slowly after migrating into the Peace River from their natal streams. This theory is supported by average length-at-age data (Table 7) and von Bertalanffy growth analyses (Figure 13 and Figure 14). In 2014, there was little difference in growth between sections for Bull Trout (Figure 13). This result could be due to the migratory nature of Bull Trout. It is possible that Peace River Bull Trout are not present in any single section of the study area long enough for the habitat quality of that section to influence their growth rate. Overall, the von Bertalanffy growth analysis indicates slightly higher growth rates for young age-classes of Bull Trout in 2014 when compared to most previous study years (Figure 14).

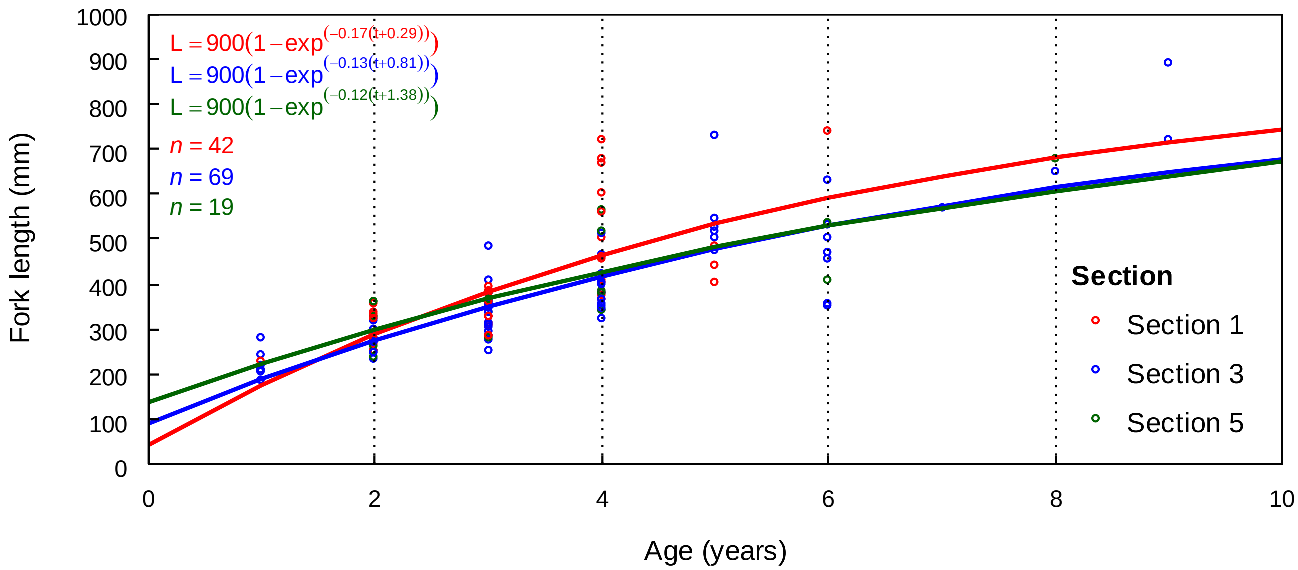

Figure 13: von Bertalanffy growth curve for Bull Trout captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014.

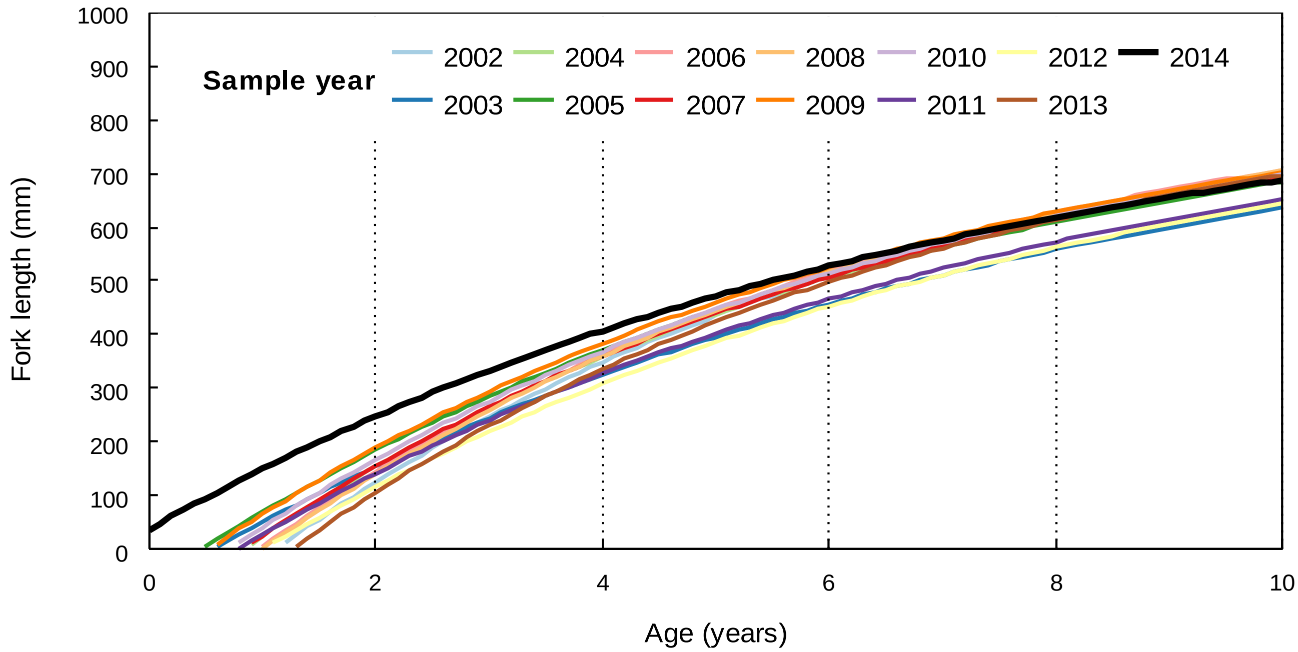

Figure 14: von Bertalanffy growth curve for Bull Trout captured by boat electroshocking in sampled sections of the Peace River, 2002 to 2014.

The average change in length-at-age analysis for Bull Trout (Figure 15) was limited to individuals less than age-5 due to the slow growth, wide range of lengths recorded, and unknown precision of ages assigned to older individuals. The results of this analysis should be treated as suspect as there was little correlation in growth between years for individual cohorts. As an example, the average length of age-3 Bull Trout in 2013 (i.e., the 2010 brood year) was 30 mm less than the average length of age-3 Bull Trout as measured over the entire 13 year study period. However, in 2014 this same cohort (i.e., the 2010 brood year at age-4) was almost 50 mm larger than the average length of age-4 Bull Trout as measured between 2002 and 2013. The feasibility of an age-3 Bull Trout growing approximately 80 mm more than the 110 mm average annual growth for this cohort in a single year (or approximately 172%; Table 7) seems unlikely. However, the average length-at-age of age-2, age-3, and age-4 Bull Trout increased each year between 2012 and 2014. The fact that a similar trend is visible for multiple age-classes over multiple years suggests a legitimate increase in growth for this species over the last 3 study years. Additional data collected in 2015, when these fish are age-3, age-4, and age-5, will provide additional insight into the validity of this analysis.

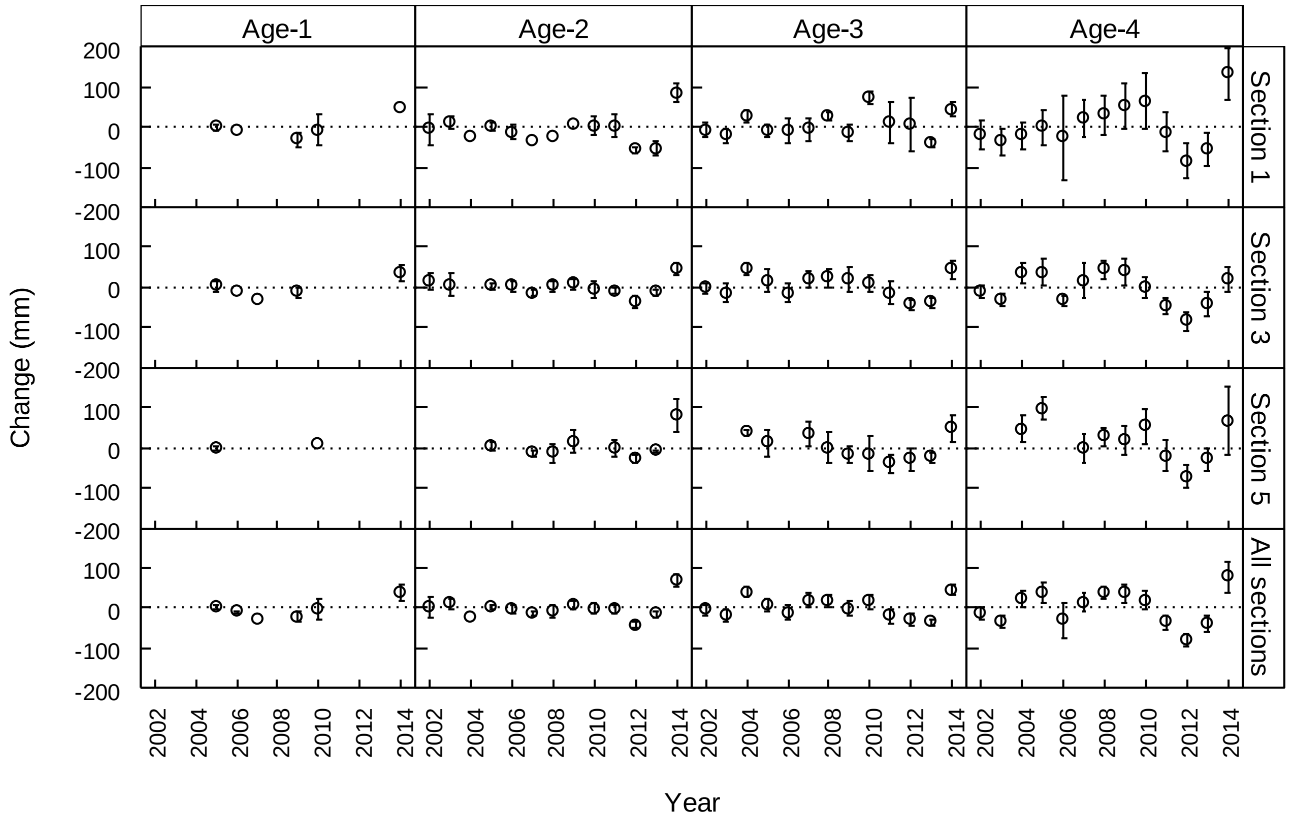

Figure 15: Change in mean length-at-age for Bull Trout captured by boat electroshocking during the Peace River Fish Index, 2002 to 2014. Change is defined as the difference between the annual estimate and the estimate of all years combined. Vertical lines represent 95% confidence intervals.

The average body condition (*K*) of the 144 Bull Trout captured and measured during the 2014 study period was 1.075 and ranged between 0.810 and 1.646 (Figure 16). Body condition was slightly higher in Section 1 when compared to Sections 3 and 5, although confidence intervals did overlap for some estimates. Body condition was generally higher for this species in Section 1 during most study years. This result is likely due to Bull Trout in Section 1 feeding off of dead and injured fish entrained through PCD; more data are required to confirm this theory. Overall, Bull Trout body condition remained relatively stable between 2002 and 2013, with the possible exception of Section 5 in 2011.

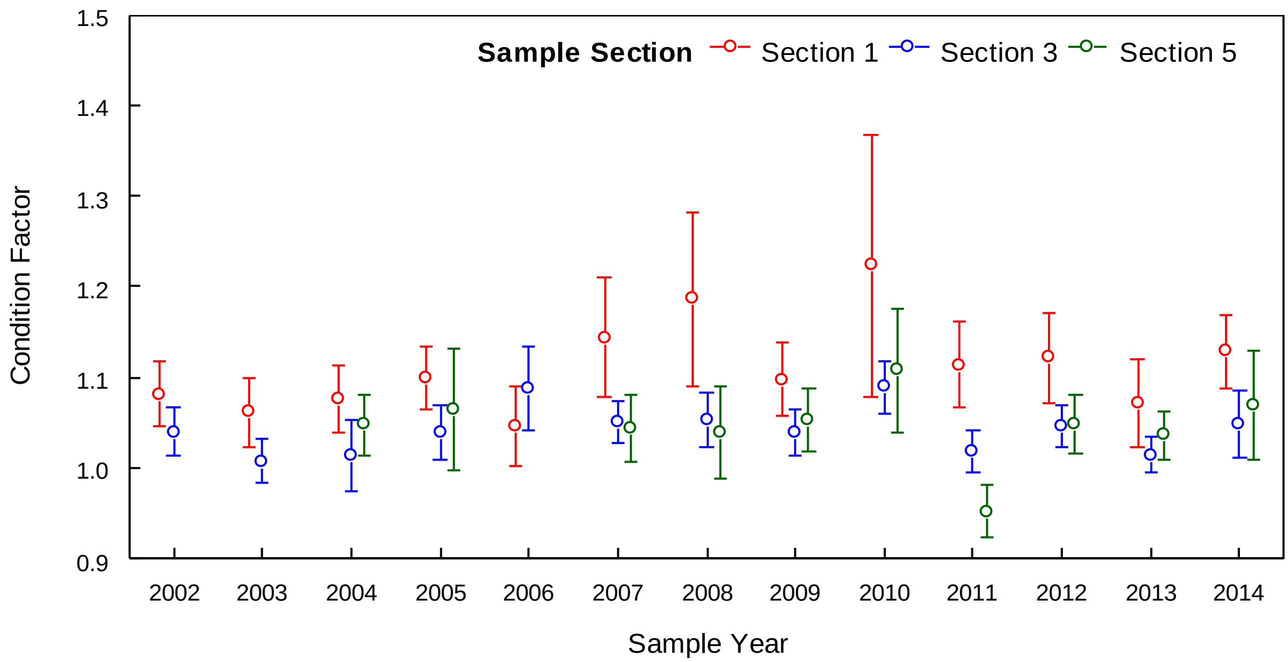

Figure 16: Mean body condition with 95% confidence intervals for Bull Trout captured by boat electroshocking in sampled sections of the Peace River, 2002 to 2014.

In 2014, the length-weight regression analyses for Bull Trout (Figure 17) were similar to historical study years (Appendix E, Figure E6). This metric showed low variability over the 13 year study period.

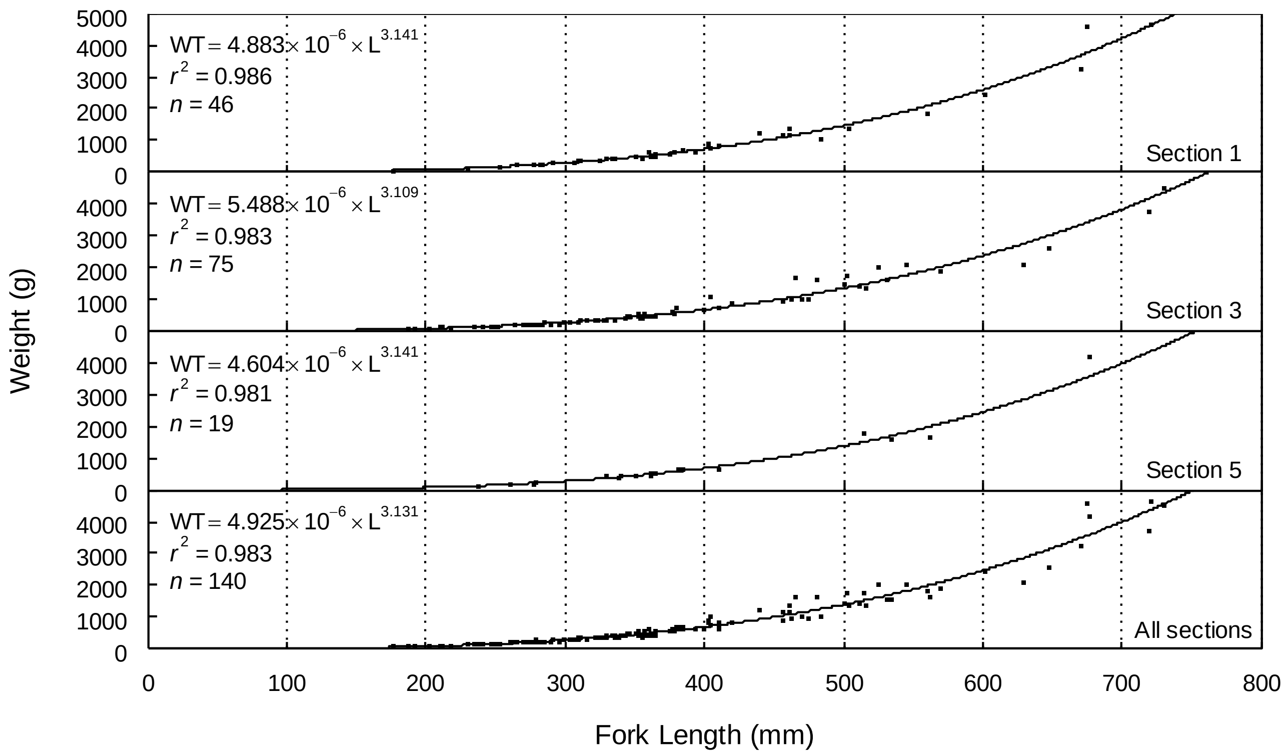

Figure 17: Length-weight regressions for Bull Trout captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014.

3.4.2 Abundance and Spatial Distribution

A thorough description of the population abundance analysis conducted by W.J. Gazey Research is provided in Appendix E. The below text represents a summary of key findings and conclusions drawn from results provided in Appendix E.

Bull Trout population estimates were generated for all 3 sections in 2014. This is the first time since the program began in 2002 that useable population estimates were generated for all 3 sections during the same study year. A summary of the 2014 population estimates generated using the Bayes sequential model are provided in Table 9. Population estimates from 2002 to 2014 are presented in Figure 18. In 2014, Bull Trout abundance estimates were highest in Section 1 and lowest in Section 5; although confidence intervals overlapped for all 3 section estimates. Abundance estimates were not generated for all sections during all study years; however, in general, abundance decreased with increased distance from PCD during must study years (Figure 18). Bull Trout abundance estimates for 2014 were similar to 2013 estimates. Estimates for this species were near stable between 2008 and 2014, with higher estimates in 2011 and 2012; however, the uncertainties surrounding those estimates also were higher (Figure 18).

Table 8: Population estimates generated using the Bayes sequential model for Bull Trout captured by boat electroshocking in sampled sections of the Peace River, 2014.

Section	Bayes Mean	Maximum Likelihood	95% Highest Probability Density		SD	CV (%)
			Low	High		
1	240	166	82	479	120	50.0
3	231	196	122	368	69	29.9
5	59	38	19	123	33	56.0
Total	530		251	809	142	26.8

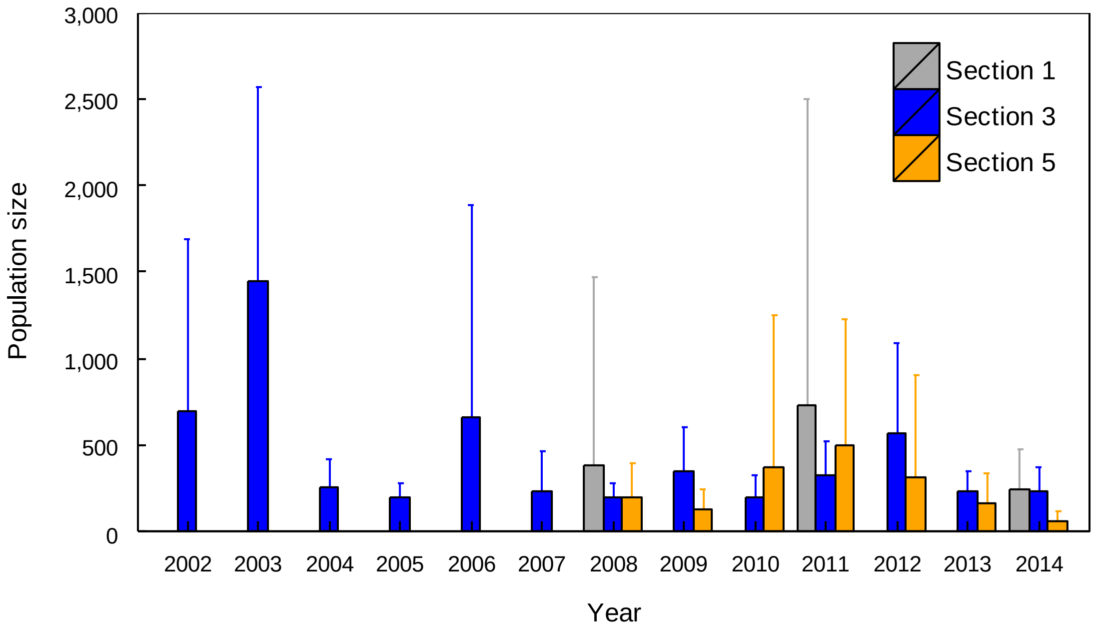

Figure 18: Population estimates with 95% confidence intervals using a Bayes sequence model for Bull Trout in sample sections of the Peace River, 2002-2014.

The average annual mortality rate for Bull Trout over the 13 year study period as calculated through a catch-curve analysis was 41% in each section (Appendix E, Figure E7). Individual annual estimates of mortality for Bull Trout (all sections combined) varied between a low of 27% in 2004 and a high of 52% in 2007 (Appendix E, Figure E8).

3.5 Mountain Whitefish

3.5.1 Biological Characteristics

During the 2014 survey, 5587 Mountain Whitefish were initially captured (i.e., excludes recaptured fish) and measured for length and weight. Fork lengths ranged between 69 and 482 mm, and weights ranged between 3 and 1275 g. Random scale and otolith samples were analyzed from 494 individuals (approximately 9% of all ageing structures collected from Mountain Whitefish in 2014); ages ranged between age-0 and age-9 (Table 9).

Table 9: Average fork length, weight, and body condition by age for Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, August 25 to October 4, 2014.

Age-Class	Fork Length (mm)		Weight (g)		Body Condition (*K*)		*n*[a]
	Average ± SD	Range	Average ± SD	Range	Average ± SD	Range	
0	97 ±11	74 - 123	10 ±4	5 - 20	1.04 ±0.21	0.69 - 1.52	35
1	173 ±8	157 - 194	60 ±9	39 - 85	1.17 ±0.13	0.92 - 1.82	111
2	220 ±11	201 - 257	128 ±24	93 - 214	1.19 ±0.09	0.98 - 1.39	54
3	272 ±14	251 - 296	255 ±53	191 - 364	1.25 ±0.09	1.16 - 1.45	12
4	297 ±18	246 - 335	333 ±57	216 - 461	1.26 ±0.14	0.84 - 1.52	72
5	301 ±24	242 - 374	344 ±71	180 - 575	1.25 ±0.12	0.89 - 1.56	105
6	324 ±29	255 - 416	407 ±110	239 - 922	1.19 ±0.14	0.59 - 1.53	72
7	345 ±32	281 - 412	476 ±131	267 - 819	1.14 ±0.13	0.87 - 1.34	28
8	370 ±17	356 - 395	618 ±75	547 - 692	1.22 ±0.11	1.12 - 1.38	4
9	379	-	607	-	1.12	-	1

[a] *n* = number of individuals sampled.

For Mountain Whitefish, 4 distinct modes were evident in the 2014 length-frequency histograms (Figure 19), corresponding to the age-0, age-1, age-2, and age-3 and older cohorts. Based on these data, growth slows considerably after approximately age-3 for this species, most likely due to fish reaching sexual maturity. The slower growth rate of older individuals prevented the identification of distinct age-classes in the length-frequency histograms for fish larger than approximately 250 mm FL. In Section 1, 95% of measured Mountain Whitefish were larger than 250 mm FL, compared to 36% in Section 3 and 48% in Section 5. The age-0 to age-2 modes were most evident in Sections 3 and 5, and less evident in Section 1. In general, modes corresponding to younger age cohorts were more evident in 2014 than in most previous study years (Appendix E, Figure E9).

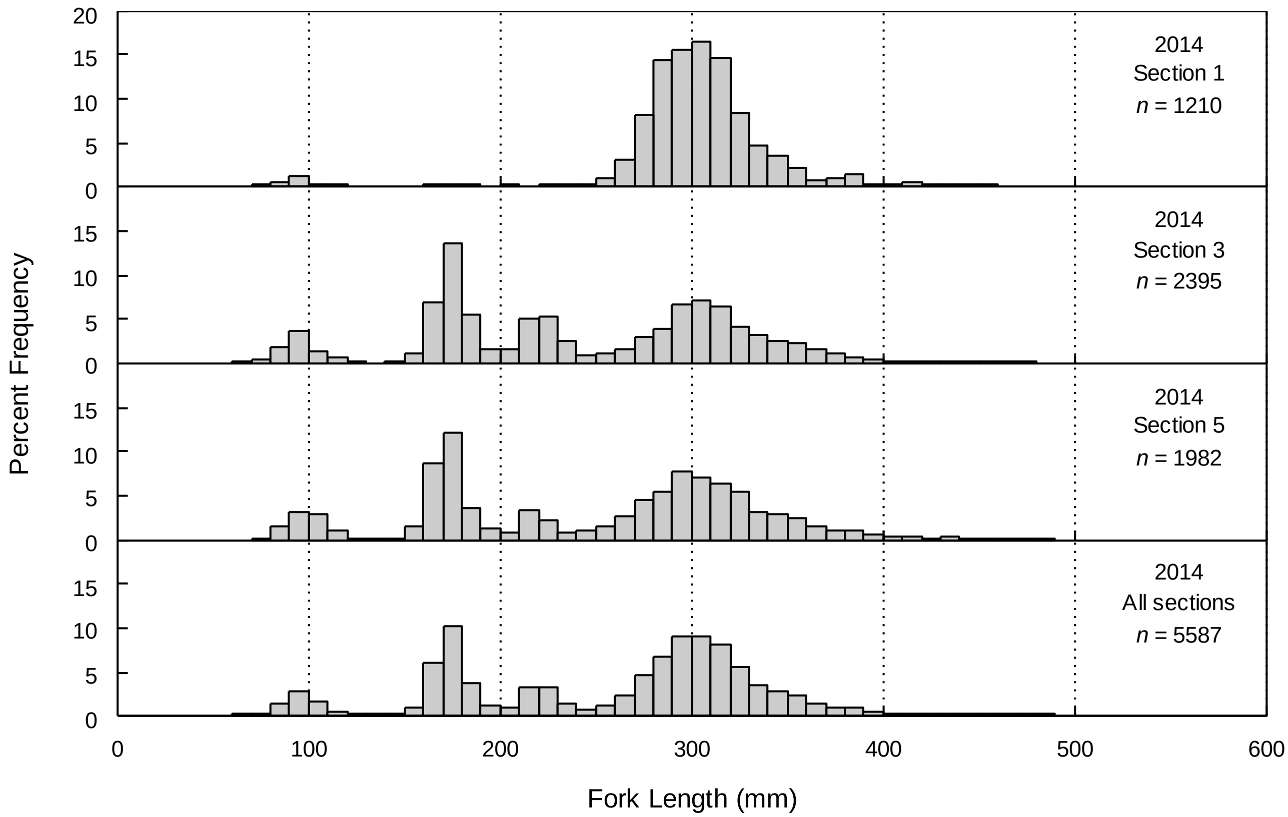

Figure 19: Length-frequency distributions for Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014.

The age-0, age-2, age-3, and age-4 cohorts were underrepresented in 2014 (Figure 20 and Figure 21). The low number of age-0 fish was not unexpected as this cohort is usually too small to fully recruit to boat electroshockers during the fall season (Mainstream and Gazey 2014; Golder and Poisson 2014; ONA et al. 2014). The low abundance of age-0 fish recorded in 2014 was consistent with previous study years (Appendix E, Figure E10). Low abundance of age-2, age-3, and age-4 Mountain Whitefish in 2014 suggests low spawning success or survival for the 2009/2010, 2010/2011 and 2011/2012 spawning seasons, respectively. This theory is partially supported by length- and age-frequency data collected between 2010 and 2013 (Appendix E, Figures E9 and E10, respectively). The apparent low recruitments from the 2009/2010 through 2011/2012 Mountain Whitefish spawning seasons also could be an artifact of differences in sampling methodologies employed during each study year. Potential biological and methodological biases are discussed in Section 4.0.

Mountain whitefish in the Peace River exhibit rapid growth until approximately age-3; thereafter, growth slows considerably (Figure 21 and Figure 22, and Table 9). In 2014, younger age-classes (age-2 and age-3) of Mountain Whitefish were slightly larger in Section 1 than equivalent fish in Sections 3 and 5. However, this summary is based on few fish (8 individuals for both age-cohorts combined). The multi-year von Bertalanffy growth analysis indicates more rapid growth for juvenile Mountain Whitefish in 2014 than in other study years (Figure 23).

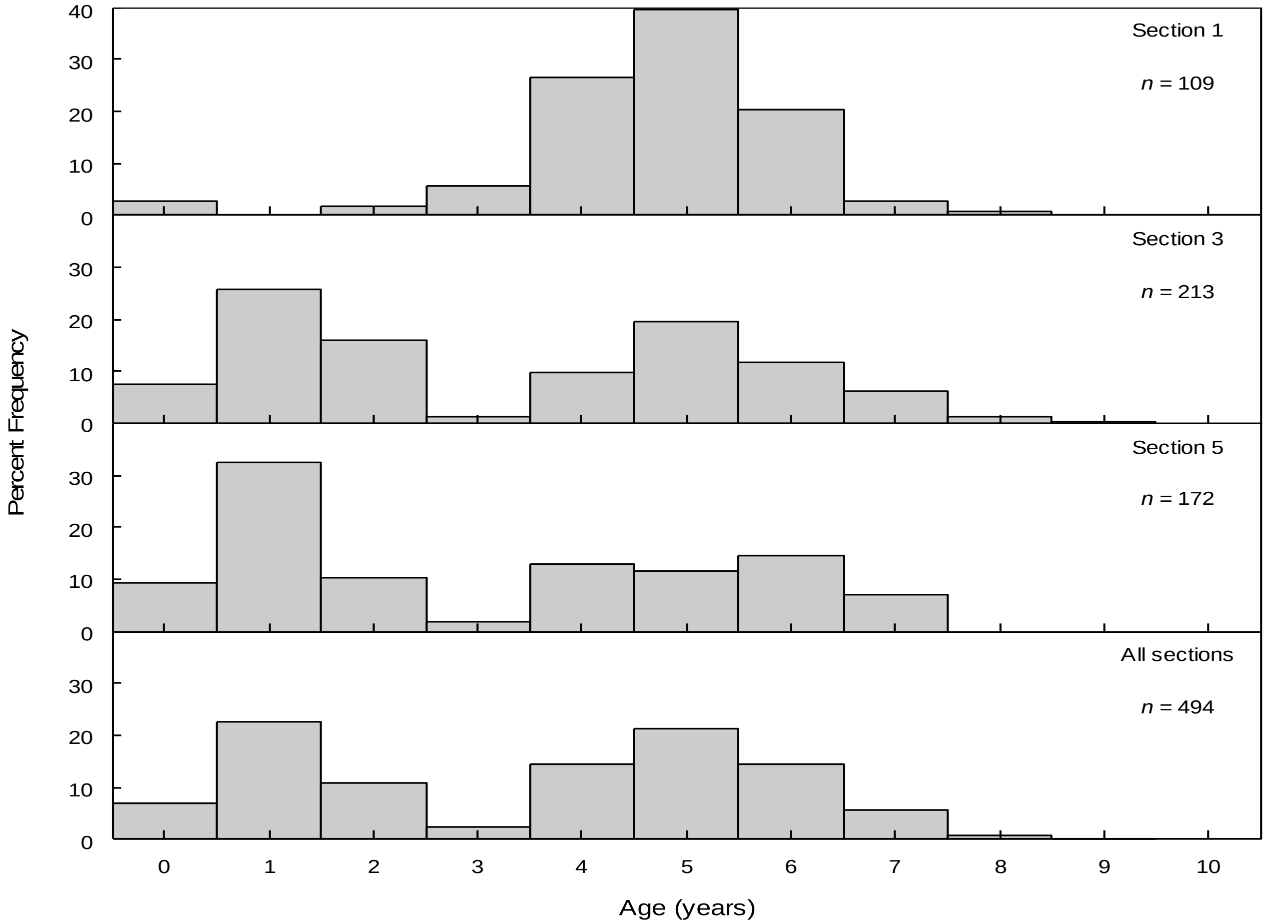

Figure 20: Age-frequency distributions for Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014.

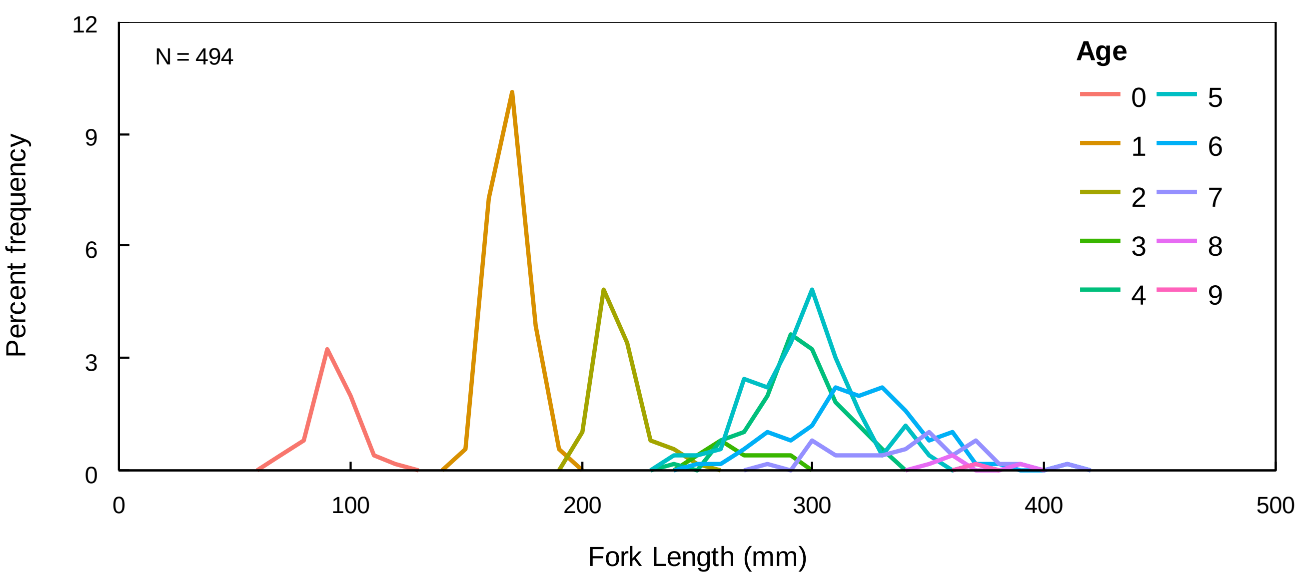

Figure 21: Length-at-age frequency distributions for Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014.

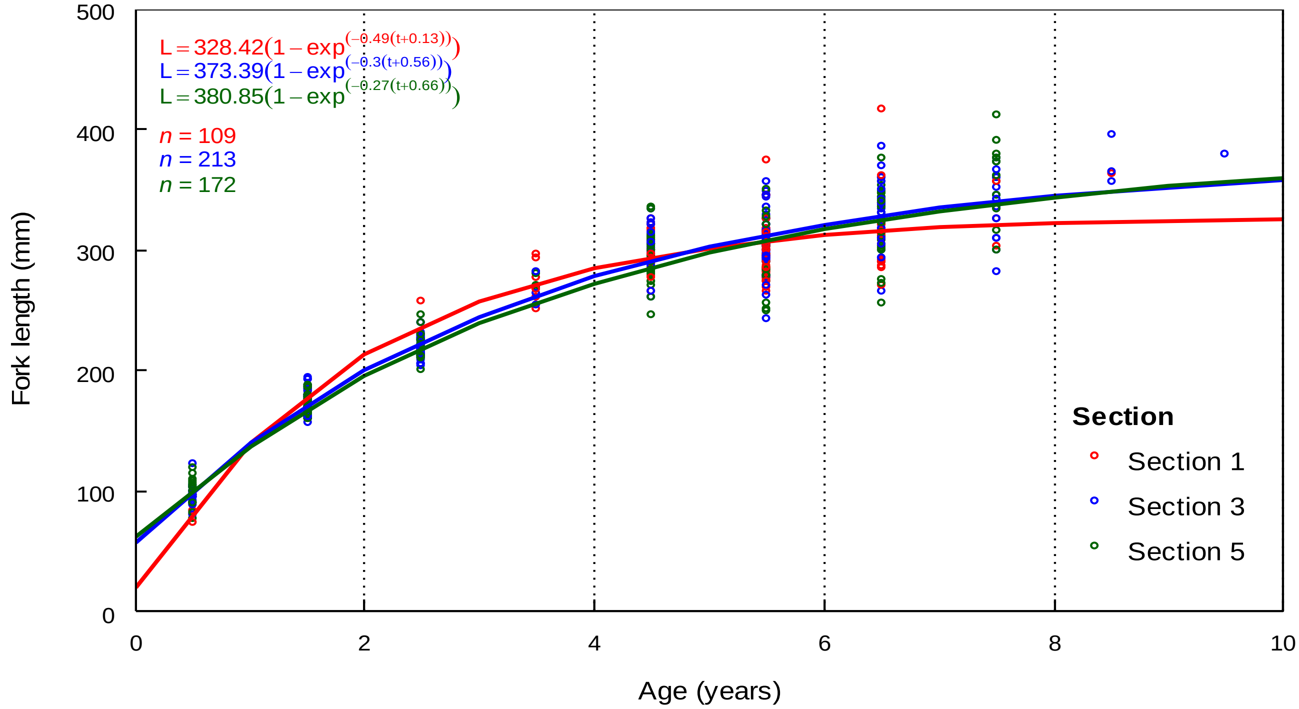

Figure 22: von Bertalanffy growth curves for Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014.

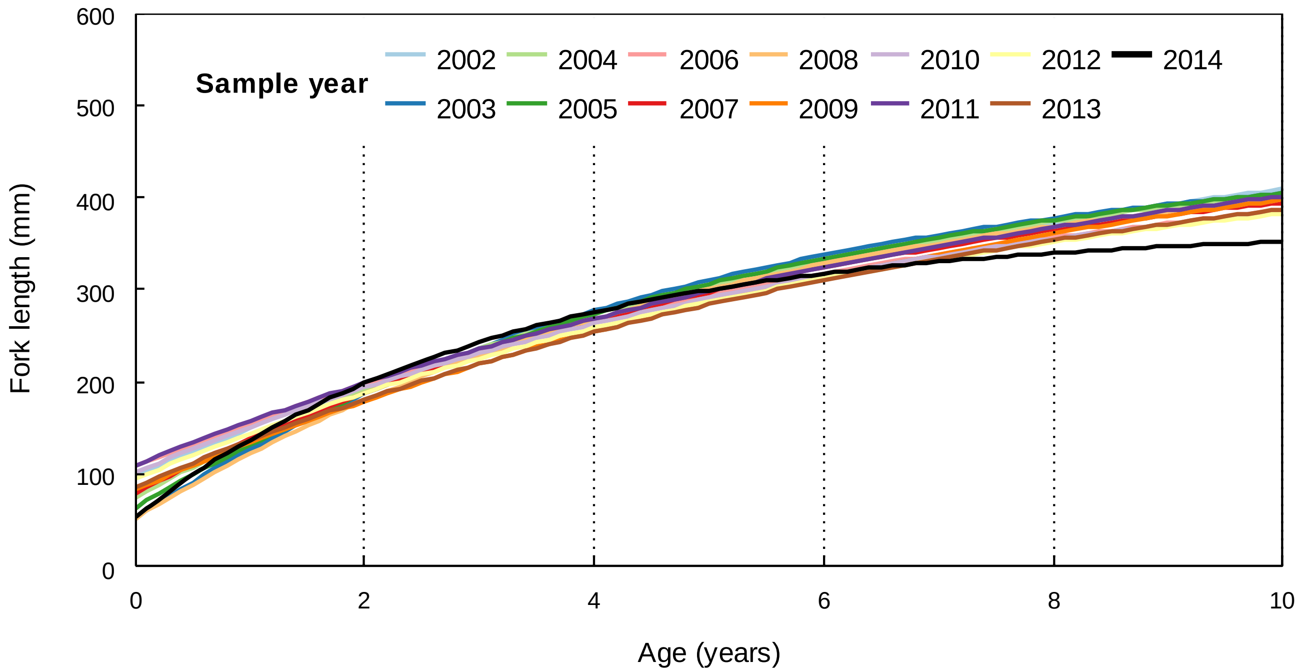

Figure 23: von Bertalanffy growth curves for Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, 2002 to 2014.

The average change in length-at-age analysis for Mountain Whitefish (Figure 24) was limited to individuals less than age-5 due to the slow growth, wide range of lengths recorded, and unknown precision of ages assigned to older individuals. Overall (all sections combined), the age-0 through age-4 cohorts were larger in 2014 when compared to 2013 data. Confidence intervals did not overlap between any of the 2013 and 2014 estimates. On average (all age cohorts combined), however, the increase in length relative to the 13 year average was minimal (approximately 15 mm more than average). A similar and more substantial increase in length-at-age also was noted for Arctic Grayling in 2014 (Figure 8). These species share food items (i.e., they are both demersal feeders); therefore, the increase in length-at-age identified for both could be related to increased food availability in 2014 relative to 2013.

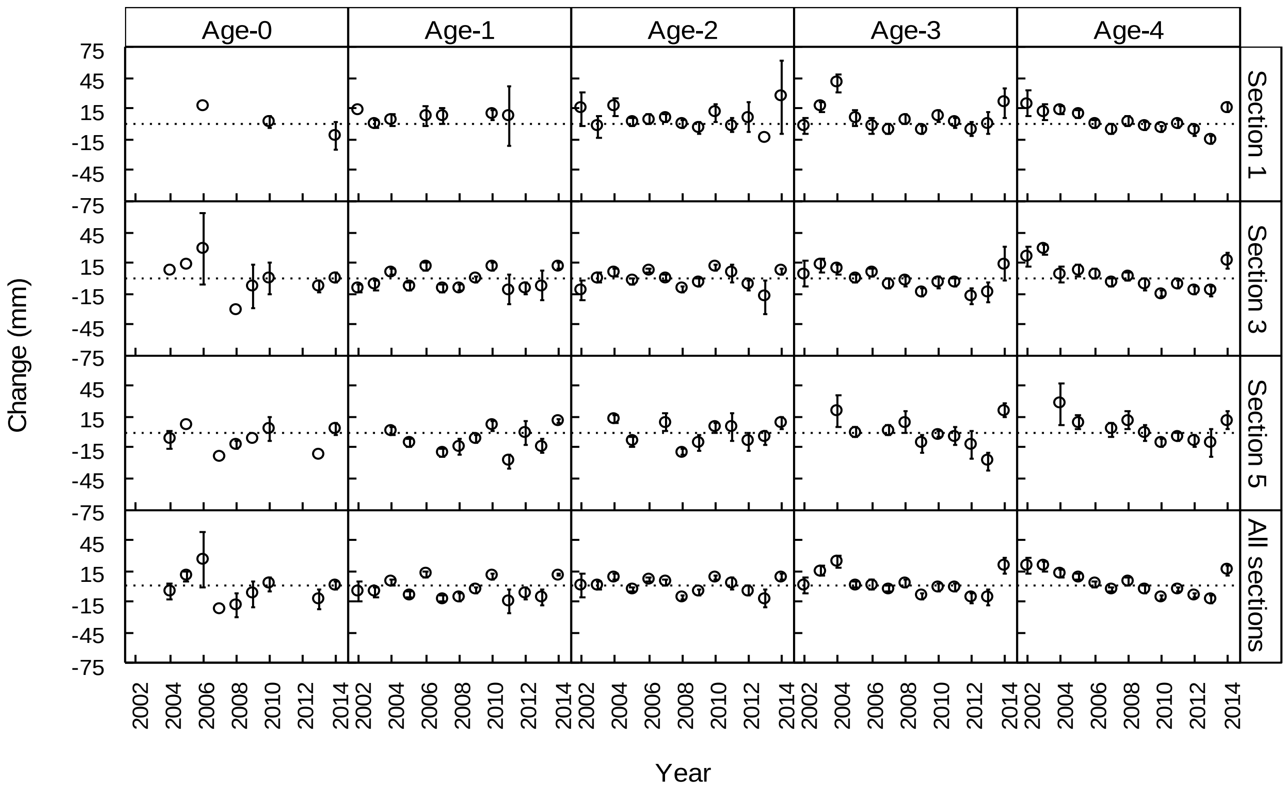

Figure 24: Change in mean length-at-age for Mountain Whitefish captured by boat electroshocking in the Peace River, 2002 to 2014. Change is defined as the difference between the annual estimate and the estimate of all years combined. Vertical lines represent 95% confidence intervals.

The average body condition (*K*) of the 5587 Mountain Whitefish captured and measured during the 2014 study period was 1.192 (Figure 25). Consistent with most previous study years, in 2014 body condition was higher in Section 1 when compared to Sections 3 and 5. The average body condition recorded in Section 1 in 2014 was higher than the average body condition recorded in any section during any previous study year. Reasons for the rotund Mountain Whitefish in this Section in 2014 are not known. An analysis of body condition at age by Section for Mountain Whitefish did not suggest any substantial differences between age cohorts or study years (Appendix E, Figure E12). Overall (all study years combined), Mountain Whitefish body condition is more variable between years than the same metric recorded for Arctic Grayling (Figure 9) or Bull Trout (Figure 16).

Length-weight regression analyses for Mountain Whitefish were similar between all sections (Figure 26) and study years (Appendix E, Figure E11).

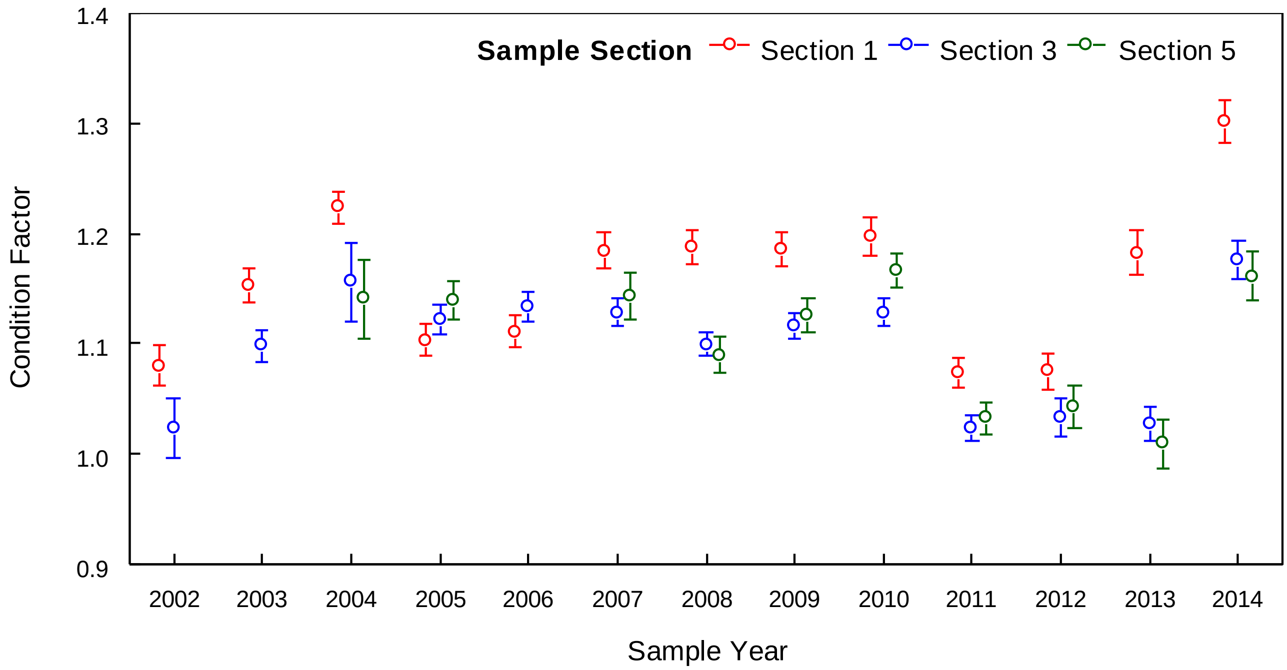

Figure 25: Mean body condition with 95% confidence intervals for Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, 2002 to 2014.

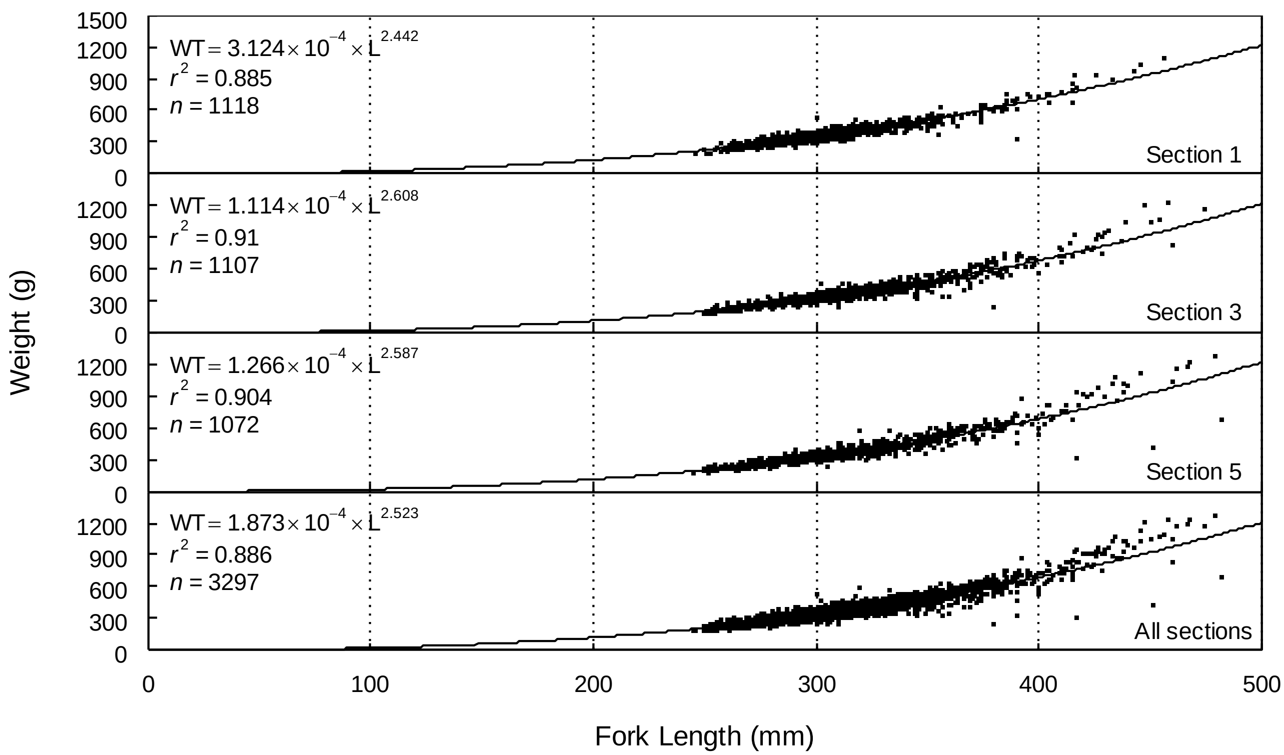

Figure 26: Length-weight regressions for Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, 25 August to 4 October 2014.

3.5.2 Abundance and Spatial Distribution

A thorough description of the Mountain Whitefish population abundance analysis conducted by W.J. Gazey Research is provided in Appendix F. The below text represents a summary of key findings and conclusions drawn from results provided in Appendix F.

The recapture rate for Mountain Whitefish initially marked in 2014 was 5.8%. This value is lower than the average value recorded during all previous GMSMON-2 study years (12.0%; range from 6.8 to 18.8%; Attachment A). Reasons for the lower recapture rate in 2014 are not known. Recapture rates recorded for this species in 2014 in the Peace River were higher than the recapture rates recorded in the Columbia River downstream of Hugh L. Keenleyside Dam (0.8%; Golder and Poisson 2014) and downstream of Revelstoke Dam (0.4%; ONA et al. 2014).

In 2014, the capture behaviour of marked Mountain Whitefish was examined by tag type (T-bar anchor tag or PIT) and year of tag application through a comparison of recapture rates in 2014 (i.e., fish encountered 2 or more times in 2014). If recapture probability for individuals was homogeneous, then recapture rate in 2014 by year of tag application should be the same. T-bar anchor tags, applied between 2002 and 2004, were recovered erratically in 2014 ($n = 12$); therefore, these tags were not included in the 2014 analysis. Recovery rates of PIT tags in 2014 by year of tag application were statistically the same ($P > 0.05$) in Sections 1 and 5 but statistically different ($P = 0.002$) in Section 3. A comparison of fish size at initial release relative to size at recapture disclosed some differences in Section 3, but these differences were not statistically significant ($P = 0.11$). Size distributions were similar between initially captured and recaptured Mountain Whitefish in Sections 1 and 5. Consistent with previous study years, recaptured Mountain Whitefish between 250 and 260 mm FL were under-represented relative to initial release data for all sections; however, power was not sufficient to detect a significant difference in size between unmarked and recaptured fish. The proportion of marked fish recaptured 2 or more times declined over the 2014 study period, consistent with apparent mortality (i.e., death or emigration from the study area). Growth (increment in length of recaptured fish as a function of time-at-large) was not statistically significant ($P = 0.10$); therefore, the number of unmarked fish that entered the population through growth during the study period (termed growth recruitment) was expected to be small (i.e., fish that were less than 250 mm FL at the start of the study period but grew beyond 250 mm FL during the study period). Because Mountain Whitefish growth over the 41 day study period was low, an estimate of the length measurement error was feasible (SD = 2.7 mm).

In 2014, Mountain Whitefish exhibited some movement from Section 3 to Section 5 (approximately 8% of marked fish). In general, however, this species exhibited high fidelity to sites within a section, even when there were multiple years between initial release and recapture.

The CJS analysis confirmed apparent mortality of tagged Mountain Whitefish. A constant survival rate over sections and sessions provided the best fit to the data. The subsequent daily instantaneous mortality (Table 10) was used as an input to estimate the number of marks available for recapture (see Equation 6) and used by the ADMB time-varying catchability and the sequential Bayes population models.

Table 10: Daily and project survival and instantaneous mortality estimates based on recaptures using the 2 best fitting Cormack-Jolly-Seber models.

Model	Daily Survival	Standard Deviation	95% Confidence		Instantaneous Daily Mortality	Project Survival
			Low	High		
Constant	0.9846	0.0097	0.9482	0.9955	0.0155	0.5942
Section 1	0.9843	0.0148	0.9054	0.9976	0.0158	0.5755
Section 3	0.9574	0.0142	0.9191	0.9780	0.0435	0.2326
Section 5	0.9926	0.0190	0.4580	1.0000	0.0074	0.7740

The evaluation of alternative closed population models using the encounter histories of individual fish with consistent sampling intensity through MARK resulted in the identification of the time-varying capture probability model as the best fit to the data, followed by the constant capture probability model based on AIC. Capture probabilities are influenced by a variety of factors, including differences in netter experience and the type of sampling gear and boat electroshocker settings employed. Capture probabilities are also influenced by changes in environmental conditions between surveys, such as changes in water velocities or water clarity. In 2014, field crews tried to maintain consistent sampling techniques throughout the study period and all netters employed during the 2014 field survey had previous netting experience; therefore, the identification of the time-varying capture probability model as being the best fit to the data is likely due to changes in environmental conditions over the study period. This result is consistent with historical study years (Mainstream and Gazey 2013). In all sections, the heterogeneous capture probability model provided the poorest fit to the data. Sensible estimates could not be obtained for the behaviour model.

In 2014, despite the same electrofishing effort applied during Sessions 1 through 4 within each section, the number of fish captured (marked and unmarked) exhibited substantial variation between sessions. The more direct test of time-varying catchability using ADMB resulted in a better fit for Section 3; however, in Sections 1 and 5 the constant catchability model fit the data better. Logarithmic population deviation estimates showed little trends and small deviations in Sections 1 and 5. Deviations in Section 3 were large and exhibited an increasing trend over time. Population estimates were similar regardless of the model (constant catchability or time-varying catchability) in Sections 1 and 5, but diverged for Section 3.

The sequential posterior probability plots, through the application of the Bayes sequential model, revealed convergent distributions in Sections 1 and 5 and divergent distributions in Section 3. If model assumptions are held, the sequential posterior probability plots should stabilize about a common mode.

A summary of the 2014 population estimates generated using the Bayes sequential model are provided in Table 11. Population estimates from 2002 to 2014 are presented in Figure 27. Population estimates deemed to have substantive assumption violations are identified in the figure. Population estimates from 2004 appear valid; however, very low water likely concentrated Mountain Whitefish from locations that were not sampled in other years. Similarly, population estimates from 2010 and 2011 are the largest on record, also coinciding with a low water levels. Population estimates for the 2014 study year are similar to estimates from 2002 through 2009, 2012 and 2013 for Sections 1 and 3. The 2014 population estimate for Section 5 exceeded estimates for

Section 1 and 3 for the first time since the program began in 2002. The reliability of the 2014 population estimates are discussed in Section 4.5.2.

Table 11: Population estimates generated using the Bayes sequential model for Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, 2014.

Section	Bayes Mean	Maximum Likelihood	95% Highest Probability Density		SD	CV (%)
			Low	High		
1	11 257	10 970	9 510	12 740	1285	11.4
3	9 092	8 890	7 270	11 030	967	10.6
5	14 315	13 840	10 860	18 060	1864	13.0
Total	34 664		29 839	39 489	2462	7.1

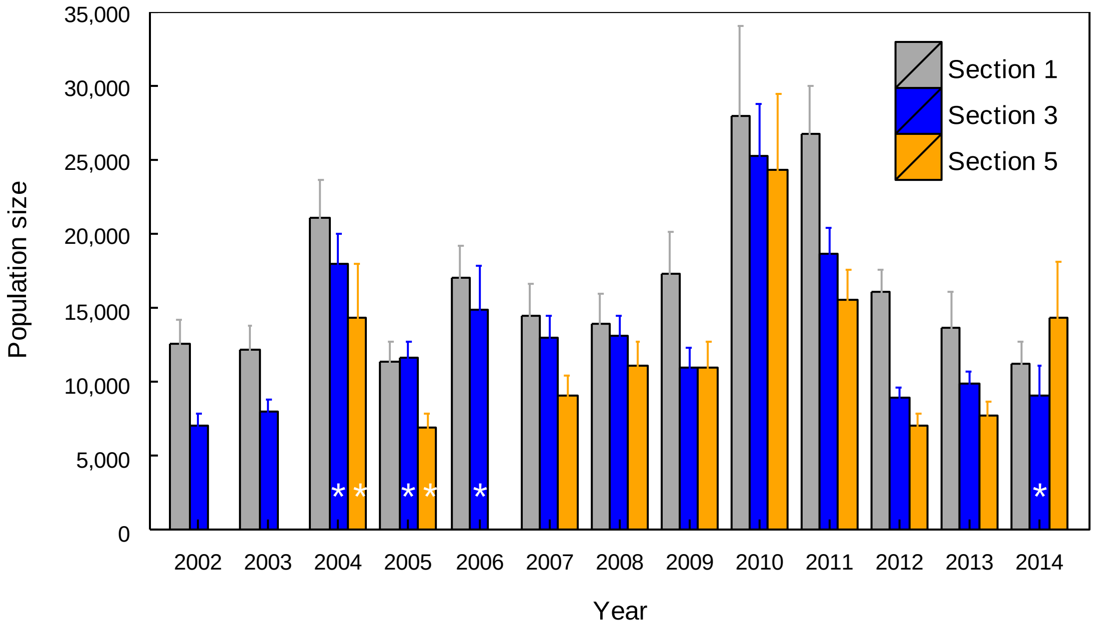

Figure 27: Population estimates with 95% confidence intervals using a Bayes sequence model for Mountain Whitefish in sample sections of the Peace River, 2002-2014. Stars denote suspect estimates due to assumption violations.

The average annual mortality rate for Mountain Whitefish over the 13-year study period as calculated through catch-curve analyses was 55% for Section 1, 53% for Section 3, and 50% for Section 5 (Appendix E, Figure E13). Individual annual estimates of mortality for Mountain Whitefish (all sections combined) varied between a low of 40% in 2011 and a high of 70% in 2014 (Appendix E, Figure E14).

3.6 Catchability

Insufficient numbers of Arctic Grayling and Bull Trout prevented the computation of catchability coefficients for these species.

Sufficient numbers of Mountain Whitefish were recaptured to compute catchability coefficients based on the Bayesian sequential estimates. Catchability coefficients, associated population estimates, standard deviation estimates, and effort (Equations 9 to 11) by section are listed in Appendix C, Table C5 (using effort measured in kilometres traveled) and Table C6 (using effort measured in hours of electroshocker operation). The catchability coefficients using both effort measures and associated 95% confidence intervals are presented in Figure 28. The 2014 catchability coefficients appear similar to 2004 estimates. Although confidence intervals overlapped between sections in 2014, coefficients were not as consistent when compared to some study years (e.g., 2008 through 2012).

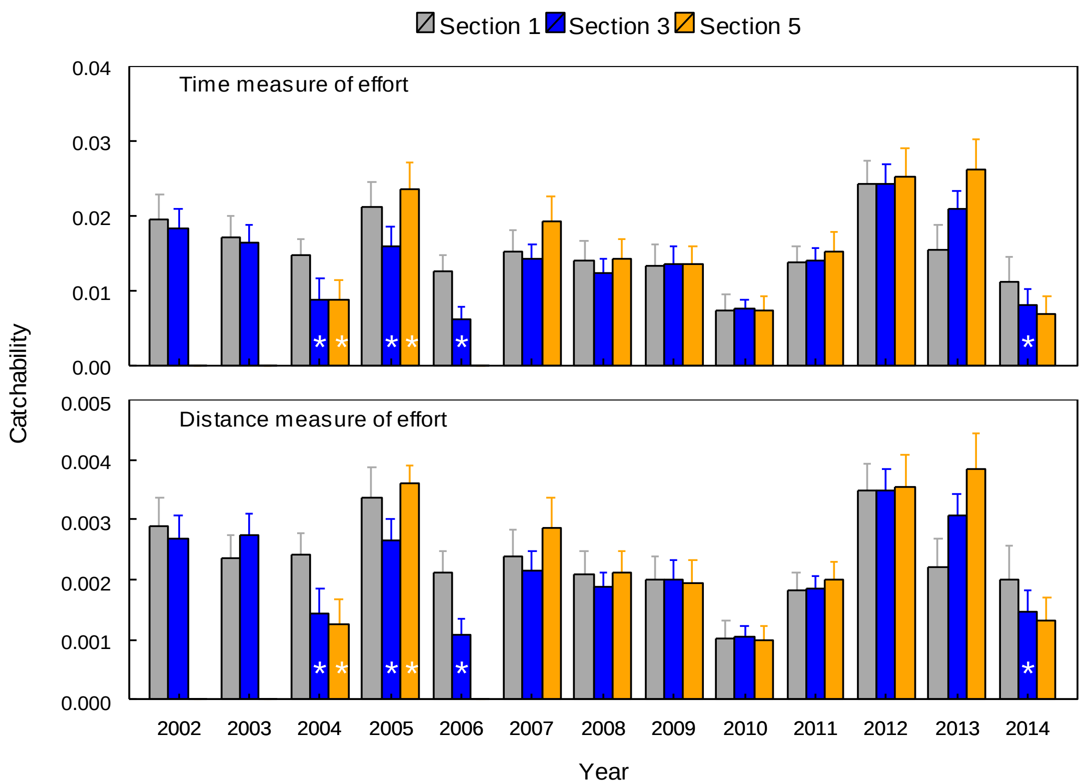

Figure 28: Catchability estimates by section for Mountain Whitefish captured by boat electroshocking using time sampled (i.e., hours of electroshocker operation; top panel) and length of shoreline sampled (kilometres; bottom panel) in the Peace River, 2002 to 2014. Vertical bars represent 95% confidence intervals; stars indicate suspect population estimates.

In 2014, the relationship between Mountain Whitefish catch rates weighted by habitat type (i.e., the presence or absence of physical cover) and Mountain Whitefish population abundance estimates were similar to previous study years (Figure 29). Over the 13-year study period, only the 2010 catch rate data (weighted by habitat type) were not a suitable proxy for population abundance (i.e., outside of the 95% prediction interval).

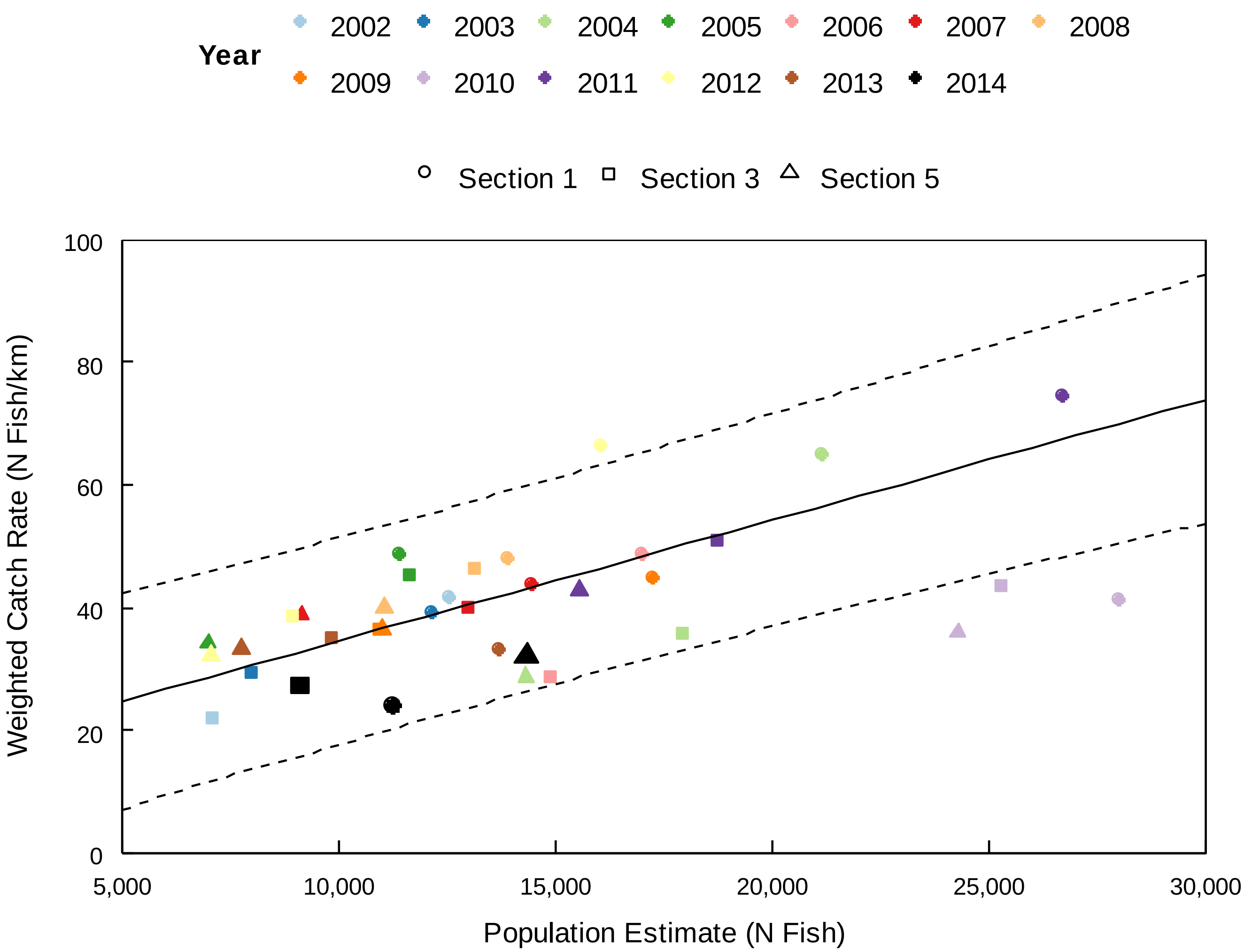

Figure 29: Relationship between Mountain Whitefish catch rates weighted by habitat type (presence or absence of physical cover) and Mountain Whitefish population abundance estimates in the Peace River, 2002 to 2014. Data from 2010 were excluded from the linear regression (solid line). The dashed lines represent 95% prediction intervals).

3.7 Effort required to detect change

The low number of Arctic Grayling and Bull Trout captured and recaptured in Section 1 over all study years prevented the generation of reliable power curves for these species; results are not presented for these species.

Sampling intensity can be isolated to each section because there is little movement of fish between sections. Figure 30 plots precision as a function of electroshocking effort (i.e., hours of electroshocker operation) for Mountain Whitefish in Section 1. The analysis was limited to Section 1 because it was the only section sampled annually each year between 2002 and 2014. Overall, power was low in 2013 and 2014 when compared to earlier study years. The analysis indicates that a reduction in effort in Section 1 may result in substantive loss of power.

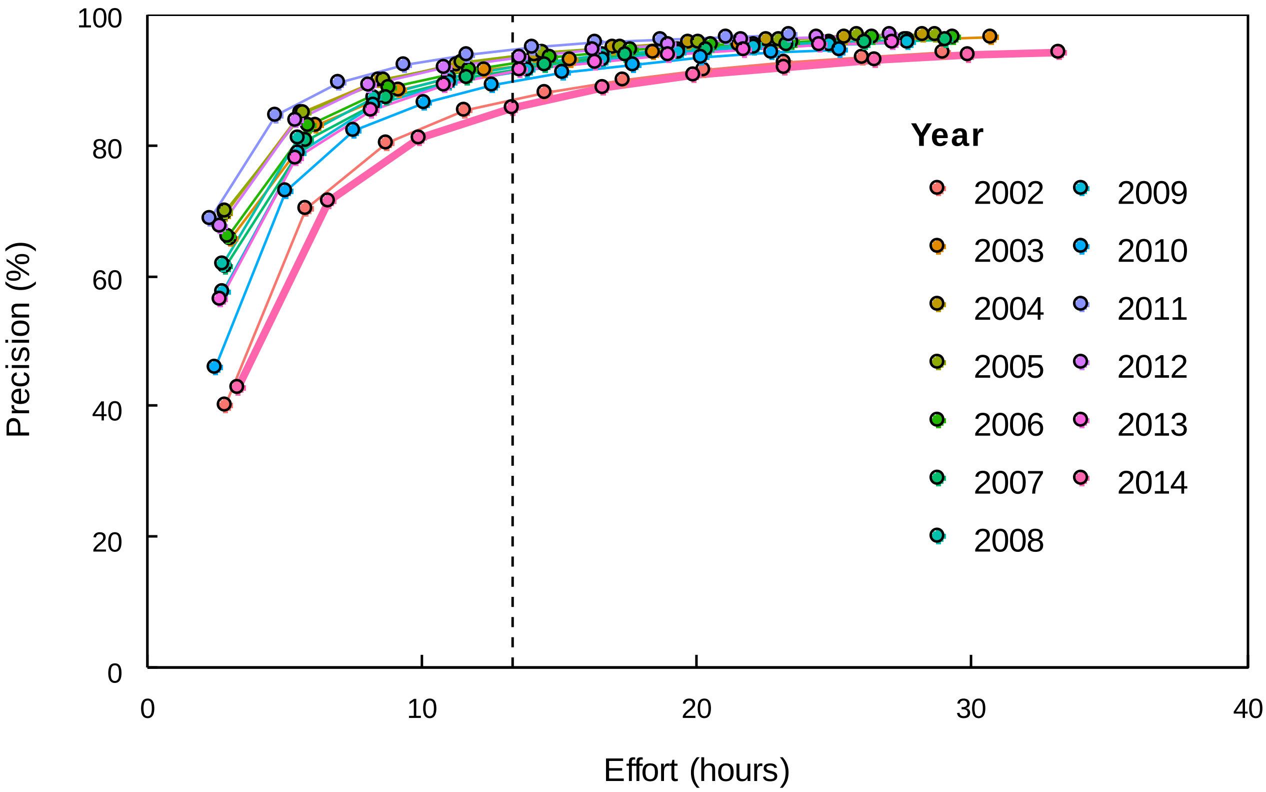

Figure 30: Precision of the Bayesian mean estimates of Mountain Whitefish abundance in Section 1 of the Peace River at various levels of effort, 2002 to 2014. The vertical dashed line represents the amount of effort (in hours) expended during the 2014 survey.

3.8 Other Species

In addition to the Arctic Grayling, Bull Trout, and Mountain Whitefish noted above, 316 other sportfish were recorded in Sections 1, 3, and 5 combined during the 2014 survey, including (in decreasing order of abundance) Rainbow Trout (n = 176), Kokanee (n = 48), Walleye (n = 35), Lake Whitefish (n = 32), Northern Pike (n = 22), Lake Trout (n = 2), and Burbot (n = 1). A brief summary of each of these species is presented below.

Although Rainbow Trout were recorded in all 3 sections during the 2014 survey, the bulk of the catch (72%) was recorded in Section 3. This result is inconsistent with recent study years. Between 2011 and 2013, Rainbow Trout were more frequently recorded in Section 1 when compared to Sections 3 and 5 (Mainstream and Gazey 2012, 2013, 2014; Attachment A). Reasons for the distribution change in 2014 are not known. Most (67%) of the Rainbow Trout recorded in 2014 were larger than 250 mm FL. Two of the Rainbow Trout recorded in 2014 had been implanted with PIT tags during the 2013 GMSMON-2 survey (Mainstream and Gazey 2014). The first Rainbow Trout (tag number 900026000056221) was captured in Site 0316 during the 2013 survey and was recaptured in the same site during the 2014 survey (Appendix A, Figure A2). Between capture occasions, this fish grew from 318 mm FL to 408 mm FL (i.e., 90 mm growth). The second Rainbow Trout (tag number 900026000035225) was captured in Site 0301 in 2013 and was recaptured in the same site during the 2014 survey (Appendix A, Figure A2). Between capture occasions, this fish grew from 286 mm FL to

356 mm FL (i.e., 70 mm growth). During the 2014 study period, field crews implanted PIT tags into 47 Rainbow Trout that were over 250 mm FL; 2 of these fish were recovered during subsequent sessions. A preliminary population abundance estimate was generated using these data and a sequential Bayes algorithm. Approximately 480 Rainbow Trout were expected to be present in Sections 1, 3, and 5 combined; confidence surrounding that estimate was very wide (95% CI = 234-4296 fish).

Kokanee numbers declined with distance from Peace Canyon Dam (i.e., 37 were recorded in Section 1, 10 were recorded in Section 3, and 1 was recorded in Section 5). This distribution pattern is likely a reflection of entrainment rates through the dam for this species. Of the 48 Kokanee recorded in 2014, all but 1 was less than 250 mm FL; a 260 mm FL Kokanee was captured in Section 1.

Walleye exhibited the opposite trend when compared to Kokanee; they were more commonly recorded in Section 5 (94%) and rarely recorded in Sections 1 and 3 (1 Walleye was recorded in each of these sections). Given their status as a cool-water species (Mainstream 2012) and the fact that the study area serves as a transitory area for upstream cold-water and downstream cool-water fish species populations, this distribution is not unexpected and is consistent with previous study years. Three of the Walleye recorded in 2014 had been marked during previous studies. A Walleye implanted with tag number 900026000051761 during the 2011 GMSMON-2 survey at Site 0509 and captured again in 2011 one week later at Site 0506 was recaptured in Site 0506 during the 2014 survey (Appendix A, Figure A3). Between its initial capture in 2011 and its 2014 recapture, this fish grew from 390 mm FL to 420 mm FL (i.e., 30 mm growth over 3 years). A Walleye initially captured during BC Hydro's 2010 Peace River Fish Inventory program (tag number 900026000033922; Mainstream 2011) near the Beatton River confluence (Site LF0701) on October 17, 2010 was recaptured during the current program in Site 0510 (approximately 31 km upstream; Appendix A, Figure A3). During the 4 years between encounters, this fish grew from 453 mm FL to 467 mm FL (14 mm growth). Another Walleye initially captured during BC Hydro's 2010 Peace River Fish Inventory program (tag number 965000000087754; Mainstream 2011) near the Pouce Coupe River confluence (Site LF08POC01) on June 9, 2010 was recaptured during the 2014 survey in Site 0515 (approximately 60 km upstream; Appendix A, Figure A3). During the 4 years between encounters, this fish grew from 326 mm FL to 454 mm FL (128 mm growth). During the 2014 study period, field crews marked 15 Walleye; none of these fish were recovered during subsequent sessions.

Field crews recorded 32 Lake Whitefish during the 2014 survey. All 32 Lake Whitefish were recorded in Section 3. These fish were not captured or processed for life history information. Based on observational records, all 32 of these fish were larger than 250 mm FL and likely adults.

Field crews recorded 14 Northern Pike in Section 3 and 8 Northern Pike in Section 5 during the 2014 survey. In 2014, Northern Pike were not recorded in Section 1. Fork lengths for this species ranged between 256 and 865 mm.

On September 22, 2014, field crews observed a recently deceased Lake Trout floating within Site 0110 prior to sampling the site (Appendix A, Figure A1). The fish was 780 mm FL, weighed 5900 g, and was a mature female. There were no obvious signs of trauma. The field crew collected fin rays and otolith samples (age-13). A second Lake Trout was captured in Site 0119 (Appendix A, Figure A1). It was 683 mm FL and weighed 3199 g. Based on a fin ray sample, it was age-9. This fish was implanted with a PIT tag (tag number 981098104940121) and released.

A single burbot was captured during the 2014 survey. It was recorded in Site 0508 (Appendix A, Figure A3), was 375 mm TL, and weighed 290 g. It was implanted with PIT tag number 981098104937952 and released.

4.0 DISCUSSION

The primary hypothesis to be tested by the Peace River Fish Index is as follows:

- Abundance, spatial distribution, body condition, and growth rates (length-at-age) of target fish populations in the Peace River are changing over time.

This hypothesis is being tested by annually monitoring populations of Arctic Grayling, Bull Trout, and Mountain Whitefish in 3 sections (Sections 1, 3, and 5) of the Peace River. These target species serve as indices of the river's overall condition as affected by anthropomorphic and natural changes.

The key management question to be addressed by GMSMON-2 is as follows:

- What is the population response of fish in the Peace River following the addition/modification of in-stream physical works or the implementation of an alternative minimum discharge regime?

Prior to regulation, flooding events were frequent in the Peace River. These flooding events resulted in the regular wetting and scouring of side channel habitats within the GMSMON-2 study area. With regulation, peak water levels declined. For side channel habitat areas, infrequent flooding after regulation has resulted in the accumulation of fine substrate within the side channel, the establishment and encroachment of more permanent terrestrial vegetation, and an overall reduction in the quality and quantity of habitat available to fish (Church and Ayles 2002; Church 1995).

The Peace River Flood Pulse Plan (PRFPP) was detailed in the Peace River WUP (BC Hydro 2007) as a means of improving the habitat that is available to fish by periodically increasing flows in the Peace River to flood and scour side channel areas. Flooding events implemented under the PRFPP in 2012 resulted in little substantial changes to the physical habitat at 2 major side channel habitat areas monitored downstream of the dam (NHC and Mainstream 2013) and likely provided little measurable benefit to the overall Peace River fish community.

The Peace Side Channel Plan (PSCP) was detailed in the Peace River WUP (BC Hydro 2007) as a means of improving the habitat that is available to fish by physically enhancing side channel areas to promote regular, effective wetting. Currently, the physical enhancement of side channels is in a trial stage (GMSWORKS-3) with NHC et al. (2010) identifying and prioritizing various side channels located throughout the GMSMON-2 study area for potential improvement. The first trial side channel physical enhancement was conducted in April 2014 near Peace Island Park.

Due to the limited measureable effect that the PRFPP has had on side channels habitats to date (NHC and Mainstream 2013), the lack of physical works conducted under the PSCP to date (NHC et al. 2010), and the fact that an alternative discharge regime has yet to be implemented, the GMSMON-2 management question cannot be adequately answered at this time. For these reasons, the below discussion focuses on the management hypothesis, specifically changes in the abundance, spatial distribution, body condition, and growth rate of Arctic Grayling, Bull Trout, and Mountain Whitefish over time. Attempts were not made to correlate any of the observed changes to the PRFPP or the PSCP.

4.1 Annual Sampling Consistency

Field methods employed during the Large River Fish Indexing program were standardized in 2002; these methods were carried over to the GMSMON-2 program when it commenced in 2008. Over this 13-year study period (2002 to 2014), small changes were occasionally made to the methods based on results of preceding years or to better address management objectives. Examples of some of these changes include the sections of river sampled (Sections 1 through 5 have all been sampled as part of the program) and the type of tag deployed (T-bar anchor versus PIT tag). For a long-term monitoring program such as GMSMON-2, changes to methods have the potential to confound results and hinder the identification of patterns and trends in the data. Changes made between 2002 and 2013 are discussed in previous reports. The 2014 field crew employ the same methods as Mainstream and Gazey (2014) when possible; however, 2 substantial changes were made to electroshocker settings that had the potential to impact results; these were pulse frequency and pulse amplitude. These changes are discussed below.

Mainstream and Gazey (2014) employed a Smith-root Type VIA electroshocker during the 2013 field survey; which has a minimum frequency setting of 60 Hz (Smith-root pers. comm.). In 2014, a Smith-root GPP5.0 electroshocker was employed with the frequency manually set at 30 Hz. Studies from other river systems indicate that salmonids, particularly larger salmonids, are more likely to be injured (i.e., branding, internal hemorrhaging, and spinal injuries) at 60 Hz when compared to 30 Hz (Snyder 2003; Golder 2004, 2005).

The average electroshocker amperage output used in 2013 was 4.5 amps (range 3.2 - 5.2 amps; Attachment A). The average electroshocker amperage output used in 2014 was 2.0 amps (range 1.8 - 2.2 amps; Appendix C, Table C3). Snyder (2003) recommends the lowest amperage output that effectively captures fish. Golder (2004, 2005) noted that Mountain Whitefish, Rainbow Trout, and Walleye that enter narcosis (i.e., are stunned) are more susceptible to internal injury than fish that remain in taxis (i.e., forced swimming). The probability of a fish experiencing narcosis increases with increased amperage.

Data regarding the frequency and/or severity of internal damage due to electroshocking has not been collected for the Peace River; the implications of any of the above electroshocker settings have not been locally tested. During most study years, inter-annual recapture rates were similar to or higher than rates documented in similar studies in other systems that use 30 Hz and 2.0 amps (Golder and Poisson 2014; ONA et al. 2014). These data would suggest that the higher electroshocker setting employed between 2002 and 2013 may not have a measureable effect on annual survival for any of the target species. Based on the literature and observations made by the field crew while conducting similar studies in other systems, it is felt that the lower settings are more appropriate in that they would reduce the effects of the electroshocking program on the long-term sustainability of fish populations in the Peace River. Determining the effects that different electroshocker setting may have on other aspects of fish life history (e.g., body condition, growth) or distribution may be possible with additional years of data collected using the revised 2014 settings.

The revised electroshocker setting described above may have resulted in changes in fish behavior that confound the data. At 30 Hz and 2.0 amps, fish are more likely to remain in taxis and are less likely to enter narcosis. In general, fish are easier to identify and capture when they are in narcosis because they are not moving relative to the netter. The lower electroshocker settings used in 2014 may have resulted in lower capture efficiencies when compared to previous study year, particularly for Mountain Whitefish, which represent approximately 90% of the total catch during a typical year. Overall, 19% fewer Mountain Whitefish were recorded in 2014 when compared to 2013 (Mainstream and Gazey 2014). However, the gradual, successive decline in Mountain

Whitefish catch rates between 2011 and 2014 makes it difficult to determine how much, if any, of the decline observed between 2013 and 2014 is due to the altered electroshocker settings. To date, 2014 was the only year in which the altered electroshocker settings were used. An additional year of data will provide insight into how much of the trend observed in 2014 was due to the altered settings and how much was due to annual variation in abundance. Additionally, data collected in 2015 could provide information on any long-term effects that the different electroshocker settings may have on growth, survival, or body condition. Until additional data are collected, metrics based on catch rate data should be interpreted with caution. The altered electroshocker setting would have had little effect on metrics based on tag recovery rates, such as the mark-recapture program, as the presence of a tag should not affect how a fish responds to an electrical field.

Another, less substantial change to the field program in 2014 relative to 2013 included the type of tag used. Between 2005 and 2013, glass-encapsulated PIT tags were deployed (depending on the study year either FECAVA-type 125 kHz full duplex tags or ISO-type 134.2 kHz full-duplex tags were deployed). In 2014, food safe polymer-shelled full duplex ISO-type 134.2 kHz PIT tags were deployed. Due to their polymer casings, food-safe tags are less likely to cause harm than a glass-encapsulated equivalent if ingested by a predator or accidentally ingested by a human. Also, the white polymer casing of the food-safe tags are more visible in the flesh of a fish when compared to the glass-encapsulated tag, which both decreases the likelihood of anglers accidentally ingesting a tag and increases the likelihood of recovered tags being submitted from anglers.

4.2 Arctic Grayling

The low number of Arctic Grayling recorded in 2014 hindered detailed analyses for this species. The number of Arctic Grayling captured during the annual survey decreased each year between 2011 and 2014. During most study years, Arctic Grayling were more commonly recorded in Section 5. This section of the study area was not sampled in 2002, 2003, or 2006. When these years are excluded, Arctic Grayling numbers have consistently declined since 2004. This decline is evident in annual catch rate data (Figure 4) and percent composition data (Appendix D, Table D1), but cannot be supported by population abundance estimates due to insufficient mark-recapture data for this species.

Reasons for the decline in Arctic Grayling catch are not known. The bulk of the Arctic Grayling population spawns in Peace River tributaries, most notably the Moberly River (Mainstream 2012). After hatching, age-0 Arctic Grayling disperse downstream into the Peace River mainstem over the summer season. The success of both of these 2 life history phases (i.e., spawning and age-0 dispersal) is paramount to sustaining the Peace River Arctic Grayling population. These 2 life history phases also are very susceptible to environmental perturbation. Low abundance of a particular age cohort is likely related to environmental conditions during the spring and summer of that cohort's spawning year. Catch data suggest low recruitment from the 2011 spawning season. Only 3 Arctic Grayling from the 2011 brood year were recorded during the 2012 survey (i.e., age-1 individuals; Mainstream and Gazey 2013) and only 2 Arctic Grayling from the 2011 brood year were recorded during the 2013 survey (i.e., age-2 individuals; Mainstream and Gazey 2014). None of the Arctic Grayling captured during the 2014 study year were from the 2011 brood year. In 2011, daily average discharge of the Moberly River was substantially higher than normal when compared to data collected between 2000 and 2010 from early May to mid-August (Wateroffice 2014). Adult Peace River Arctic Grayling are known to enter the Moberly River as early as April and return to the Peace River in June (AMEC and LGL 2008); spawning likely occurs in May and June. Age-0 Arctic Grayling were recorded in the lower Moberly River and the Peace River immediately downstream of the Moberly River confluence from mid-July to mid-October (Mainstream 2013a). Based on these timing considerations, the high 2011 water levels in the Moberly River could have negatively impacted either spawning/incubation or the downstream dispersal of age-0 Arctic Grayling and likely impacted both of these life history functions to some extent. In 2011, age-0 Arctic Grayling were recorded in a rotary screw trap near the confluence of the Moberly River by mid-May (Mainstream 2013b), which was early relative to data collected in 2012 (mid-July; Mainstream 2013a) and other northern systems (Scott and Crossman 1973; McPhail 2007). Higher discharge in 2011 may have caused Arctic Grayling to spawn or hatch earlier than normal or caused them to disperse downstream earlier than normal.

Data also suggest poor abundance for the 2007 brood year, although the trend was not as pronounced as it was with the 2011 brood year (Appendix E, Figure E2). In 2007, daily average discharge for the Moberly River also was substantially higher when compared to other study years (Wateroffice 2014). These data help support the above theory that Arctic Grayling abundance in the Peace River is influenced by Moberly River discharge rates during the spring and summer.

Arctic Grayling were not recorded in Section 1 during the 2014 survey and were rarely recorded in this section during earlier study years relative to catches in Sections 3 and 5. Poor habitat within Section 1 may limit its use by Arctic Grayling. Historically, this species was usually only present in Section 1 when catch rates were high in Sections 3 and 5.

Between early May and late August, water temperatures in Section 1 are generally colder than in Sections 3 and 5. After late September and until ice formation, water temperatures in Section 1 are generally warmer than in Sections 3 and 5. This spatial change in water temperature patterns varies in magnitude each year (Appendix B, Figure B2). For instance, in 2013, Section 3 was as much as 8°C warmer than Section 1 in mid-August and was 3°C colder than Section 1 by late September. However in 2009, Section 3 was only 2°C warmer than Section 1 in mid-August and only 2°C colder than Section 1 by late September. Regardless of the magnitude of these temperature changes, they usually occurred over the fall study period (i.e., late August to late September). During a typical study year, sampling occurred when Section 1 was changing from being the coldest location in the study area to being the warmest location in the study area (Appendix B, Figure B2). Continuous water temperature data are not available for the study area prior to 2009. However, a visual comparison of water temperature data that were available for the same time period as Arctic Grayling catch rate data suggest higher densities in Section 1 when water temperatures are more uniform throughout the study area. As with most of the conclusions presented for Arctic Grayling, low numbers hindered interpretation.

Body Condition for the 10 Arctic Grayling measured in 2014 were higher than average when compared to most previous study years. Although this result is based on few data points, it may reflect less competition for available resources. For the age-1, age-2, and age-4 cohorts, body condition generally increased each year between 2011 and 2014 for this species. Over that same time period, abundance declined. The age-3 cohort, however, did not follow a similar pattern and was variable over the 13 year study period regardless of abundance (Attachment A). All Arctic Grayling body condition data from recent study years (i.e., 2012 to 2014) should be interpreted with caution due to the low number of measured fish during each study year.

Lengths-at-age for the 10 Arctic Grayling measured in 2014 were higher than average when compared to all previous study years, although this result is based on few data points. Larger length-at-age may be a reflection of reduced competition (see above regarding similar trends for body condition). For the age-1, age-2, and age-4 cohorts, length-at-age increased each year between 2011 and 2014. Over that same time period, abundance declined. Similar to body condition, the age-3 cohort did follow a similar pattern when compared to other age-cohorts; however, only 9 fish from this cohort were measured for fork length and weight in 2012 and 2013 combined. All Arctic Grayling length-at-age data from recent study years (i.e., 2012 to 2014) should be interpreted with caution due to the low number of measured and aged fish during each study year.

4.3 Bull Trout

As detailed in Section 2.1.6, scale samples from 15 Bull Trout captured in 2014 were analyzed and assigned ages. These Bull Trout also were captured during earlier study years (i.e., when they were younger) and assigned ages using fin ray samples. Scale samples analyzed in 2014 were analyzed blindly, in that technicians were not aware of previous encounters for these fish. Each of the 15 scale samples were assigned ages between 1 and 3 years younger than the fish's "true" age based on its previous encounter. Slow growth rates for this species results in annuli along the outside edges of scales overlapping, causing samples to be under-aged during analysis. During the current study, evidence of this inconsistent annuli development was noted on scales collected from Bull Trout as small as approximately 200 mm FL (i.e., age-2 individuals). These results confirm findings from MacKay et al. (1990), Golder (2010a), Erhardt and Scarnecchia (2013), Zymonas and McMahon (2009) and numerous other studies that have indicated low precision in ages assigned using Bull Trout scales. The collection of scale samples from Bull Trout is not recommended during future study years.

Erhardt and Scarnecchia (2013) and Zymonas and McMahon (2009) state that the precision of ages assigned using fin ray samples decreases with increased age. Based on these studies, ages assigned to older Bull Trout using fin rays should be treated as suspect. Unfortunately, accurate age-class assignments are paramount for Bull Trout if the program is to successfully answer the Management Question for this species. Otoliths are the preferred ageing structure for Bull Trout (MacKay et al. 1990; Erhardt and Scarnecchia 2013; Zymonas and McMahon 2009); however, their collection requires lethal sampling. Pending approval from regulatory agencies, otoliths could be collected from a sub-sample of the Bull Trout catch to confirm the precision of fin rays and the development of a correction factor if needed. However, based on the small population size, their long life span, and the wide range of sizes recorded for each age-class, it is unlikely that this approach would outweigh the negative impacts associated with sacrificing a portion of the Bull Trout population. Opportunistically collecting otoliths from legally harvested Bull Trout (e.g., from recreational angling or local First Nations groups) may provide additional insight into this aspect of the Bull Trout population; however, linking data from these fish back to data collected under GMSMON-2 could be problematic.

It may be possible to use microchemistry analyses on collected fin ray samples to assign accurate ages to Bull Trout without the need for lethal sampling. A small dataset ($n = 10$) analyzed by Golder (2010b) showed consistent ages between otolith and fin rays samples collected from the same Bull Trout in the Duncan River watershed. Although the results of the microchemistry analyses performed on the fin rays were not accurate enough to determine migratory patterns, they were accurate enough to assign ages. The feasibility of microchemistry analysis is watershed-specific; this approach would require a substantial level of investigation before it could be implemented under GMSMON-2. However, if it does prove to be a valid option, it may be possible to analyze fin rays collected from all previous study years (depending on how they have been stored), providing precise ages for all Bull Trout dating back to 2002.

Consistent with previous study years, in 2014 Bull Trout were more commonly recorded in Section 3 than in other sections (Table 5). Section 3 is located immediately downstream of the Halfway River confluence. Higher Bull Trout numbers in this section may be partially due to post-spawning adults migrating out of the Halfway River immediately prior to or during the study period (see AMEC and LGL 2008 for timing of out-migration). However, none of the Bull Trout recorded during the 2014 survey had visible secondary characteristics indicative to spawning (e.g., pronounced kypes, flaccid abdomens, colourations).

With the possible exception of 2011 and 2012 (confidence intervals were wide), Bull Trout population estimates were near stable between 2008 and 2014. Limited mark-recapture data continue to hinder detailed population abundance analyses for this species. Based on data collected to date (2002 to 2014), it is unlikely that the program, in its current format, will ever generate abundance estimates that are precise enough to link changes in abundance to side channel productivity or changes to minimum flow regimes (i.e., the key management question); additional mark-recapture data are required. These data could be generated through additional sessions, sampling in additional season, or sampling in additional sections.

Consistent with previous study years, in 2014 Bull Trout captured in Section 1 had higher body condition relative to Bull Trout captured in Sections 3 and 5. Over most study years, body condition for this species decreased with distance from PCD. A similar trend was noted by ONA et al. (2014) on the Columbia River downstream of Revelstoke Dam. The result is likely related to Bull Trout feeding on dead or injured food items (e.g., kokanee) entrained through the dam. On a smaller scale, a similar pattern also was observed within Section 3 (all years combined), most likely related to food items entering the study area from the Halfway River system. This pattern is more evident for Mountain Whitefish (Section 4.4) than with Bull Trout. Bull Trout body conditions measured in 2014 were similar to most previous study years. Overall, body condition for this species was near consistent over the 13-year study period, with the possible exception of higher body condition noted in Section 1 during the 2007, 2008, and 2010 study years. Reasons for these higher body condition estimates are not known and were not discussed by Mainstream and Gazey in previous annual reports (Mainstream and Gazey 2008, 2009, 2011). These estimates are based on few fish; therefore, this result could be an artifact of small sample sizes. A preliminary review of PCD discharge data during each of these study years provided little insight.

Few conclusions can be inferred from growth data collected from Bull Trout in the Peace River. Slow growth and a long life-cycle also mean that little can be determined from length-frequency analyses. This, coupled with a lack of precise age data (for older individuals) makes it impossible to determine age-cohort strengths using the current methods. Overall, length-at-age and growth rate estimates generated for Bull Trout from 2002 to 2014 have shown no distinguishable trends over time, with most estimates overlapping estimates from previous years.

4.4 Mountain Whitefish

Population estimates for Mountain Whitefish in 2014 were similar to estimates from 2002 through 2009, 2012, and 2013 for Sections 1 and 3. Results from Section 5 were unusual in that the population estimate was higher for this section than in the other 2 sections. This is the first time in 10 years of sampling that Section 5 estimates were the highest of the 3 sections. This substantial change in spatial distribution was not noted for Mountain Whitefish in 2014 using any other metric.

Overall, the abundance of Mountain Whitefish in the study area during the study season appears to be closely related to water levels, with higher densities generally observed when water levels were lower. Mainstream and

Gazey (2011) speculated that at lower water levels, side channel habitat areas become isolated or unsuitable for use by Mountain Whitefish, thereby concentrating fish in remaining areas of the study area. The 2 years with highest Mountain Whitefish abundance estimates (2010 and 2011) coincided with low PCD summer discharge rates (Appendix B, Figure B1), supporting this relationship. However, to test the validity of this relationship, additional sampling would be required in side channel habitat areas in conjunction with existing sites. Alternatively, a telemetry program could be conducted that focused on fish movements in relation to changing water levels. Without additional data on this aspect of fish distribution, it will be difficult for the program in its current format to adequately link changes in abundance to side channel habitat enhancements or to changes to the flow regime. Presently, the program cannot determine if population estimates represent true Peace River fish abundances or are indicative of river stage.

Ages assigned to Mountain Whitefish in 2014 were similar to previous study years, were consistent with modes observed in length-frequency histograms, and were compatible with known ages assigned through mark-recapture data and previous encounter histories. The precision of assigned ages likely declined for older individuals. For that reason, the feasibility of implementing a correction factor for Mountain Whitefish, similar to the one described by Mainstream and Gazey (2013) should be explored. Accurate ages are paramount in determining spawning success and cohort survival, 2 life history parameters that need to be adequately understood to address the Management Question.

Age-frequency data indicate poor recruitment from the 2009/2010 through 2011/2012 spawning seasons. The bulk of the Peace River Mountain Whitefish population is known to spawn in tributaries (Mainstream 2012); therefore, the success of a particular age-class is unlikely to be influenced by changing environmental variables in the mainstem of the Peace River. A visual review of PCD discharge data and mainstem water temperatures during the Mountain Whitefish spawning and incubation periods showed no obvious correlations. A visual review of discharge data for the Moberly and Halfway rivers (2 major tributaries where spawning Mountain Whitefish have been documented; Mainstream 2012), also showed no correlations. The low abundances of these cohorts are not exclusively supported by catch data from earlier study years (Mainstream and Gazey 2012, 2013, 2014). The pattern observed in 2014 may partially be due to differences in electroshocker settings (Section 4.1) because these settings affect different lengths of fish in different ways. An additional year of data may provide more insight as observing low abundances of age-3, age-4, and age-5 Mountain Whitefish in 2015 would support this theory.

Age-0 Mountain Whitefish (i.e., fish less than approximately 150 mm FL) are too small to efficiently be captured by the boat electroshocker; therefore, the success of the 2013/2014 Mountain Whitefish spawning season will not be evident until at least 2015 under GMSMON-2.

In 2014, more Mountain Whitefish were recorded in Section 3 than in Sections 1 and 5. This result is consistent with most previous study years and contradicts results from the population abundance models, which indicate that the highest Mountain Whitefish abundance in 2014 occurred in Section 5. Reasons for the apparent discrepancy are unknown, but are likely related to violations of the constant catchability assumptions for Section 5 (Section 4.5.2). Section 3 is located immediately downstream of the Halfway River confluence. The Halfway River is a known spawning area for Mountain Whitefish (Mainstream 2012) and may serve as a holding area for this species prior to the spawning season. AMEC and LGL (2008) noted substantial movements of Mountain Whitefish as early as August, which they associated with pre-spawning migration. Spawning for this species likely occurs in October when water temperature decline to approximately 7°C (Northcote and

Ennis 1994 cited in Mainstream and Gazey 2014). Several Mountain Whitefish recorded in Section 3 during the 2014 survey had tubercles (a secondary sexual characteristic) and all 3 of the adult Mountain Whitefish that succumbed to sampling in Section 3 were females that would have spawned during the upcoming spawning season (Attachment A).

Consistent with most previous study years, Mountain Whitefish captured in 2014 in Section 1 had higher body condition relative to Mountain Whitefish captured in Sections 3 and 5. This result is likely due to Mountain Whitefish in Section 1 feeding off entrained food items. A similar scenario was noted by Golder and Poisson (2014) in the Columbia River downstream of Hugh L. Keenleyside Dam. This pattern also is evident in the body condition of Peace River Bull Trout (Section 4.3). In Section 3 (all years combined), body condition generally decreased with distance downstream from the Halfway River confluence. This trend is most likely related to food items entering the study area from the Halfway River system. A similar pattern was noted in the body condition of Mountain Whitefish in the Columbia River downstream of the Jordan River confluence (ONA et al. 2014). Body conditions measured in 2014 were similar to most previous study years, although overall, body condition for this species was high when compared to the previous 3 study years (i.e., 2011 to 2013). In 2014, body condition in Section 1 was substantially higher than measurements recorded in all other sections during all other study years. Reasons for the higher body condition in Section 1 are unknown. Discharge and water temperature data that were available for the Peace, Halfway, Moberly, and Pine rivers in the 3 months leading up to the 2014 study period were similar to previous study years.

4.5 Summary of Population Abundance Estimates

4.5.1 Evaluation of Assumptions

Factors that affect population estimates can be evaluated through an assessment of assumptions. This assessment is required for the Bayes sequential and stratified population models.

1) The population size in the study area does not change or is subject to apparent mortality over the period of the experiment.

Few Mountain Whitefish were recaptured in river sections other than their section of initial release (approximately 4.6%). Moreover, the model accounts for fish that move under the assumption that all movement is described by the history of recaptured marks. No Arctic Grayling or Bull Trout were recaptured in a different section relative to their section of initial release. For Mountain Whitefish, minimal growth occurred over the study period; therefore, any growth recruitment (fish becoming larger than 250 mm during the study) was minimal. Apparent mortality was estimated by the CJS analysis and included in the population estimates. Inspection of the posterior probability plot sequences generated by the Bayes model indicated that Sections 1 and 5 were convergent with no marked trend to larger or smaller population sizes. Conversely, the posterior probability for Section 3 was not stable, possibly caused by unaccounted for apparent mortality, time trends in catchability, and/or the migration of unmarked Mountain Whitefish out of the study area. Available evidence supports a closed population subject to apparent mortality in Sections 1 and 5, but not for Section 3.

2) All fish in a stratum (day and section), whether marked or unmarked, have the same probability of being captured.

The study area was stratified into the 3 river sections to account for any differences from marks applied, population size, or spatial catchability. Similarly, the day strata accounted for new marks applied through the study. Only PIT tags applied after 2003 were used in the analyses. For Mountain Whitefish, significant differences (P = 0.002) in the 2014 recovery rate were observed in Section 3 for marks applied in previous years. Evaluation of heterogeneous capture probability models using MARK did not provide any empirical evidence for some fish to more likely be caught than others. In Section 3, the time-varying catchability model provided a significantly better fit to the data over the constant catchability model; however, in Sections 1 and 5, the constant catchability model fit the data better. The logarithmic population deviation estimates showed little time trend with small deviations in Sections 1 and 5; conversely, Section 3 showed large deviations and an increasing time trend. Overall, the evidence supported the assumption for Sections 1 and 5 but was suspect for Section 3.

3) Fish do not lose their marks over the period of the study.

Each captured fish was examined for the presence of a tag scar. None of the fish captured in 2014 had evidence of recent tag wounds with no tags being present (i.e., a tag loss from the current year). In 2014, 4 of the Mountain Whitefish that were captured had tag scars with no tag present (i.e., a tag loss from a previous year). All 4 of these individuals had adipose fin clips. Tag scars were not observed on any Arctic Grayling or Bull Trout. The impact on the 2014 population estimates from lost tags should be very small.

4) All marked fish are reported on recovery.

Only captured fish were included in the number of fish examined for a mark; thus, it is unlikely that a marked fish would escape detection.

4.5.2 Reliability of Estimates

The foremost issue for the reliability of estimates is the weight each sampling sequence should receive for estimating population size. The time-varying capture probability model assumed uniform reliability of the capture probability computed for each sequence (White 2006). Similarly, the time-varying catchability model developed here employed equal weight for the logarithmic population deviations. The constant catchability model used by the Bayesian algorithm updated the posterior distribution of the previous sequence by the information contained in the current sampling sequence (Gazey and Staley 1986 showed that the sequential mark-recapture experiment can be characterized as a sequential Bayes algorithm updated by the binomial kernel). Thus, the sequential Bayes model weighted each sampling sequence by the information contained in the sample regardless of variations in catchability. From a practical perspective, when the model assumptions hold, as in Sections 1 and 5, the population estimates were very similar (within 3%) regardless of model (constant capture probability, time-varying capture probability, constant catchability, or time-varying catchability) or estimation program (MARK, ADMB, or MS-Excel Bayes).

The Bayes population estimates are likely the best available. The assumptions required to produce population estimates appear to hold for Sections 1 and 5. The constant catchability assumption for Mountain Whitefish appears to be deficient for Section 5. Therefore, multi-year catch-per-unit effort comparisons should be confined to Section 1.

The mark-recapture study for Arctic Grayling was largely unsuccessful, with little information obtained from the few fish captured. For Bull Trout, population estimates were available in all sampled sections for the first time under GMSMON-2, with better precision than obtained historically (overall CV = 27%).

Forecasts of effort levels needed for reliable population estimates were not conducted for Arctic Grayling or Bull Trout, but were conducted for Mountain Whitefish (Figure 30) and discussed in Section 3.7.

4.6 Catchability

Catchability coefficients were calculated under the assumptions of a closed population with apparent mortality and that abundance indices are proportional to population size. If these assumptions were true, coefficients should remain constant over all study years and sections (Figure 28). Three caveats were developed by Mainstream and Gazey (2005) for the application of catch rate as an index of abundance for Mountain Whitefish:

1) Sampling protocols (methods, equipment, and approach) must be consistent;

2) Water clarity must remain above 50 cm; and

3) The target population must remain closed during the sampling period;

The 2014 program complied with the above caveats albeit apparent mortality was detected. The estimated catchability coefficients were not consistent across sections within 2014. The coefficient for Section 1 was historically consistent and all available evidence suggests a valid population estimate. Coefficients for Sections 3 and 5 were lower in 2014 when compared to other recent study years.

The relationship between Mountain Whitefish catch rates weighted by habitat type and Mountain Whitefish population abundance estimates were similar between 2014 and most previous study years. Over the 13-year study period, only the 2010 catch rate data were not a suitable proxy for population abundance. The compatibility of the 2014 data is reassuring, as it indicates that the changes in methodologies employed in 2014 (e.g., crew, electroshocking equipment, electroshocker settings) did not negatively impact the 2014 results.

5.0 CONCLUSIONS

Sampling conducted since 2002 has provided a high-quality, long-term dataset to test the management hypothesis regarding changes to the abundance, spatial distribution, body condition, and growth rates of target fish populations in the Peace River over time. For some of these metrics, the program has shown both consistent, long-term patterns and abrupt and substantial changes. For other metrics, limited data collected under the program have prevented detailed analyses or limited the interpretation of results.

The key findings of the 2014 Peace River Fish Index are summarized as follows:

- In 2014, discharge for the Peace River was low for most of the year when compared to discharges recorded between 2002 and 2013. During the 2014 study period, discharge generally decreased over Session 1, increased over Sessions 2 and 3, decreased over Session 4, and varied over Sessions 5 and 6.
- In 2014, water temperatures for the Peace River were similar to water temperatures recorded between 2008 and 2013 in Section 1 and 3. Slightly warmer than average water temperatures were noted in Section 5 from late spring to mid-summer and slightly cooler than average water temperatures were noted in Section 5 from mid-summer to early fall.
- Only 10 Arctic Grayling were recorded during the 2014 survey, the fewest since the program began in 2002. Two of those 10 fish were recaptured during subsequent sessions. Their low numbers prevented the generation of abundance estimates.
- The number of Bull Trout recorded during the 2014 survey was similar to most previous study years. Population abundance was estimated for this species for all 3 sections for the first time since the program began. In 2014, Bull Trout abundance was estimated at 240 in Section 1, 231 in Section 3, and 59 in Section 5 (530 Bull Trout for all sections combined).
- Fewer Mountain Whitefish were recorded in 2014 than during all previous study years. Capture numbers for this species have generally declined since 2011; however, abundance estimates for this species were similar to most previous study years. Tag recoveries for this species were inconsistent in Section 3 relative to Sections 1 and 5. In 2014, Mountain Whitefish abundance was estimated at approximately 11 000 individuals in Section 1, 9000 individuals in Section 3, and 14 315 individuals in Section 5 (35 000 Mountain Whitefish for all sections combined).
- In 2014, Mountain Whitefish abundance was highest in Section 5. During all previous study years, Mountain Whitefish abundance was highest in Section 1.
- Body condition and age data for the 10 Arctic Grayling recorded in 2014 were similar to previous study years.
- For Bull Trout, 2014 estimates of body condition and length-at-age were similar to previous study years.
- Several age-classes of Mountain Whitefish were underrepresented in the 2014 age-frequency histograms, most notably the age-3 cohort (i.e., the 2010/2011 spawning/incubation season). This cohort also was underrepresented in 2013 (as age-2) and 2012 (as age-1). They would have been too small to capture during the 2011 survey.

- The body condition of Mountain Whitefish increased substantially between 2012 and 2014, particularly in Section 1.
- Ageing Bull Trout scales was inaccurate due to fewer annuli relative to fin rays samples collected from the same fish. The precision of ages assigned to Bull Trout using fin ray samples likely decreases with increased age.
- Two of the 176 Rainbow Trout captured during the 2014 survey had been previously marked during the 2013 survey.
- Three of the 35 Walleye captured during the 2014 survey had been previously marked. One of those 3 was previously marked during the 2011 survey. The other 2 were marked during BC Hydro's 2010 Peace River Fish Inventory program.

In its current format, the program can successfully monitor changes in fish populations over time. However, it is unlikely to estimate most of the selected metrics with enough precision to adequately link changes in those metrics to the in-stream physical works or alternative flow regimes identified in the Management Question.

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7.0 CLOSURE

We trust that this report meets your current requirements. If you have any further questions, please do not hesitate to contact the undersigned.

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W.J. GAZEY RESEARCH

Bill Gazey

DF/GA/cmc

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APPENDIX A

Maps and UTM Locations

Table A1 Location and distance from WAC Bennett Dam of GMSMON-2 boat electroshocking sites in the Peace River, 2014.

Section	Site Name	Bank[a]	Bank Habitat Type[b]	Physical Habitat[c]	Upper Site Limit				Lower Site Limit			
					Zone[d]	Easting	Northing	River Km[e]	Zone[d]	Easting	Northing	River Km[e]
1	0101	ILDB	A3	Absent	10	566453	6207858	25.4	10	566936	6208239	25.9
	0102	ILDB	A3	Absent	10	566936	6208240	25.9	10	567497	6208907	26.9
	0103	RDB	A1	Present	10	566302	6207742	25.3	10	567401	6208075	26.2
	0104	IRDB	A3	Absent	10	566460	6207754	25.4	10	566934	6207880	25.8
	0105	RDB	A2	Present	10	567402	6208074	26.2	10	568000	6208913	27.3
	0107	LDB	A1	Present	10	568372	6210050	28.4	10	568798	6210402	28.9
	0108	RDB	A3	Absent	10	568605	6209966	28.5	10	569259	6210477	29.3
	0109	RDB	A3	Absent	10	569260	6210478	29.3	10	569850	6211235	30.3
	0110	LDB	A1	Present	10	568798	6210403	28.9	10	569302	6211053	29.7
	0111	LDB	A1	Present	10	569302	6211053	29.7	10	569825	6211869	30.7
	0112	LDB	A1	Present	10	569824	6211868	30.7	10	570686	6212472	31.8
	0113	RDB	A2	Present	10	569994	6211528	30.6	10	570510	6212043	31.3
	0114	LDB	A2	Present	10	570686	6212474	31.8	10	571342	6213121	32.8
	0116	RDB	A3	Absent	10	570511	6212043	31.3	10	571265	6212633	32.3
	0119	LDB	A1	Present	10	567516	6209096	27.0	10	568019	6209628	27.8
3	0301	RDB	A2	Present	10	600824	6232860	71.3	10	602606	6233198	73.1
	0302	IRDB	A2	Present	10	599753	6233307	70.2	10	601597	6233232	72.0
	0303	IRDB	A2	Present	10	601597	6233232	72.0	10	602930	6233597	73.6
	0304	ILDB	A2	Absent	10	602583	6233193	73.1	10	603787	6233290	74.5
	0305	LDB	A2	Absent	10	603204	6233827	73.8	10	604640	6233426	75.4
	0306	LDB	A3	Absent	10	604655	6233435	75.4	10	605586	6233750	76.5
	0307	IRDB	A3	Absent	10	605976	6233888	77.0	10	606935	6234160	78.0
	0308	IRDB	A3	Absent	10	606935	6234158	78.0	10	607692	6235034	79.4
	0309	ILDB	A3	Absent	10	605976	6233878	77.0	10	606666	6234387	77.8
	0310	ILDB	A3	Present	10	606662	6234395	77.8	10	607691	6235034	79.4
	0311	LDB	A3	Present	10	605585	6233743	76.5	10	606512	6234441	77.7
	0312	LDB	A2	Absent	10	607058	6234840	78.6	10	608047	6235753	80.2
	0314	RDB	A2	Present	10	604468	6233079	75.1	10	605400	6233321	76.1
	0315	RDB	A3	Present	10	605400	6233320	76.1	10	606956	6233951	77.9
	0316	RDB	A2	Present	10	606956	6233951	77.9	10	607974	6234928	79.3
5	0501	RDB	A2	Present	10	629169	6229759	105.4	10	630016	6229305	106.2
	0502	RDB	A2	Present	10	630016	6229305	106.2	10	630954	6229298	107.1
	0503	IRDB	A3	Absent	10	629023	6230250	105.0	10	629611	6229680	105.7
	0504	IRDB	A3	Absent	10	629787	6229549	106.0	10	630560	6229543	106.8
	0505	LDB	A1	Present	10	630553	6229765	106.7	10	631540	6229590	107.7
	0506	LDB	A2	Present	10	631539	6229590	107.7	10	632491	6229713	108.6
	0507	RDB	A2	Present	10	632339	6229356	108.4	10	633099	6229489	109.1
	0508	LDB	A2	Present	10	637926	6227901	115.5	10	638432	6227150	116.4
	0509	IRDB	A3	Absent	10	632785	6229686	108.9	10	633704	6229905	109.8
	0510	RDB	A1	Present	10	634530	6229634	110.5	10	635555	6230048	111.6
	0511	LDB	A2	Present	10	635651	6230419	111.8	10	636334	6230361	112.4
	0512	IRDB	A3	Absent	10	633855	6229835	110.0	10	634872	6230026	111.0
	0513	RDB	A3	Absent	10	637113	6228814	114.2	10	637433	6228125	115.0
	0514	ILDB	A3	Absent	10	637427	6228123	115.0	10	637735	6227647	115.5
	0515	IRDB	A3	Absent	10	637376	6229072	114.1	10	637591	6228192	115.0

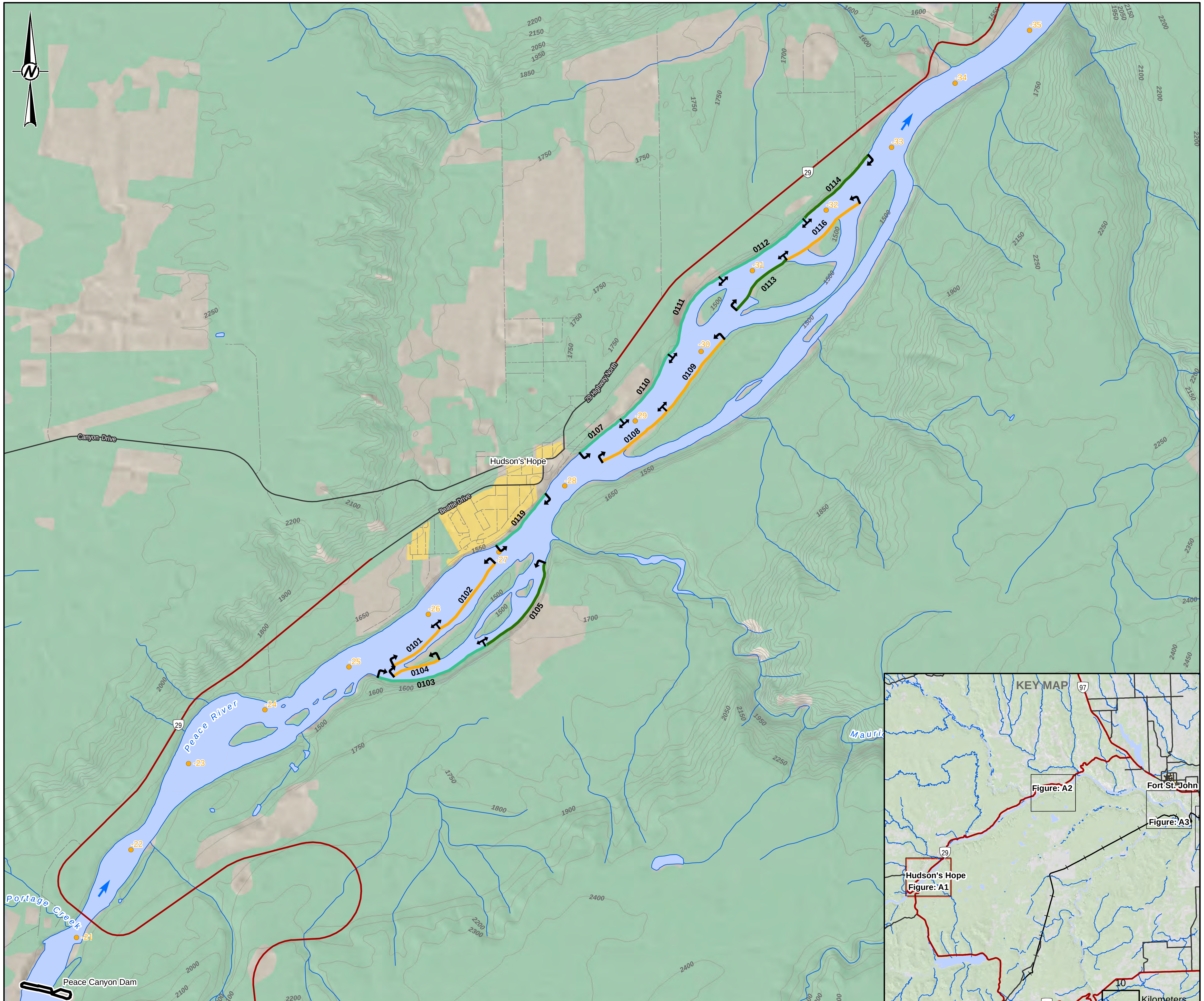
[a] RDB=Right bank as viewed facing downstream; LDB=Left bank as viewed facing downstream; IRDB=Right bank of island as viewed facing downstream; ILDB=Left bank of island as viewed facing downstream.

[b] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

[c] Absent=Nearshore habitat without physical cover; Present=Nearshore habitat with physical cover. Assigned by P&E and Gazey (2003).

[d] NAD 83.

[e] River kilometres measured downstream from WAC Bennett Dam (RiverKm 0.0).



LEGEND

RIVER KILOMETRE AS MEASURED DOWNSTREAM FROM W.A.C. BENNETT DAM

0110 BOAT ELECTROSHOCKING SITE

FLOW DIRECTION

DAM SECTION

SITE HABITAT CLASSIFICATION

A1 WITH PHYSICAL COVER

A2 WITH PHYSICAL COVER

A3 WITHOUT PHYSICAL COVER

TRANSPORTATION

ARTERIAL ROAD

LOCAL ROAD

HIGHWAY

RAILROAD

HYDROLOGY

WATERCOURSE

WATER

TOPOGRAPHY

CONTOUR (m)

URBAN AREA

FOREST AREA

0 1,000 2,000

1:40,000 METRES

REFERENCES
1. TRANSPORTATION, HYDROLOGY AND TOPOGRPHY LAYERS CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. RAILROAD OBTAINED FROM IHS ENERGY.
3. RIVER KILOMETER MARKERS OBTAINED FROM BC HYDRO.
4. DAM SECTION AND ISLANDS OBTAINED FROM FROM GEOBASE®.

PROJECTION: UTM ZONE 10 DATUM: NAD 83

CLIENT
BC HYDRO

PROJECT
GMSMON-2 PEACE RIVER FISH INDEX

TITLE
SECTION 1 OF THE GMSMON-2 PEACE RIVER FISH INDEX STUDY AREA

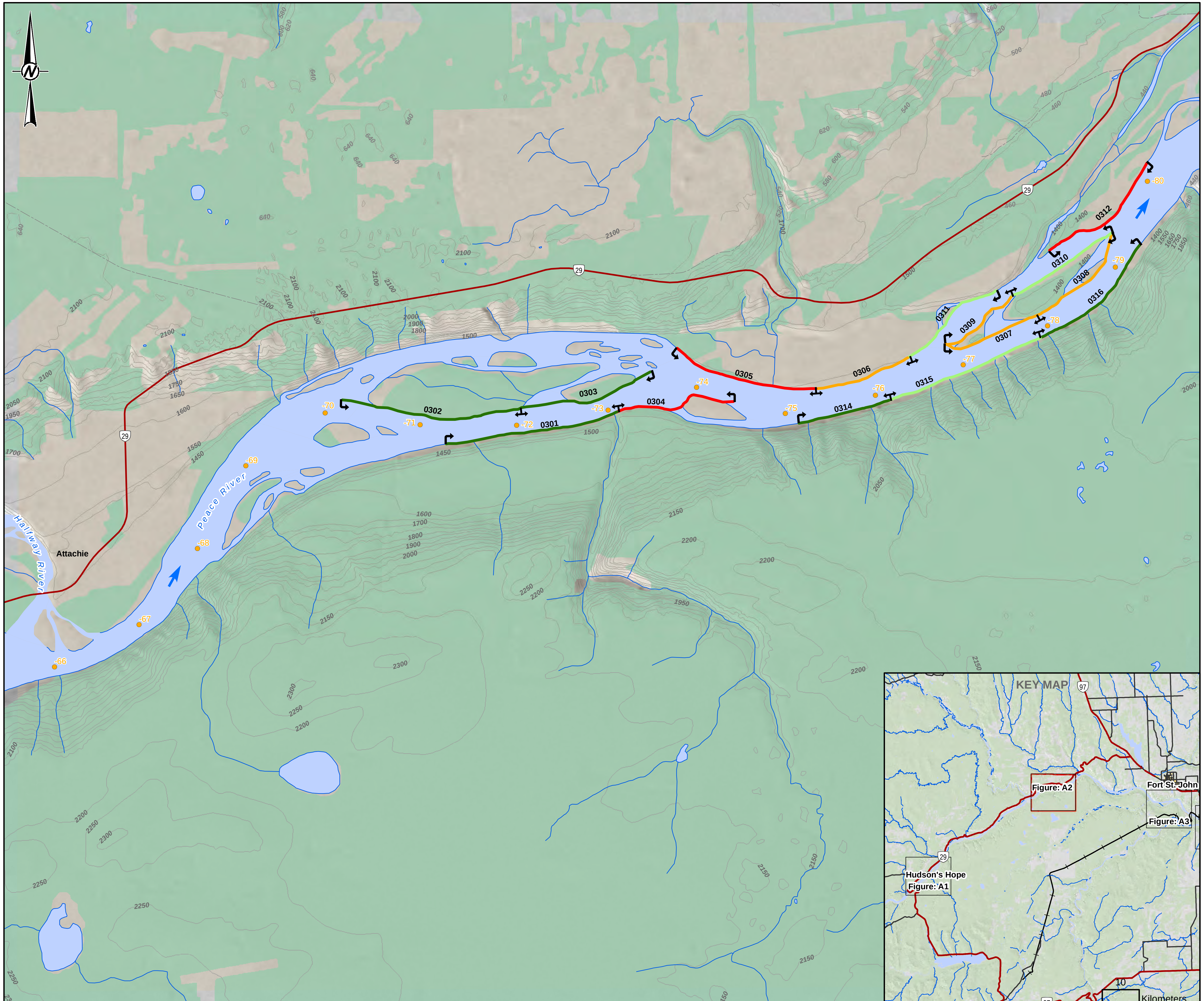
CONSULTANT

Golder Associates

YYYY-MM-DD	2015-01-07
DESIGNED	DF
PREPARED	AD
REVIEWED	DF
APPROVED	GA

PROJECT NO.	CONTROL	REV.	FIGURE
1400753		0	A1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

- RIVER KILOMETRE AS MEASURED DOWNSTREAM FROM W.A.C. BENNETT DAM
- 0110 BOAT ELECTROSHOCKING SITE
- FLOW DIRECTION
- DAM SECTION

SITE HABITAT CLASSIFICATION

- A2 WITH PHYSICAL COVER
- A2 WITHOUT PHYSICAL COVER
- A3 WITH PHYSICAL COVER
- A3 WITHOUT PHYSICAL COVER

TRANSPORTATION

- ARTERIAL ROAD
- LOCAL ROAD
- HIGHWAY
- RAILROAD

HYDROLOGY

- WATERCOURSE
- WATER

TOPOGRAPHY

- CONTOUR (m)
- URBAN AREA
- FOREST AREA

0 1,000 2,000

1:40,000 METRES

REFERENCES

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PROJECTION: UTM ZONE 10 DATUM: NAD 83

CLIENT
BC HYDRO

PROJECT
GMSMON-2 PEACE RIVER FISH INDEX

TITLE
SECTION 3 OF THE GMSMON-2 PEACE RIVER FISH INDEX STUDY AREA

CONSULTANT

Golder Associates

YYYY-MM-DD	2015-01-07
DESIGNED	DF
PREPARED	AD
REVIEWED	DF
APPROVED	GA

PROJECT NO.	CONTROL	REV.	FIGURE
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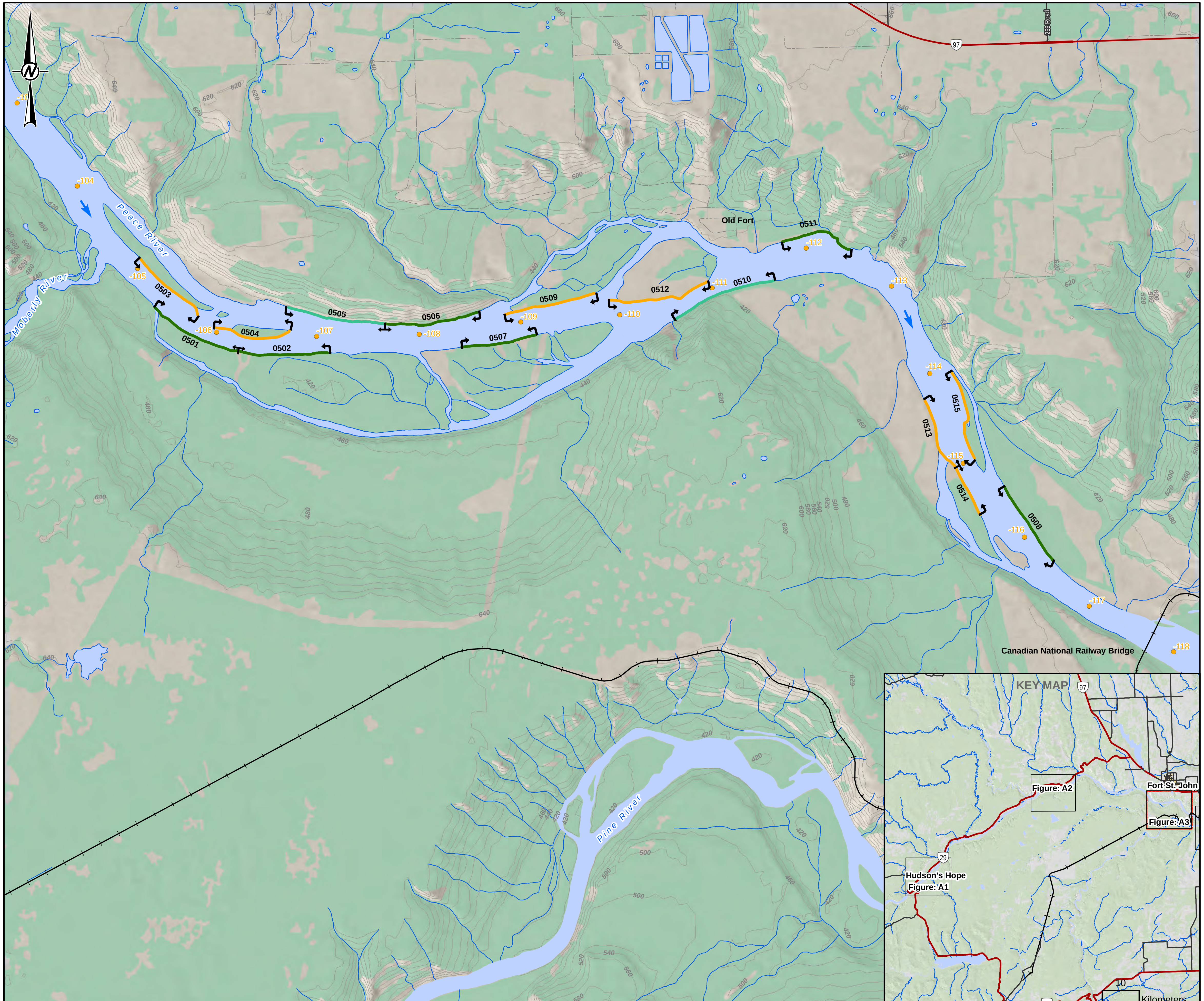

LEGEND

- RIVER KILOMETRE AS MEASURED DOWNSTREAM FROM W.A.C. BENNETT DAM
- 0110 BOAT ELECTROSHOCKING SITE
- FLOW DIRECTION
- DAM SECTION

SITE HABITAT CLASSIFICATION

- A1 WITH PHYSICAL COVER
- A2 WITH PHYSICAL COVER
- A3 WITHOUT PHYSICAL COVER

TRANSPORTATION

- ARTERIAL ROAD
- LOCAL ROAD
- HIGHWAY
- RAILROAD

HYDROLOGY

- WATERCOURSE
- WATER

TOPOGRAPHY

- CONTOUR (m)
- URBAN AREA
- FOREST AREA

0 1,000 2,000

1:40,000 METRES

REFERENCES

1. TRANSPORTATION, HYDROLOGY AND TOPOGRPHY LAYERS CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. RAILROAD OBTAINED FROM IHS ENERGY.
3. RIVER KILOMETER MARKERS OBTAINED FROM BC HYDRO.
4. DAM SECTION AND ISLANDS OBTAINED FROM FROM GEOBASE®.

PROJECTION: UTM ZONE 10 DATUM: NAD 83

CLIENT
BC HYDRO

PROJECT
GMSMON-2 PEACE RIVER FISH INDEX

TITLE
SECTION 5 OF THE GMSMON-2 PEACE RIVER FISH INDEX STUDY AREA

CONSULTANT

Golder Associates

YYYY-MM-DD	2015-01-07
DESIGNED	DF
PREPARED	AD
REVIEWED	DF
APPROVED	GA

PROJECT NO.	CONTROL	REV.	FIGURE
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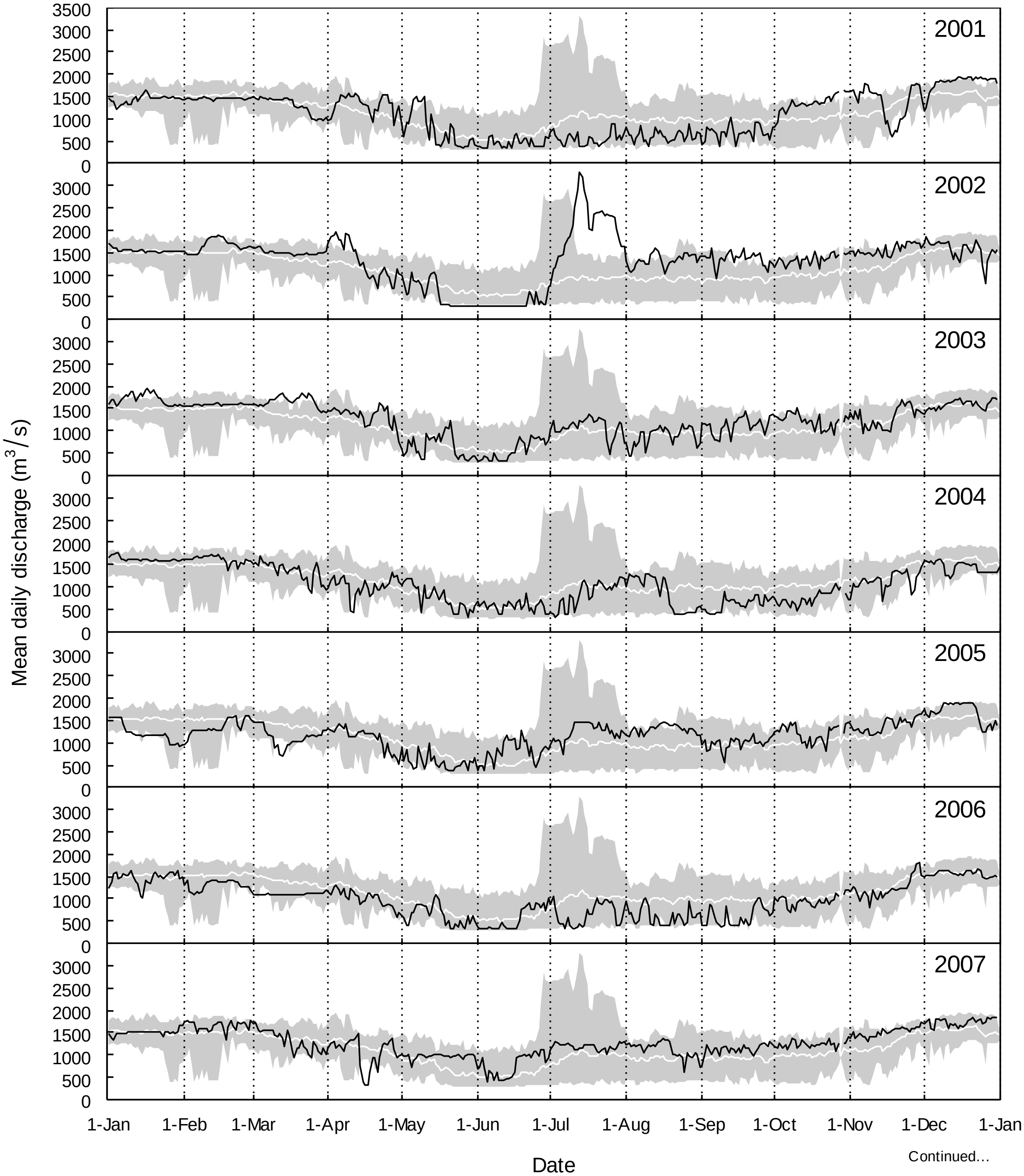
APPENDIX B

Discharge and Temperature Data



Continued…

Figure B1: Mean daily discharge (m³/s) for the Peace River at Peace Canyon Dam (PCD; black line), 2001 to 2014. The shaded area represents minimum and maximum mean daily discharge recorded at PCD during other study years between 2001 and 2014. The white line represents average mean daily discharge over the same time period

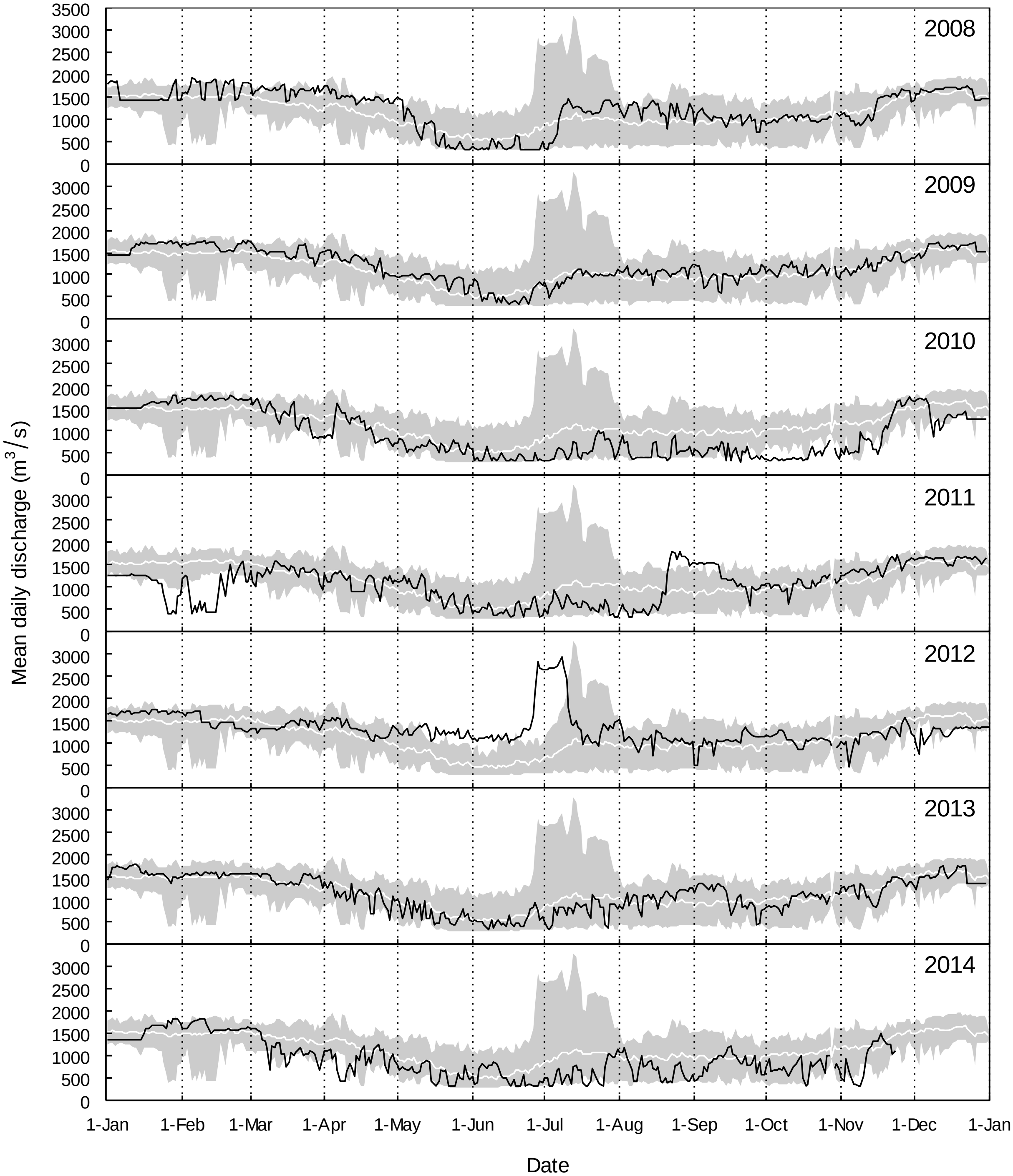


Figure B1: Concluded.

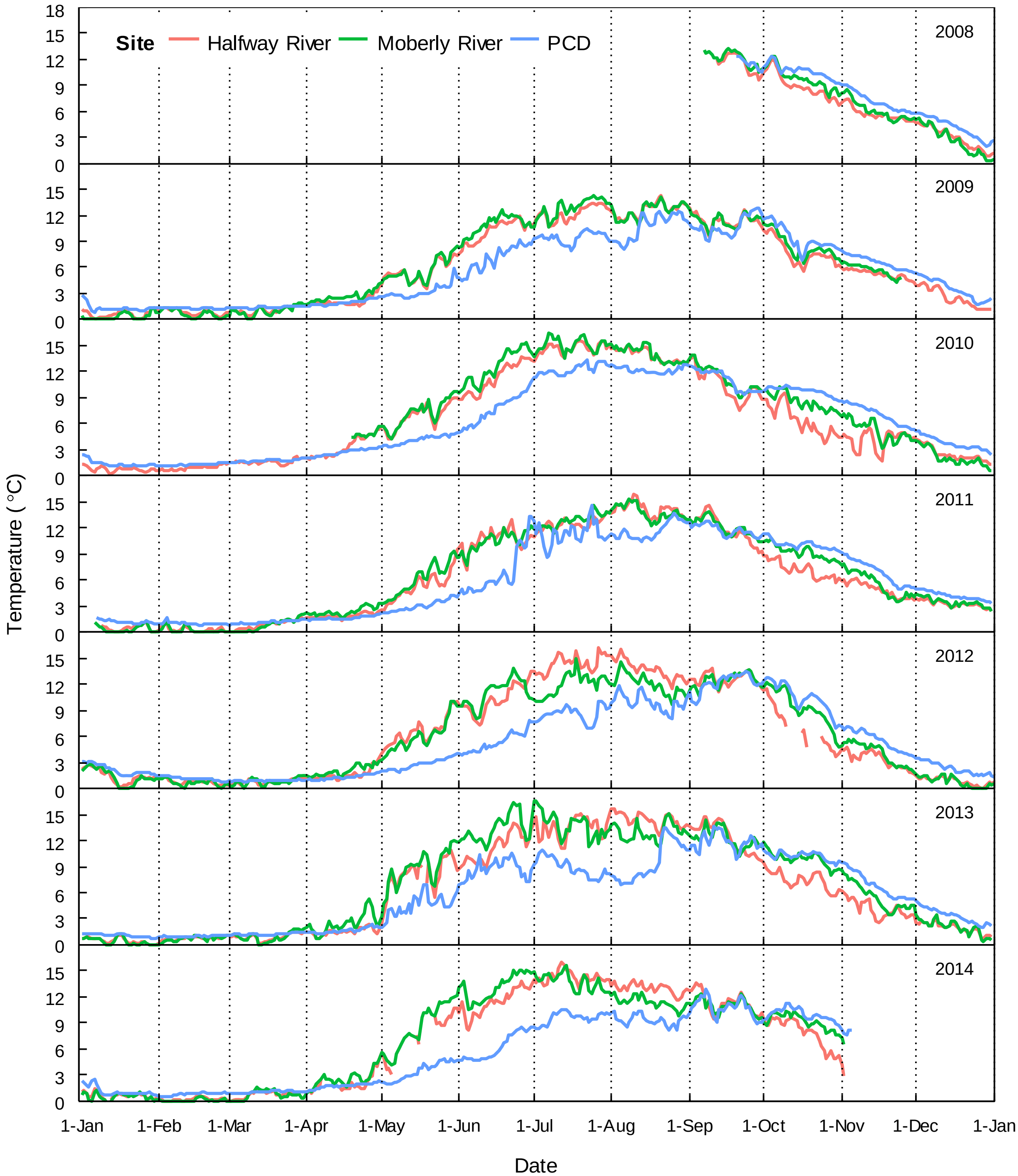


Figure B2: Mean daily water temperatures (°C) for the Peace River downstream of Peace Canyon Dam (PCD; blue line), downstream of the Halfway River confluence (red line) and downstream of the Moberly River confluence (green line), 2008 to 2014. Data were collected under GMSWORKS-2 (DES 2014).

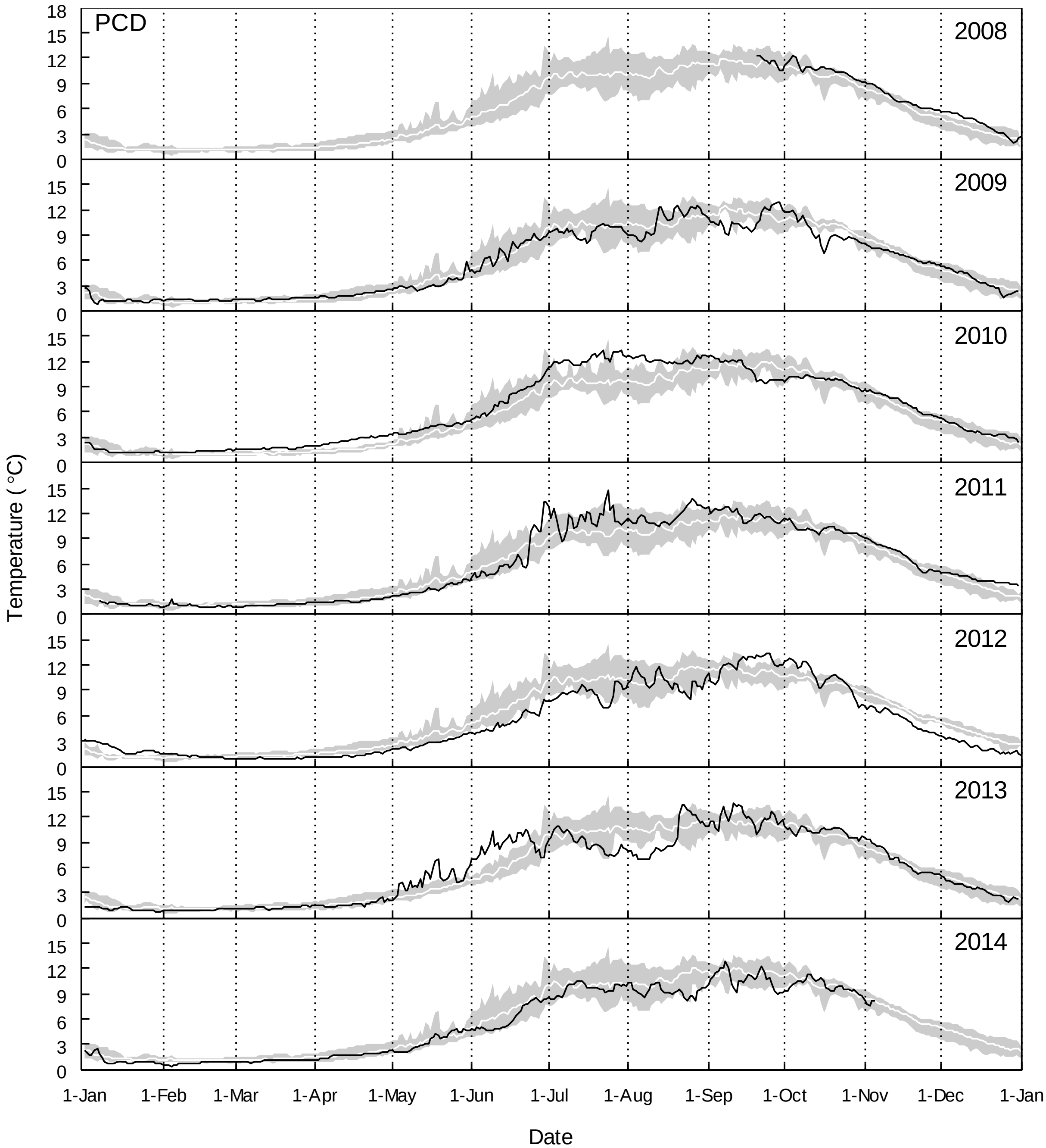


Figure B3: Mean daily water temperature (°C) for the Peace River at Peace Canyon Dam (PCD; black line), 2008 to 2014. The shaded area represents minimum and maximum water temperatures recorded at PCD during other study years between 2008 and 2014. The white line represents average mean daily water temperatures over the same time period. Data were collected under GMSWORKS-2 (DES 2014).

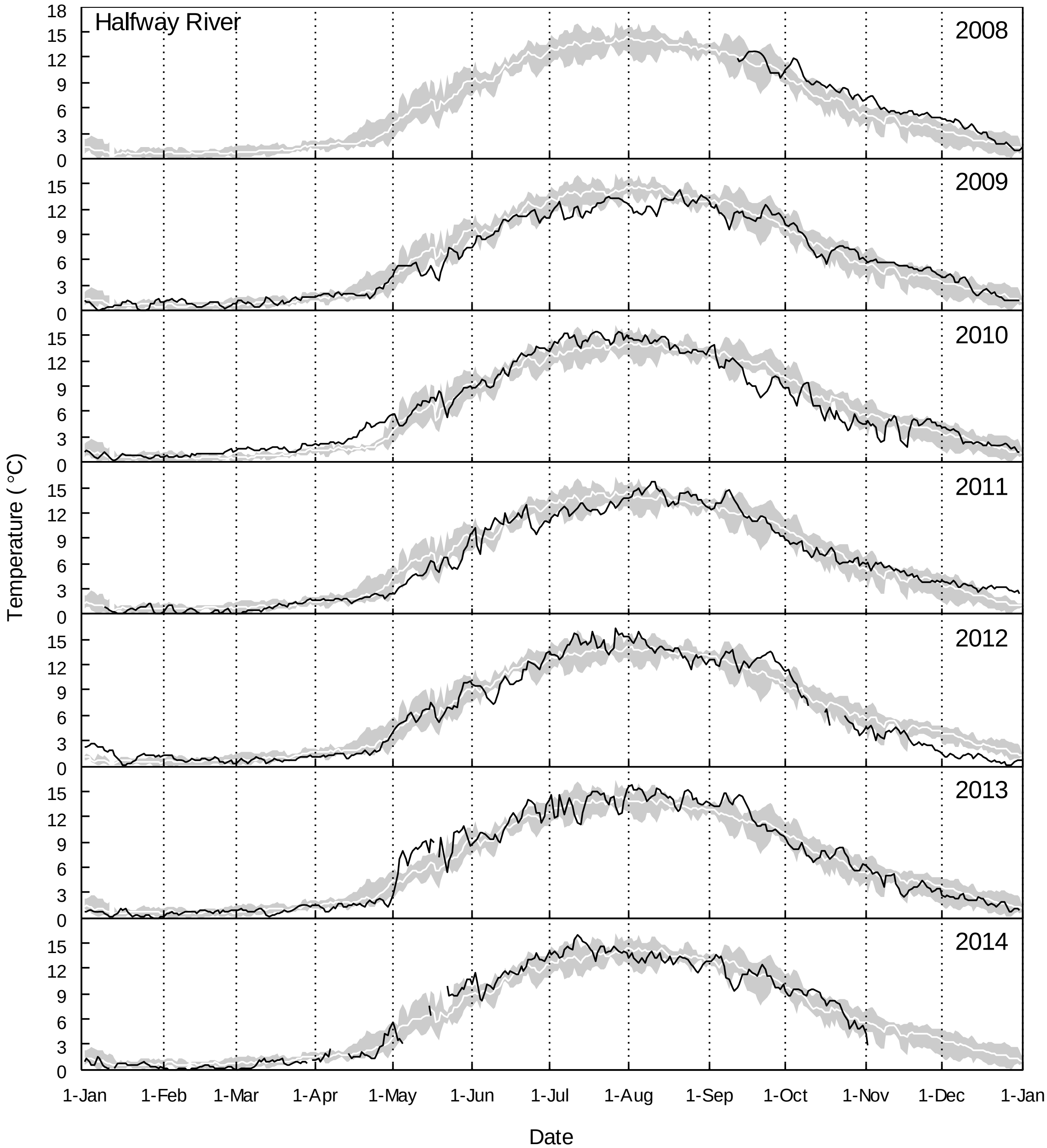


Figure B4: Mean daily water temperature (°C) for the Peace River downstream of the Halfway River confluence (black line), 2008 to 2014. The shaded area represents minimum and maximum water temperatures recorded at the site during other study years between 2008 and 2014. The white line represents average mean daily water temperatures over the same time period. Data were collected under GMSWORKS-2 (DES 2014).

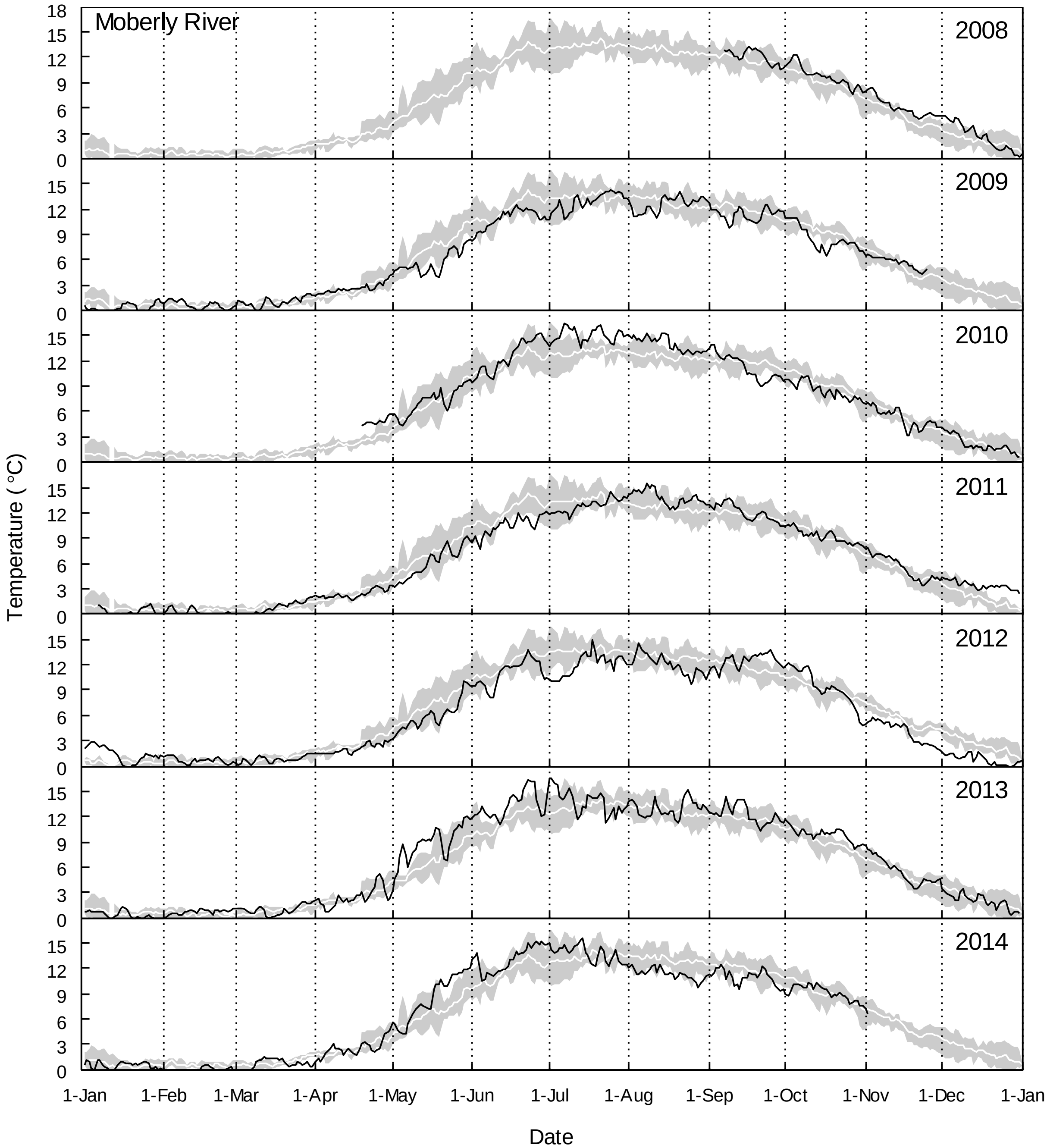


Figure B5: Mean daily water temperature (°C) for the Peace River downstream of the Moberly River confluence (black line), 2008 to 2014. The shaded area represents minimum and maximum water temperatures recorded at the site during other study years between 2008 and 2014. The white line represents average mean daily water temperatures over the same time period. Data were collected under GMSWORKS-2 (DES 2014).

APPENDIX C

Habitat Data

Table C1 Lengths of boat electroshocking sites by habitat type in the Peace River, 2014.

Section	Site[a]	Length (m) of Site							Total Length (m)
		Physical Cover Present[b]				Physical Cover Absent[b]			
		A1[c]	A2[c]	A3[c]	Total	A2[c]	A3[c]	Total	
1	0101				0		600	600	**600**
	0102				0		975	975	**975**
	0103	1200			1200			0	**1200**
	0104				0		500	500	**500**
	0105		1100		1100			0	**1100**
	0107	550			550			0	**550**
	0108				0		850	850	**850**
	0109				0		975	975	**975**
	0110	650			650			0	**650**
	0111	1000			1000			0	**1000**
	0112	1070			1070			0	**1070**
	0113		750		750			0	**750**
	0114		950		950			0	**950**
	0116				0		985	985	**985**
	0119	750			750			0	**750**
Section 1 Total		**5220**	**2800**	**0**	**8020**	**0**	**4885**	**4885**	**12905**
3	0301		1800		1800			0	**1800**
	0302		1900		1900			0	**1900**
	0303		1450		1450			0	**1450**
	0304				0	1350		1350	**1350**
	0305				0	1550		1550	**1550**
	0306				0		1000	1000	**1000**
	0307				0		950	950	**950**
	0308				0		1350	1350	**1350**
	0309				0		950	950	**950**
	0310			1200	1200			0	**1200**
	0311			1250	1250			0	**1250**
	0312				0	1170		1170	**1170**
	0314		975		975			0	**975**
	0315			1700	1700			0	**1700**
	0316		1475		1475			0	**1475**
Section 3 Total		**0**	**7600**	**4150**	**11750**	**4070**	**4250**	**8320**	**20070**
5	0501		995		995			0	**995**
	0502		950		950			0	**950**
	0503				0		820	820	**820**
	0504				0		850	850	**850**
	0505	1000			1000			0	**1000**
	0506		1000		1000			0	**1000**
	0507		780		780			0	**780**
	0508		925		925			0	**925**
	0509				0		975	975	**975**
	0510	1130			1130			0	**1130**
	0511		720		720			0	**720**
	0512				0		1280	1280	**1280**
	0513				0		770	770	**770**
	0514				0		560	560	**560**
	0515				0		970	970	**970**
Section 5 Total		**2130**	**5370**	**0**	**7500**	**0**	**6225**	**6225**	**13725**
Grand Total		**7350**	**15770**	**4150**	**27270**	**4070**	**15360**	**19430**	**46700**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

[b] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[c] Nearshore habitat with no physical cover as assigned by P&E and Gazey (2003).

[d] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C2 Descriptions of categories used in the Bank Habitat Types Classification System as summarized from R.L.&L. (2001).

Category	Code	Description
Armoured/Stable	A1	Banks generally stable and at repose with cobble/small boulder/gravel substrates predominating; uniform shoreline configuration with few/minor bank irregularities; velocities adjacent to bank generally low-moderate, instream cover limited to substrate roughness (i.e., cobble/small boulder interstices).
	A2	Banks generally stable and at repose with cobble/small boulder and large boulder substrates predominating; irregular shoreline configuration generally consisting of a series of armoured cobble/boulder outcrops that produce Backwater habitats; velocities adjacent to bank generally moderate with low velocities provided in BW habitats: instream cover provided by BW areas and substrate roughness; overhead cover provided by depth and woody debris; occasionally associated with C2, E4, and E5 banks.
	A3	Similar to A2 in terms of bank configuration and composition although generally with higher composition of large boulders/bedrock fractures; very irregular shoreline produced by large boulders and bed rock outcrops; velocities adjacent to bank generally moderate to high; instream cover provided by numerous small BW areas, eddy pools behind submerged boulders, and substrate interstices; overhead cover provided by depth; exhibits greater depths offshore than found in A1 or A2 banks; often associated with C1 banks.
	A4	Gently sloping banks with predominantly small and large boulders (boulder garden) often embedded in finer materials; shallow depths offshore, generally exhibits moderate to high velocities; instream cover provided by “pocket eddies” behind boulders; overhead cover provided by surface turbulence.
	A5	Bedrock banks, generally steep in profile resulting in deep water immediately offshore; often with large bedrock fractures in channel that provide instream cover; usually associated with moderate to high current velocities; overhead cover provided by depth.
	A6	Man-made banks usually armoured with large boulder or concrete rip-rap; depths offshore generally deep and usually found in areas with moderate to high velocities; instream cover provided by rip-rap interstices; overhead cover provided by depth and turbulence.
Depositional	D1	Low relief, gently sloping bank type with shallow water depths offshore; substrate consists predominantly of fines (i.e., sand/silt); low current velocities offshore; instream cover generally absent or, if present, consisting of shallow depressions produced by dune formation (i.e., in sand substrates) or embedded cobble/boulders and vegetative debris; this bank type was generally associated with bar formations or large backwater areas.
	D2	Low relief, gently sloping bank type with shallow water depths offshore; substrate consists of coarse materials (i.e., gravels/cobbles); low-moderate current velocities offshore; areas with higher velocities usually producing riffle areas; overhead cover provided by surface turbulence in riffle areas; instream cover provided by substrate roughness; often associated with bar formations and shoal habitat.
	D3	Similar to D2 but with coarser substrates (i.e., large cobble/small boulder) more dominant; boulders often embedded in cobble/gravel matrix; generally found in areas with higher average flow velocities than D1 or D2 banks; instream cover abundantly available in form of substrate roughness; overhead cover provided by surface turbulence; often associated with fast riffle transitional bank type that exhibits characteristics of both Armoured and Depositional bank types.
SPECIAL HABITAT FEATURES		
BACKWATER POOLS	-	These areas represent discrete areas along the channel margin where backwater irregularities produce localized areas of counter-current flows or areas with reduced flow velocities relative to the mainstem; can be quite variable in size and are often an integral component of Armoured and erosional bank types. The availability and suitability of Backwater pools are determined by flow level. To warrant separate identification as a discrete unit, must be a minimum of 10 m in length; widths highly variable depending on bank irregularity that produces the pool. Three classes are identified:
	BW-P1	Highest quality pool habitat type for adult and subadult cohorts for feeding/holding functions. Maximum depth exceeding 2.5 m, average depth 2.0 m or greater; high availability of instream cover types (e.g., submerged boulders, bedrock fractures, depth, woody debris); usually with Moderate to High countercurrent flows that provide overhead cover in the form of surface turbulence.
	BW-P2	Moderate quality pool type for adult and subadult cohorts for feeding/holding; also provides moderate quality habitat for smaller juveniles for rearing. Maximum depths between 2.0 to 2.5 m, average depths generally in order of 1.5 m. Moderate availability of instream cover types; usually with Low to Moderate countercurrent flow velocities that provide limited overhead cover.

Continued.

Table C2 Concluded.

	BW-P3	Low quality pool type for adult/subadult classes; moderate-high quality habitat for y-o-y and small juveniles for rearing. Maximum depth <1.0 m. Low availability of instream cover types; usually with Low-Nil current velocities.
EDDY POOL	EDDY	Represent 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 subadult life stages. High availability of instream cover.
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 predominantly depositional substrates (i.e., sand/silt/gravel); often supports growths of aquatic vegetation; very important areas for rearing and feeding.

Velocity Classifications:

Low: <0.5 m/s
Moderate: 0.5 to 1.0 m/s
High: >1.0 m/s

Table C3 Summary of habitat variables recorded at boat electroshocking sites in the Peace River, 25 August to 4 October 2014.

Section	Site[a]	Session	Air Temp. (°C)	Water Temp. (°C)	Water Cond. (µS/cm)	Cloud Cover[b]	Estimated Flow Category[c]	Water Surface Visibility	Instream Velocity[d]	Water Clarity[e]	Secchi Depth (m)	Cover Types (%)						
												Substrate Interstices	Woody Debris	Turbulence	Aquatic Vegetation	Terrestrial Vegetation	Shallow Water	Deep Water
1	0101	1	17.0	9.5	190	Mostly cloudy	High	Low	High	High	Bottom	70	0	20	0	0	10	0
1	0101	2	14.0	10.1	190	Partly cloudy	Low	Medium	High	High	Bottom	50	0	5	0	0	45	0
1	0101	3	1.0	11.6	190	Overcast	Transitional	High	High	High	Bottom	70	0	30	0	0	0	0
1	0101	4	14.0	10.5	190	Clear	High	High	High	High	Bottom	25	0	50	0	0	25	0
1	0101	5	15.0	12.0	180	Partly cloudy	Low	High	High	High	Bottom	60	0	20	0	0	20	0
1	0101	6	8.0	11.3	190	Overcast	Transitional	Medium	High	High	Bottom	40	0	20	0	0	40	0
1	0102	1	18.0	9.5	190	Overcast	High	Low	High	High	Bottom	80	0	20	0	0	0	0
1	0102	2	14.0	10.1	190	Partly cloudy	Low	Medium	High	High	Bottom	70	0	20	0	0	10	0
1	0102	3	2.0	11.6	190	Overcast	High	High	High	High	Bottom	60	0	30	0	0	10	0
1	0102	4	15.0	10.5	190	Partly cloudy	High	High	High	High	Bottom	30	0	70	0	0	0	0
1	0102	5	15.0	12.0	180	Mostly cloudy	Low	High	High	High	Bottom	80	0	20	0	0	0	0
1	0102	6	8.0	11.3	190	Overcast	Transitional	Medium	High	High	Bottom	40	0	20	0	0	40	0
1	0103	1	23.0	9.2	190	Partly cloudy	Low	Low	Medium	High	Bottom	80	5	5	0	0	10	0
1	0103	2	15.0	10.1	190	Clear	Low	High	Medium	High	Bottom	50	0	0	0	0	50	0
1	0103	3	1.0	11.6	190	Overcast	High	High	Medium	High	Bottom	49	1	0	0	0	0	50
1	0103	4	10.0	10.5	190	Partly cloudy	High	Low	Medium	High	Bottom	75	5	10	0	0	0	10
1	0103	5	15.0	12.0	180	Overcast	Transitional	High	Medium	High	Bottom	40	5	5	0	0	10	40
1	0103	6	8.0	11.3	190	Overcast	Transitional	High	Medium	High	Bottom	70	1	9	0	0	0	20
1	0104	1	20.0	9.5	190	Partly cloudy	High	Low	Low	High	Bottom	70	0	0	0	10	20	0
1	0104	2	Did not sample during this session due to low water preventing access to site.															
1	0104	3	2.0	11.6	190	Overcast	High	High	Low	High	Bottom	75	0	0	0	5	20	0
1	0104	4	11.0	10.5	190	Partly cloudy	High	High	Low	High	Bottom	50	0	0	0	10	40	0
1	0104	5	15.0	12.0	180	Overcast	Transitional	High	Medium	High	Bottom	50	0	0	0	5	45	0
1	0104	6	8.0	11.3	190	Overcast	High	High	Low	High	Bottom	50	0	0	0	20	30	0
1	0105	1	20.0	9.5	190	Partly cloudy	High	Low	High	High	Bottom	65	5	30	0	0	0	0
1	0105	2	Did not sample during this session due to low water preventing access to site.															
1	0105	3	2.0	11.6	190	Overcast	High	High	High	High	Bottom	67	3	20	0	0	0	10
1	0105	4	11.0	10.5	190	Clear	High	Medium	High	High	Bottom	40	0	60	0	0	0	0
1	0105	5	15.0	12.0	180	Overcast	Transitional	Medium	High	High	Bottom	20	0	70	0	0	0	10
1	0105	6	8.0	11.3	190	Overcast	High	Medium	High	High	Bottom	60	0	30	0	0	10	0

[a] See Appendix A, Figures A1 to A3 for sample site locations.

continued…

[b] Clear = <10%; Partly Cloudy = 10-49%; Mostly Cloudy = 50-90%; Overcast = >90%.

[c] Field Observation

[d] High = >1.0 m/s; Medium = 0.5-1.0 m/s; Low = <0.5 m/s.

[e] High = >3.0 m; Medium = 1.0-3.0 m; Low = <1.0 m.

Table C3 Continued.

Section	Site[a]	Session	Air Temp. (°C)	Water Temp. (°C)	Water Cond. (µS/cm)	Cloud Cover[b]	Estimated Flow Category[c]	Water Surface Visibility	Instream Velocity[d]	Water Clarity[e]	Secchi Depth (m)	Cover Types (%)						
												Substrate Interstices	Woody Debris	Turbulence	Aquatic Vegetation	Terrestrial Vegetation	Shallow Water	Deep Water
1	0107	1	20.0	9.5	190	Overcast	High	Low	Medium	High	Bottom	100	0	0	0	0	0	0
1	0107	2	17.0	10.1	190	Overcast	Low	High	Medium	High	Bottom	50	0	0	0	0	0	50
1	0107	3	1.0	11.6	190	Overcast	High	Medium	Medium	High	Bottom	45	0	0	0	0	0	55
1	0107	4	19.0	10.5	190	Partly cloudy	High	High	Medium	High	Bottom	98	0	0	0	2	0	0
1	0107	5	15.0	12.0	180	Mostly cloudy	Transitional	High	Medium	High	Bottom	80	0	0	0	0	10	10
1	0107	6	8.0	11.3	190	Overcast	Transitional	High	Medium	High	Bottom	60	0	0	0	0	0	40
1	0108	1	20.0	9.5	190	Overcast	High	Low	High	High	Bottom	100	0	0	0	0	0	0
1	0108	2	17.0	10.1	190	Overcast	Low	High	Medium	High	Bottom	50	0	0	0	0	50	0
1	0108	3	3.0	11.2	200	Overcast	Transitional	High	Low	High	Bottom	14	1	0	0	5	80	0
1	0108	4	19.0	10.5	190	Clear	High	High	Medium	High	Bottom	60	0	0	0	20	20	0
1	0108	5	15.0	12.0	180	Overcast	Transitional	High	Low	High	Bottom	95	0	5	0	0	0	0
1	0108	6	8.0	11.3	190	Overcast	Transitional	High	Low	High	Bottom	95	0	0	0	5	0	0
1	0109	1	18.0	9.5	190	Overcast	High	Low	High	High	Bottom	80	0	10	0	0	10	0
1	0109	2	16.0	10.1	190	Partly cloudy	Low	High	Medium	High	Bottom	50	0	0	0	0	50	0
1	0109	3	4.0	11.2	200	Overcast	Transitional	High	Medium	High	Bottom	95	0	0	0	5	0	0
1	0109	4	9.0	10.9	190	Overcast	High	Medium	Medium	High	Bottom	95	0	0	0	5	0	0
1	0109	5	15.0	12.0	180	Overcast	Transitional	High	Medium	High	Bottom	90	0	0	0	5	5	0
1	0109	6	8.0	11.3	190	Overcast	Transitional	High	Medium	High	Bottom	95	0	0	0	5	0	0
1	0110	1	20.0	9.5	190	Overcast	High	Low	High	High	Bottom	80	0	0	0	0	20	0
1	0110	2	16.0	10.1	190	Overcast	Low	High	Medium	High	Bottom	45	0	0	0	0	50	5
1	0110	3	4.0	11.2	200	Overcast	Transitional	High	Medium	High	Bottom	45	0	0	0	5	0	50
1	0110	4	7.0	10.9	190	Overcast	High	Medium	Medium	High	Bottom	83	0	0	0	10	2	5
1	0110	5	15.0	12.0	180	Overcast	Transitional	High	Medium	High	Bottom	80	0	5	0	5	0	10
1	0110	6	8.0	11.3	190	Overcast	Transitional	High	Medium	High	Bottom	80	0	5	0	5	5	5
1	0111	1	20.0	9.5	190	Partly cloudy	High	Low	Medium	High	Bottom	90	0	0	0	0	0	10
1	0111	2	16.0	10.1	190	Partly cloudy	Low	Medium	Low	High	Bottom	100	0	0	0	0	0	0
1	0111	3	4.0	11.2	200	Overcast	Transitional	High	Medium	High	Bottom	10	0	0	0	0	0	90
1	0111	4	11.0	10.9	190	Overcast	High	Medium	High	High	Bottom	55	0	5	0	0	0	40
1	0111	5	15.0	12.0	180	Partly cloudy	Transitional	High	Medium	High	Bottom	50	0	30	0	0	0	20
1	0111	6	12.0	10.7	190	Partly cloudy	Transitional	Medium	Medium	High	Bottom	60	0	20	0	0	10	10

[a] See Appendix A, Figures A1 to A3 for sample site locations.

continued…

[b] Clear = <10%; Partly Cloudy = 10-49%; Mostly Cloudy = 50-90%; Overcast = >90%.

[c] Field Observation

[d] High = >1.0 m/s; Medium = 0.5-1.0 m/s; Low = <0.5 m/s.

[e] High = >3.0 m; Medium = 1.0-3.0 m; Low = <1.0 m.

Table C3 Continued.

Section	Site[a]	Session	Air Temp. (°C)	Water Temp. (°C)	Water Cond. (µS/cm)	Cloud Cover[b]	Estimated Flow Category[c]	Water Surface Visibility	Instream Velocity[d]	Water Clarity[e]	Secchi Depth (m)	Cover Types (%)						
												Substrate Interstices	Woody Debris	Turbulence	Aquatic Vegetation	Terrestrial Vegetation	Shallow Water	Deep Water
1	0112	1	18.0	9.5	190	Clear	High	Low	High	High	Bottom	80	0	15	0	0	0	5
1	0112	2	16.0	10.1	190	Partly cloudy	Low	Medium	Medium	High	Bottom	100	0	0	0	0	0	0
1	0112	3	3.0	11.2	200	Overcast	High	High	Medium	High	Bottom	40	0	0	0	10	0	50
1	0112	4	13.0	10.9	190	Overcast	High	High	High	High	Bottom	45	0	3	0	7	0	45
1	0112	5	15.0	12.0	180	Partly cloudy	Transitional	High	Medium	High	Bottom	70	5	0	0	0	5	20
1	0112	6	8.0	11.3	190	Overcast	High	High	Medium	High	Bottom	80	0	10	0	10	0	0
1	0113	1	16.0	9.5	190	Overcast	High	Low	High	High	Bottom	90	0	5	0	0	5	0
1	0113	2	16.0	10.1	190	Partly cloudy	Low	Medium	High	High	Bottom	95	0	5	0	0	0	0
1	0113	3	4.0	11.2	200	Overcast	Transitional	High	Medium	High	Bottom	50	0	0	0	5	0	45
1	0113	4	11.0	10.9	190	Overcast	High	High	High	High	Bottom	55	0	0	0	5	0	40
1	0113	5	15.0	12.0	180	Overcast	Transitional	High	Medium	High	Bottom	90	0	10	0	0	0	0
1	0113	6	8.0	11.3	190	Overcast	Transitional	High	Medium	High	Bottom	90	0	5	0	5	0	0
1	0114	1	16.0	9.5	190	Clear	High	Low	High	High	Bottom	90	0	5	0	0	5	0
1	0114	2	20.0	10.1	190	Partly cloudy	Low	High	Medium	High	Bottom	95	0	0	0	0	0	5
1	0114	3	6.0	11.2	200	Overcast	Transitional	High	Medium	High	Bottom	15	0	0	0	5	0	80
1	0114	4	18.0	10.9	190	Partly cloudy	High	High	High	High	Bottom	75	0	0	0	5	0	20
1	0114	5	17.0	12.0	180	Partly cloudy	Transitional	Medium	High	High	Bottom	80	0	5	0	5	0	10
1	0114	6	8.0	11.3	190	Overcast	High	High	Medium	High	Bottom	70	0	10	0	10	0	10
1	0116	1	16.0	9.5	190	Clear	High	Low	High	High	Bottom	50	0	0	0	20	30	0
1	0116	2	18.0	10.1	190	Partly cloudy	Low	High	Medium	High	Bottom	50	0	0	0	0	45	5
1	0116	3	6.0	11.2	200	Overcast	Transitional	High	Medium	High	Bottom	45	0	0	0	5	45	5
1	0116	4	18.0	10.9	190	Partly cloudy	High	High	Medium	High	Bottom	85	0	0	0	5	5	5
1	0116	5	18.0	12.0	180	Partly cloudy	Transitional	Medium	Medium	High	Bottom	90	0	0	0	5	0	5
1	0116	6	8.0	11.3	190	Overcast	Transitional	High	Medium	High	Bottom	50	0	0	0	0	50	0
1	0119	1	19.0	9.5	190	Mostly cloudy	High	Low	High	High	Bottom	90	0	5	0	0	0	5
1	0119	2	18.0	10.8	290	Partly cloudy	Low	Medium	High	High	Bottom	50	0	30	0	0	0	20
1	0119	3	1.0	11.6	190	Overcast	High	High	High	High	Bottom	45	0	5	0	0	0	50
1	0119	4	18.0	10.5	190	Partly cloudy	High	High	High	High	Bottom	65	0	30	0	0	0	5
1	0119	5	15.0	12.0	180	Partly cloudy	Low	High	High	High	Bottom	20	0	75	0	0	0	5
1	0119	6	8.0	11.3	190	Overcast	Transitional	Medium	High	High	Bottom	50	0	50	0	0	0	0

[a] See Appendix A, Figures A1 to A3 for sample site locations.

continued…

[b] Clear = <10%; Partly Cloudy = 10-49%; Mostly Cloudy = 50-90%; Overcast = >90%.

[c] Field Observation

[d] High = >1.0 m/s; Medium = 0.5-1.0 m/s; Low = <0.5 m/s.

[e] High = >3.0 m; Medium = 1.0-3.0 m; Low = <1.0 m.

Table C3 Continued.

Section	Site[a]	Session	Air Temp. (°C)	Water Temp. (°C)	Water Cond. (μS/cm)	Cloud Cover[b]	Estimated Flow Category[c]	Water Surface Visibility	Instream Velocity[d]	Water Clarity[e]	Secchi Depth (m)	Cover Types (%)						
												Substrate Interstices	Woody Debris	Turbulence	Aquatic Vegetation	Terrestrial Vegetation	Shallow Water	Deep Water
3	0301	1	20.0	9.6	220	Clear	Low	Low	High	Medium	Bottom	80	0	0	0	0	0	20
3	0301	2	15.0	11.2	210	Overcast	Low	High	High	High	Bottom	50	0	10	0	0	0	30
3	0301	3	3.0	9.9	220	Partly cloudy	Transitional	Medium	Medium	Medium	Bottom	10	0	10	0	0	0	10
3	0301	4	20.0	11.9	160	Overcast	High	Medium	Medium	Medium	1.1	10	0	0	0	5	0	40
3	0301	5	15.0	11.1	250	Clear	High	High	High	Medium	Bottom	30	0	30	0	0	0	30
3	0301	6	6.0	10.4	210	Overcast	Low	High	Medium	High	Bottom	100	0	0	0	0	0	0
3	0302	1	23.0	9.6	220	Clear	Low	Low	High	Medium	Bottom	75	0	10	0	0	10	5
3	0302	2	15.0	11.2	210	Overcast	Low	Medium	Medium	Medium	Bottom	40	0	5	0	0	5	10
3	0302	3	1.0	9.9	220	Partly cloudy	Low	Low	Medium	Medium	Bottom	0	0	0	0	0	0	0
3	0302	4	20.0	11.9	160	Overcast	High	High	High	High	Bottom	75	2	3	0	0	0	20
3	0302	5	15.0	11.1	250	Clear	High	High	High	Medium	Bottom	80	0	10	0	0	0	0
3	0302	6	6.0	10.5	210	Overcast	Low	High	High	High	Bottom	90	0	0	0	0	10	0
3	0303	1	23.0	9.5	220	Clear	Low	Low	High	Medium	Bottom	85	0	0	0	0	10	5
3	0303	2	17.0	11.2	210	Overcast	Low	Medium	Medium	Medium	Bottom	30	0	5	0	0	10	5
3	0303	3	8.0	9.9	220	Clear	Transitional	Low	lm	Low	0.45	0	0	5	0	0	0	0
3	0303	4	9.0	10.7	200	Partly cloudy	Transitional	Medium	Medium	High	Bottom	97	0	2	0	0	0	1
3	0303	5	15.0	11.1	250	Clear	High	High	Medium	High	Bottom	80	0	0	0	0	10	0
3	0303	6	6.0	10.4	210	Overcast	Low	High	Medium	High	Bottom	100	0	0	0	0	0	0
3	0304	1	25.0	9.5	220	Clear	Low	Low	High	Medium	Bottom	10	0	0	0	0	30	60
3	0304	2	17.0	11.8	220	Overcast	Low	Medium	Medium	Medium	Bottom	30	0	0	0	0	30	0
3	0304	3	5.8	9.3	220	Partly cloudy	Low	High	Medium	High	Bottom	40	0	0	0	0	60	0
3	0304	4	9.0	10.7	200	Mostly cloudy	Transitional	Medium	Medium	High	Bottom	68	0	1	1	0	30	0
3	0304	5	15.0	11.1	250	Clear	Transitional	Medium	Medium	High	Bottom	60	0	0	0	10	30	0
3	0304	6	7.0	10.4	210	Overcast	Transitional	High	Low	High	Bottom	50	0	0	0	0	50	0
3	0305	1	25.0	9.5	220	Clear	Transitional	Low	High	Medium	Bottom	100	0	0	0	0	0	0
3	0305	2	18.0	12.5	190	Partly cloudy	Low	High	Medium	Medium	2.1	10	0	0	0	0	0	5
3	0305	3	8.0	9.9	220	Clear	High	Low	Medium	Low	0.45	0	0	0	0	10	0	40
3	0305	4	8.0	10.7	200	Overcast	Transitional	Medium	Medium	High	Bottom	50	0	10	0	0	20	20
3	0305	5	4.0	11.1	250	Clear	Low	High	Medium	High	Bottom	70	0	0	0	0	30	0
3	0305	6	8.0	10.4	210	Overcast	Transitional	High	Medium	High	Bottom	100	0	0	0	0	0	0

[a] See Appendix A, Figures A1 to A3 for sample site locations.

continued…

[b] Clear = <10%; Partly Cloudy = 10-49%; Mostly Cloudy = 50-90%; Overcast = >90%.

[c] Field Observation

[d] High = >1.0 m/s; Medium = 0.5-1.0 m/s; Low = <0.5 m/s.

[e] High = >3.0 m; Medium = 1.0-3.0 m; Low = <1.0 m.

Table C3 Continued.

Section	Site[a]	Session	Air Temp. (°C)	Water Temp. (°C)	Water Cond. (μS/cm)	Cloud Cover[b]	Estimated Flow Category[c]	Water Surface Visibility	Instream Velocity[d]	Water Clarity[e]	Secchi Depth (m)	Cover Types (%)						
												Substrate Interstices	Woody Debris	Turbulence	Aquatic Vegetation	Terrestrial Vegetation	Shallow Water	Deep Water
3	0306	1	20.0	9.5	220	Clear	High	Low	Medium	Medium	Bottom	50	0	0	0	0	50	0
3	0306	2	18.0	12.5	190	Partly cloudy	Low	High	Low	Medium	2.1	35	0	0	0	0	60	0
3	0306	3	5.0	9.7	260	Partly cloudy	Low	Medium	Low	Medium	Bottom	30	0	0	0	0	40	0
3	0306	4	12.0	10.7	200	Mostly cloudy	Transitional	High	Low	High	Bottom	99	1	0	0	0	0	0
3	0306	5	5.0	11.1	250	Clear	Transitional	High	Low	High	Bottom	50	0	0	0	0	50	0
3	0306	6	8.0	10.4	210	Overcast	Transitional	High	Low	High	Bottom	50	5	0	0	0	45	0
3	0307	1	18.0	9.4	190	Clear	Low	Medium	Low	Medium	2.1	50	0	0	0	0	30	0
3	0307	2	14.0	10.8	190	Partly cloudy	Low	Medium	Medium	Medium	Bottom	80	0	0	0	0	0	0
3	0307	3	15.0	9.8	260	Partly cloudy	High	Medium	Low	Medium	Bottom	30	0	0	0	5	0	0
3	0307	4	12.0	10.8	190	Partly cloudy	Low	Medium	Medium	High	Bottom	100	0	0	0	0	0	0
3	0307	5	6.0	11.1	250	Clear	Transitional	High	Medium	High	Bottom	50	0	0	0	0	50	0
3	0307	6	10.0	9.2	200	Partly cloudy	Transitional	High	Medium	High	Bottom	50	0	0	0	0	50	0
3	0308	1	20.0	9.4	190	Clear	Low	Medium	Medium	Medium	2.1	55	0	0	0	0	0	5
3	0308	2	18.0	10.8	190	Clear	Low	Medium	Medium	High	Bottom	60	0	0	0	0	40	0
3	0308	3	9.0	10.1	210	Overcast	Low	Medium	Medium	High	Bottom	30	0	10	0	0	50	10
3	0308	4	13.0	10.8	190	Partly cloudy	Low	Low	Medium	High	Bottom	50	0	0	0	0	48	2
3	0308	5	6.0	11.1	250	Partly cloudy	Transitional	High	Medium	High	Bottom	50	0	10	0	0	40	0
3	0308	6	12.0	9.2	200	Partly cloudy	Transitional	Medium	High	High	Bottom	50	0	10	0	0	40	0
3	0309	1	20.0	9.4	190	Partly cloudy	High	Medium	Medium	Medium	2.1	50	0	0	0	0	10	0
3	0309	2	13.0	11.8	250	Partly cloudy	Low	Medium	Low	Low	1	0	0	0	0	0	20	0
3	0309	3	15.0	10.1	220	Partly cloudy	Transitional	Medium	Low	Medium	Bottom	35	5	0	5	5	40	0
3	0309	4	13.0	10.8	190	Partly cloudy	Transitional	Low	Low	Medium	Bottom	85	0	5	0	0	10	0
3	0309	5	10.0	11.1	250	Clear	Transitional	High	Medium	High	Bottom	60	0	10	5	10	10	5
3	0309	6	12.0	9.2	200	Overcast	Transitional	Medium	Medium	High	Bottom	50	0	5	0	0	35	10
3	0310	1	20.0	9.4	190	Partly cloudy	Low	Medium	Medium	Medium	2.1	40	0	40	0	10	0	0
3	0310	2	14.0	11.8	250	Partly cloudy	Low	Medium	Low	Low	1	5	0	3	0	0	0	1
3	0310	3	10.0	10.1	220	Partly cloudy	Transitional	Medium	Medium	Medium	Bottom	10	1	10	0	0	10	10
3	0310	4	14.0	10.8	190	Partly cloudy	Transitional	Low	Medium	Medium	Bottom	98	0	2	0	0	0	0
3	0310	5	10.0	11.1	250	Clear	Transitional	High	Medium	High	Bottom	70	0	30	0	0	0	0
3	0310	6	12.0	9.2	200	Overcast	Transitional	Medium	Medium	High	Bottom	90	0	5	0	0	0	5

[a] See Appendix A, Figures A1 to A3 for sample site locations.

continued…

[b] Clear = <10%; Partly Cloudy = 10-49%; Mostly Cloudy = 50-90%; Overcast = >90%.

[c] Field Observation

[d] High = >1.0 m/s; Medium = 0.5-1.0 m/s; Low = <0.5 m/s.

[e] High = >3.0 m; Medium = 1.0-3.0 m; Low = <1.0 m.

Table C3 Continued.

Section	Site[a]	Session	Air Temp. (°C)	Water Temp. (°C)	Water Cond. (μS/cm)	Cloud Cover[b]	Estimated Flow Category[c]	Water Surface Visibility	Instream Velocity[d]	Water Clarity[e]	Secchi Depth (m)	Cover Types (%)						
												Substrate Interstices	Woody Debris	Turbulence	Aquatic Vegetation	Terrestrial Vegetation	Shallow Water	Deep Water
3	0311	1	17.0	9.4	190	Partly cloudy	High	Medium	Medium	Medium	2.1	20	0	10	0	0	20	30
3	0311	2	12.0	11.9	250	Mostly cloudy	Low	Medium	Low	Low	1	0	0	0	0	0	5	0
3	0311	3	17.0	10.1	220	Partly cloudy	Transitional	Medium	High	Medium	Bottom	25	0	10	0	10	10	5
3	0311	4	13.0	10.7	200	Overcast	Transitional	Medium	Medium	Medium	Bottom	85	0	0	0	5	5	5
3	0311	5	15.0	11.1	250	Clear	High	High	Medium	High	Bottom	60	0	10	0	0	10	10
3	0311	6	12.0	9.2	200	Overcast	Transitional	Medium	Medium	High	Bottom	55	0	10	0	0	30	5
3	0312	1	20.0	9.4	190	Partly cloudy	Low	Medium	High	Medium	2.1	55	0	10	0	0	0	5
3	0312	2	17.0	11.8	250	Partly cloudy	Low	High	Medium	Medium	1	20	0	0	0	0	10	10
3	0312	3	10.0	10.1	220	Partly cloudy	Transitional	Medium	Medium	Medium	Bottom	50	0	10	0	0	20	10
3	0312	4	14.0	10.8	190	Mostly cloudy	Transitional	Low	Medium	Medium	Bottom	50	0	5	0	0	43	2
3	0312	5	6.0	11.1	250	Clear	Transitional	High	Medium	High	Bottom	80	0	10	0	0	5	5
3	0312	6	12.0	9.2	200	Overcast	Transitional	Medium	Medium	High	Bottom	50	0	30	0	0	10	10
3	0314	1	20.0	9.5	220	Clear	High	Low	Medium	Low	Bottom	70	0	0	0	0	0	30
3	0314	2	18.0	12.5	190	Partly cloudy	Low	High	Low	Medium	Bottom	5	0	0	0	0	0	10
3	0314	3	5.0	9.8	260	Partly cloudy	Low	Low	Medium	Medium	Bottom	30	0	0	0	0	0	20
3	0314	4	12.0	10.7	200	Mostly cloudy	Low	Medium	Medium	High	Bottom	85	0	0	0	0	0	5
3	0314	5	5.0	11.1	250	Clear	Low	High	Low	High	Bottom	95	0	0	0	0	0	5
3	0314	6	8.0	10.4	210	Overcast	Transitional	Medium	Low	High	Bottom	90	0	0	0	0	0	0
3	0315	1	18.0	9.4	190	Clear	Low	Medium	Low	Medium	2.1	60	0	0	0	0	0	0
3	0315	2	10.0	10.8	190	Mostly cloudy	Low	High	Low	High	Bottom	90	1	0	0	0	0	9
3	0315	3	8.0	9.8	260	Partly cloudy	Transitional	Medium	Medium	Medium	Bottom	10	0	5	0	0	0	40
3	0315	4	14.0	10.7	200	Overcast	Transitional	High	Medium	High	Bottom	93	1	0	0	1	0	5
3	0315	5	5.0	11.1	250	Clear	Transitional	High	Medium	High	Bottom	80	5	0	0	0	0	10
3	0315	6	9.0	9.2	200	Partly cloudy	Transitional	Medium	Medium	High	Bottom	90	0	0	0	0	0	10
3	0316	1	20.0	9.4	190	Partly cloudy	Low	Medium	High	Medium	2.1	40	0	20	0	0	0	10
3	0316	2	18.0	10.8	190	Clear	Low	High	Medium	High	Bottom	60	0	30	0	0	0	10
3	0316	3	9.0	9.7	190	Overcast	Low	Medium	High	High	Bottom	20	0	40	0	0	0	20
3	0316	4	12.0	10.8	190	Partly cloudy	Low	Medium	Medium	High	Bottom	65	0	30	0	0	0	5
3	0316	5	6.0	11.1	250	Clear	Transitional	High	High	High	Bottom	80	0	10	0	0	0	5
3	0316	6	10.0	9.2	200	Partly cloudy	Transitional	Medium	High	High	Bottom	80	0	10	0	0	0	10

[a] See Appendix A, Figures A1 to A3 for sample site locations.

continued…

[b] Clear = <10%; Partly Cloudy = 10-49%; Mostly Cloudy = 50-90%; Overcast = >90%.

[c] Field Observation

[d] High = >1.0 m/s; Medium = 0.5-1.0 m/s; Low = <0.5 m/s.

[e] High = >3.0 m; Medium = 1.0-3.0 m; Low = <1.0 m.

Table C3 Continued.

Section	Site[a]	Session	Air Temp. (°C)	Water Temp. (°C)	Water Cond. (µS/cm)	Cloud Cover[b]	Estimated Flow Category[c]	Water Surface Visibility	Instream Velocity[d]	Water Clarity[e]	Secchi Depth (m)	Cover Types (%)						
												Substrate Interstices	Woody Debris	Turbulence	Aquatic Vegetation	Terrestrial Vegetation	Shallow Water	Deep Water
5	0501	1	14.0	10.4	200	Overcast	Low	Medium	High	High	Bottom	65	5	10	0	0	0	20
5	0501	2	15.0	12.2	200	Partly cloudy	Low	High	High	High	Bottom	50	0	10	0	0	0	10
5	0501	3	8.0	8.8	200	Overcast	High	High	High	High	Bottom	53	5	2	0	0	0	40
5	0501	4	14.0	10.6	200	Overcast	Transitional	High	High	High	Bottom	55	2	3	0	0	0	40
5	0501	5	8.0	11.1	200	Overcast	Transitional	High	Medium	High	Bottom	70	10	10	0	0	0	10
5	0501	6	5.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	95	1	4	0	0	0	0
5	0502	1	12.0	10.2	200	Partly cloudy	Low	Medium	High	High	Bottom	80	0	0	0	0	20	0
5	0502	2	17.0	12.2	200	Partly cloudy	Low	High	Medium	High	Bottom	50	0	0	0	0	50	0
5	0502	3	12.0	8.8	200	Partly cloudy	Transitional	High	Medium	High	Bottom	70	0	0	0	0	30	0
5	0502	4	16.0	10.6	200	Overcast	Transitional	High	Medium	High	Bottom	100	0	0	0	0	0	0
5	0502	5	8.0	11.1	200	Overcast	Transitional	Medium	Medium	Medium	Bottom	80	0	10	0	0	0	10
5	0502	6	6.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	100	0	0	0	0	0	0
5	0503	1	14.0	10.3	200	Overcast	Low	Medium	Medium	High	Bottom	100	0	0	0	0	0	0
5	0503	2	15.0	12.2	200	Partly cloudy	Low	High	Medium	High	Bottom	50	0	0	0	0	50	0
5	0503	3	6.0	8.8	200	Overcast	High	High	Medium	High	Bottom	80	0	0	0	0	20	0
5	0503	4	14.0	10.6	200	Overcast	Transitional	High	Medium	High	Bottom	100	0	0	0	0	0	0
5	0503	5	7.0	11.1	200	Overcast	Transitional	Medium	Medium	High	Bottom	80	0	0	0	0	20	0
5	0503	6	5.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	50	0	0	0	0	50	0
5	0504	1	12.0	10.4	200	Overcast	Low	Medium	Medium	High	Bottom	70	0	0	0	0	30	0
5	0504	2	16.0	12.2	200	Partly cloudy	Low	High	Medium	High	Bottom	45	0	5	0	0	50	0
5	0504	3	10.0	8.8	200	Mostly cloudy	Transitional	High	Medium	High	Bottom	60	0	0	0	0	40	0
5	0504	4	14.0	10.6	200	Overcast	Transitional	High	Medium	High	Bottom	49	0	0	0	0	50	1
5	0504	5	8.0	11.1	200	Overcast	Transitional	High	Medium	High	Bottom	45	0	5	0	0	45	5
5	0504	6	5.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	45	0	0	0	0	50	5
5	0505	1	14.0	10.4	200	Partly cloudy	Low	Medium	Medium	Medium	Bottom	40	0	20	0	0	0	10
5	0505	2	20.0	12.2	200	Partly cloudy	Low	Medium	Medium	Medium	Bottom	10	0	10	0	0	0	10
5	0505	3	15.0	8.8	200	Clear	Transitional	High	High	High	Bottom	70	0	10	0	0	0	20
5	0505	4	17.0	10.6	200	Overcast	Transitional	Medium	High	Medium	Bottom	45	0	5	0	0	0	10
5	0505	5	8.0	11.1	200	Overcast	Transitional	Medium	High	Medium	Bottom	60	0	40	0	0	0	0
5	0505	6	6.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	70	0	10	0	0	0	20

[a] See Appendix A, Figures A1 to A3 for sample site locations.

continued…

[b] Clear = <10%; Partly Cloudy = 10-49%; Mostly Cloudy = 50-90%; Overcast = >90%.

[c] Field Observation

[d] High = >1.0 m/s; Medium = 0.5-1.0 m/s; Low = <0.5 m/s.

[e] High = >3.0 m; Medium = 1.0-3.0 m; Low = <1.0 m.

Table C3 Continued.

Section	Site[a]	Session	Air Temp. (°C)	Water Temp. (°C)	Water Cond. (µS/cm)	Cloud Cover[b]	Estimated Flow Category[c]	Water Surface Visibility	Instream Velocity[d]	Water Clarity[e]	Secchi Depth (m)	Cover Types (%)						
												Substrate Interstices	Woody Debris	Turbulence	Aquatic Vegetation	Terrestrial Vegetation	Shallow Water	Deep Water
5	0506	1	14.0	10.4	200	Partly cloudy	Low	Medium	Medium	Medium	Bottom	40	0	0	0	0	0	0
5	0506	2	20.0	12.2	200	Overcast	Low	Medium	Low	Medium	Bottom	20	0	0	0	0	0	10
5	0506	3	18.0	8.8	200	Clear	Low	High	Low	High	Bottom	20	0	0	0	0	5	30
5	0506	4	18.0	10.6	200	Overcast	Transitional	Medium	Low	Medium	Bottom	40	0	0	0	0	10	20
5	0506	5	8.0	11.1	200	Overcast	Transitional	Medium	Low	Medium	Bottom	50	0	0	0	0	0	0
5	0506	6	5.0	8.9	210	Overcast	Transitional	Medium	Low	High	Bottom	100	0	0	0	0	0	0
5	0507	1	14.0	10.4	200	Partly cloudy	High	Medium	Medium	High	Bottom	70	0	0	0	0	30	0
5	0507	2	18.0	12.2	200	Overcast	Low	Medium	High	Medium	2.2	45	0	0	0	0	0	5
5	0507	3	18.0	8.8	200	Partly cloudy	Low	High	Medium	High	Bottom	95	0	0	0	0	0	5
5	0507	4	18.0	10.6	200	Overcast	Transitional	High	Medium	High	Bottom	90	0	0	0	0	10	0
5	0507	5	8.0	11.1	200	Overcast	Transitional	High	Medium	High	Bottom	50	0	0	0	0	50	0
5	0507	6	6.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	90	0	0	0	0	10	0
5	0508	1	20.0	10.1	210	Partly cloudy	Low	High	Low	Medium	Bottom	100	0	0	0	0	0	0
5	0508	2	6.0	11.2	200	Overcast	Low	Low	Medium	Low	0.15	0	0	0	0	0	0	0
5	0508	3	20.0	10.4	200	Overcast	Low	Medium	Low	Medium	2.5	40	0	0	0	0	0	30
5	0508	4	24.0	11.2	200	Partly cloudy	Low	Medium	Low	Medium	Bottom	49	1	0	0	0	0	0
5	0508	5	8.0	11.1	200	Overcast	Low	Medium	Low	Low	0.2	0	0	0	0	0	0	0
5	0508	6	6.0	8.7	210	Overcast	Low	High	Medium	High	Bottom	90	0	0	0	0	0	10
5	0509	1	11.0	10.1	210	Partly cloudy	Low	Medium	Medium	Medium	Bottom	30	0	0	0	0	0	40
5	0509	2	18.0	12.2	200	Overcast	Low	Medium	Medium	Medium	2.2	20	0	0	0	0	0	30
5	0509	3	17.0	8.8	200	Mostly cloudy	Low	High	Medium	High	1.4	65	0	0	0	0	5	30
5	0509	4	18.0	10.6	200	Overcast	Transitional	High	Medium	High	Bottom	95	0	0	0	0	0	5
5	0509	5	8.0	11.1	200	Overcast	Transitional	High	Medium	High	Bottom	65	0	0	0	0	10	5
5	0509	6	6.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	10	0	0	0	0	0	90
5	0510	1	15.0	10.1	210	Partly cloudy	Low	High	Medium	High	Bottom	45	4	0	1	0	0	20
5	0510	2	8.0	11.5	200	Overcast	Low	Medium	Medium	Medium	Bottom	10	0	10	0	0	0	10
5	0510	3	9.0	10.4	200	Overcast	Transitional	Medium	Medium	Medium	2.5	0		30	0	0	0	60
5	0510	4	16.0	11.2	200	Partly cloudy	Transitional	High	Medium	High	Bottom	93	2	0	0	0	0	5
5	0510	5	8.0	11.1	200	Overcast	Transitional	High	Medium	High	Bottom	50	0	5	0	0	40	5
5	0510	6	6.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	50	0	20	0	0	0	30

[a] See Appendix A, Figures A1 to A3 for sample site locations.

continued…

[b] Clear = <10%; Partly Cloudy = 10-49%; Mostly Cloudy = 50-90%; Overcast = >90%.

[c] Field Observation

[d] High = >1.0 m/s; Medium = 0.5-1.0 m/s; Low = <0.5 m/s.

[e] High = >3.0 m; Medium = 1.0-3.0 m; Low = <1.0 m.

Table C3 Concluded.

Section	Site[a]	Session	Air Temp. (°C)	Water Temp. (°C)	Water Cond. (µS/cm)	Cloud Cover[b]	Estimated Flow Category[c]	Water Surface Visibility	Instream Velocity[d]	Water Clarity[e]	Secchi Depth (m)	Cover Types (%)						
												Substrate Interstices	Woody Debris	Turbulence	Aquatic Vegetation	Terrestrial Vegetation	Shallow Water	Deep Water
5	0511	1	17.0	10.1	210	Partly cloudy	Low	Medium	Medium	Medium	Bottom	94	0	1	0	0	0	5
5	0511	2	6.0	11.5	200	Overcast	Low	Low	High	Low	Bottom	0	0	20	0	0	0	10
5	0511	3	9.0	10.4	200	Partly cloudy	High	Low	High	Medium	2.5	0	0	50	0	0	0	50
5	0511	4	14.0	11.2	200	Mostly cloudy	Transitional	Medium	Medium	Medium	Bottom	80	0	5	0	0	0	5
5	0511	5	8.0	11.1	200	Overcast	Transitional	High	Medium	Low	0.2	0	0	0	0	0	0	0
5	0511	6	6.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	100	0	0	0	0	0	0
5	0512	1	15.0	10.1	210	Partly cloudy	Low	High	Medium	High	Bottom	50	0	0	0	0	45	5
5	0512	2	8.0	11.8	200	Overcast	Low	Medium	Medium	Medium	Bottom	20	0		0	0	0	20
5	0512	3	9.0	10.4	200	Overcast	Transitional	Medium	High	Medium	2.5	30	0	10	0	0	30	20
5	0512	4	15.0	11.5	200	Partly cloudy	Transitional	High	Medium	High	2.5	95	0	2	0	0	0	3
5	0512	5	8.0	11.1	200	Overcast	Transitional	High	Medium	High	Bottom	50	0	0	0	0	45	5
5	0512	6	6.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	60	0	0	0	0	20	20
5	0513	1	18.0	10.1	210	Partly cloudy	Low	Medium	Low	High	Bottom	100	0	0	0	0	0	0
5	0513	2	6.0	11.2	200	Overcast	Low	Medium	Medium	Medium	Bottom	50	0	0	0	0	40	0
5	0513	3	20.0	10.4	200	Partly cloudy	Transitional	Medium	Medium	Medium	2.5	70	0	0	0	0	0	0
5	0513	4	24.0	11.2	200	Partly cloudy	Low	High	Medium	High	Bottom	100	0	0	0	0	0	0
5	0513	5	8.0	11.1	200	Overcast	Transitional	High	Medium	High	Bottom	100	0	0	0	0	0	0
5	0513	6	6.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	100	0	0	0	0	0	0
5	0514	1	20.0	10.1	210	Partly cloudy	Low	Medium	Low	High	Bottom	100	0	0	0	0	0	0
5	0514	2	6.0	11.2	200	Overcast	Low	Medium	Medium	Medium	Bottom	50	0	0	0	0	40	0
5	0514	3	20.0	10.4	200	Partly cloudy	Low	High	Low	High	2.5	90	0	0	0	0	10	0
5	0514	4	24.0	11.2	200	Partly cloudy	Low	High	Low	High	Bottom	100	0	0	0	0	0	0
5	0514	5	8.0	11.1	200	Overcast	Low	High	Medium	High	Bottom	50	0	0	0	0	50	0
5	0514	6	6.0	8.7	210	Overcast	Low	High	Medium	High	Bottom	50	0	0	0	0	50	0
5	0515	1	18.0	10.1	210	Partly cloudy	Low	Medium	Medium	Medium	Bottom	85	5	0	0	0	5	5
5	0515	2	6.0	11.2	200	Overcast	Low	Low	Medium	Low	Bottom	0	0	0	0	0	0	0
5	0515	3	10.0	10.4	200	Overcast	Transitional	Medium	Low	Medium	2.5	50	1	0	0	0	40	0
5	0515	4	22.0	11.2	200	Partly cloudy	Transitional	High	Medium	High	Bottom	0	1	0	0	0	99	0
5	0515	5	8.0	11.1	200	Overcast	Transitional	High	Medium	Low	0.2	0	0	0	0	0	0	0
5	0515	6	6.0	8.7	210	Overcast	Transitional	High	Medium	High	Bottom	50	0	0	0	0	50	0

[a] See Appendix A, Figures A1 to A3 for sample site locations.

[b] Clear = <10%; Partly Cloudy = 10-49%; Mostly Cloudy = 50-90%; Overcast = >90%.

[c] Field Observation

[d] High = >1.0 m/s; Medium = 0.5-1.0 m/s; Low = <0.5 m/s.

[e] High = >3.0 m; Medium = 1.0-3.0 m; Low = <1.0 m.

Table C4 Summary of species counts by habitat types in the Peace River, 25 August to 4 October 2014.

Section	Site[a]	Species	Size Class	Number of Fish[b]					Total
				Physical Cover Present[c]			Physical Cover Absent[d]		
				A1[e]	A2[e]	A3[e]	A2[e]	A3[e]	
1	0101	Bull Trout	Adult					1	1
	0101	Mountain Whitefish	Adult					570	570
	0101	Mountain Whitefish	Immature					7	7
	0101	Mountain Whitefish	YOY					13	13
	Site 0101 Total			**0**	**0**	**0**	**0**	**591**	**591**
	0102	Bull Trout	Immature					1	1
	0102	Mountain Whitefish	Adult					521	521
	0102	Mountain Whitefish	Immature					4	4
	0102	Slimy Sculpin	All					1	1
	Site 0102 Total			**0**	**0**	**0**	**0**	**527**	**527**
	0103	Bull Trout	Adult	7					7
	0103	Kokanee	Adult	3					3
	0103	Kokanee	All	1					1
	0103	Mountain Whitefish	Adult	302					302
	0103	Mountain Whitefish	Immature	3					3
	0103	Mountain Whitefish	YOY	19					19
	0103	Rainbow Trout	Adult	2					2
	0103	Rainbow Trout	Immature	2					2
	0103	Prickly Sculpin	All	3					3
	0103	Sculpin spp.	Adult	90					90
	0103	Sculpin spp.	YOY	2					2
	0103	Slimy Sculpin	All	5					5
	0103	White Sucker	Adult	1					1
	Site 0103 Total			**440**	**0**	**0**	**0**	**0**	**440**
	0104	Bull Trout	Adult	3					3
	0104	Kokanee	Adult	3					3
	0104	Kokanee	All	5					5
	0104	Mountain Whitefish	Adult	97					97
	0104	Mountain Whitefish	Immature	7					7
	0104	Mountain Whitefish	YOY	36					36
	0104	Rainbow Trout	Immature	1					1
	0104	Largescale Sucker	Adult	2					2
	0104	Northern Pikeminnow	Adult	1					1
	0104	Sculpin spp.	Adult	27					27
	0104	Slimy Sculpin	All	1					1
	0104	Sucker spp.	Adult	1					1
	Site 0104 Total			**184**	**0**	**0**	**0**	**0**	**184**
	0105	Bull Trout	Adult		2				2
	0105	Kokanee	Adult		1				1
	0105	Kokanee	All		1				1
	0105	Mountain Whitefish	Adult		141				141
	0105	Mountain Whitefish	Immature		9				9
	0105	Mountain Whitefish	YOY		17				17
	0105	Rainbow Trout	Adult		1				1
	0105	Rainbow Trout	Immature		1				1
	0105	Northern Pikeminnow	Adult		2				2
	0105	Sculpin spp.	Adult		5				5
	Site 0105 Total			**0**	**180**	**0**	**0**	**0**	**180**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Continued.

Section	Site[a]	Species	Size Class	Number of Fish[b]					Total
				Physical Cover Present[c]			Physical Cover Absent[d]		
				A1[e]	A2[e]	A3[e]	A2[e]	A3[e]	
1	0107	Bull Trout	Adult	3					3
	0107	Kokanee	Adult	5					5
	0107	Kokanee	All	4					4
	0107	Mountain Whitefish	Adult	197					197
	0107	Mountain Whitefish	Immature	10					10
	0107	Mountain Whitefish	YOY	1					1
	0107	Rainbow Trout	Adult	7					7
	0107	Longnose Sucker	Adult	4					4
	0107	Northern Pikeminnow	Adult	3					3
	0107	Northern Pikeminnow	Immature	1					1
	0107	Sculpin spp.	Adult	34					34
	0107	Sculpin spp.	Immature	3					3
	0107	Slimy Sculpin	All	3					3
	0107	Sucker spp.	Adult	14					14
	0107	White Sucker	Adult	1					1
	Site 0107 Total			**290**	**0**	**0**	**0**	**0**	**290**
	0108	Kokanee	Adult					3	3
	0108	Kokanee	All					2	2
	0108	Mountain Whitefish	Adult					108	108
	0108	Mountain Whitefish	Immature					3	3
	0108	Mountain Whitefish	YOY					47	47
	0108	Largescale Sucker	Adult					2	2
	0108	Prickly Sculpin	All					1	1
	0108	Sculpin spp.	Adult					58	58
	0108	Sculpin spp.	YOY					2	2
	0108	Slimy Sculpin	All					4	4
	0108	Sucker spp.	Adult					4	4
	0108	White Sucker	Adult					1	1
	Site 0108 Total			**0**	**0**	**0**	**0**	**235**	**235**
	0109	Brook Trout	Adult					1	1
	0109	Bull Trout	Adult					3	3
	0109	Kokanee	Adult					2	2
	0109	Kokanee	All					1	1
	0109	Mountain Whitefish	Adult					582	582
	0109	Mountain Whitefish	Immature					42	42
	0109	Mountain Whitefish	YOY					42	42
	0109	Largescale Sucker	Adult					9	9
	0109	Longnose Sucker	Adult					9	9
	0109	Northern Pikeminnow	Adult					1	1
	0109	Sculpin spp.	Adult					73	73
	0109	Slimy Sculpin	All					4	4
	0109	Sucker spp.	Adult					50	50
	Site 0109 Total			**0**	**0**	**0**	**0**	**819**	**819**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Continued.

Section	Site[a]	Species	Size Class	Number of Fish[b]					Total
				Physical Cover Present[c]			Physical Cover Absent[d]		
				A1[e]	A2[e]	A3[e]	A2[e]	A3[e]	
1	0110	Bull Trout	Adult	7					7
	0110	Bull Trout	Immature	1					1
	0110	Kokanee	All	2					2
	0110	Lake Trout	Adult	1					1
	0110	Mountain Whitefish	Adult	186					186
	0110	Mountain Whitefish	Immature	8					8
	0110	Mountain Whitefish	YOY	42					42
	0110	Rainbow Trout	Adult	1					1
	0110	Largescale Sucker	Adult	1					1
	0110	Longnose Sucker	Adult	4					4
	0110	Sculpin spp.	Adult	23					23
	0110	Slimy Sculpin	All	2					2
	0110	Sucker spp.	Adult	15					15
	0110	White Sucker	Adult	1					1
	Site 0110 Total			**294**	**0**	**0**	**0**	**0**	**294**
	0111	Bull Trout	Adult	2					2
	0111	Mountain Whitefish	Adult	120					120
	0111	Mountain Whitefish	Immature	9					9
	0111	Mountain Whitefish	YOY	6					6
	0111	Rainbow Trout	Adult	4					4
	0111	Sculpin spp.	Adult	20					20
	0111	Sculpin spp.	Immature	1					1
	0111	Slimy Sculpin	All	1					1
	0111	Sucker spp.	Adult	1					1
	Site 0111 Total			**164**	**0**	**0**	**0**	**0**	**164**
	0112	Bull Trout	Adult	12					12
	0112	Mountain Whitefish	Adult	497					497
	0112	Mountain Whitefish	Immature	14					14
	0112	Mountain Whitefish	YOY	37					37
	0112	Rainbow Trout	Adult	1					1
	0112	Rainbow Trout	Immature	1					1
	0112	Walleye	Adult	1					1
	0112	Largescale Sucker	Adult	1					1
	0112	Longnose Sucker	Adult	5					5
	0112	Sculpin spp.	Adult	19					19
	0112	Slimy Sculpin	All	1					1
	0112	Sucker spp.	Adult	28					28
	Site 0112 Total			**617**	**0**	**0**	**0**	**0**	**617**
	0113	Bull Trout	Adult		12				12
	0113	Mountain Whitefish	Adult		391				391
	0113	Mountain Whitefish	Immature		30				30
	0113	Mountain Whitefish	YOY		107				107
	0113	Sculpin spp.	Adult		2				2
	0113	Sucker spp.	Adult		5				5
	Site 0113 Total			**0**	**547**	**0**	**0**	**0**	**547**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Continued.

Section	Site[a]	Species	Size Class	Number of Fish[b] Physical Cover Present[c] A1[e]	A2[e]	A3[e]	Physical Cover Absent[d] A2[e]	A3[e]	Total
1	0114	Bull Trout	Adult		9				9
	0114	Mountain Whitefish	Adult		503				503
	0114	Mountain Whitefish	Immature		9				9
	0114	Mountain Whitefish	YOY		15				15
	0114	Rainbow Trout	Adult		2				2
	0114	Rainbow Trout	Immature		4				4
	0114	Longnose Sucker	Adult		4				4
	0114	Sculpin spp.	Adult		14				14
	0114	Slimy Sculpin	All		3				3
	0114	Sucker spp.	Adult		9				9
	0114	Sucker spp.	Immature		1				1
	Site 0114 Total			**0**	**573**	**0**	**0**	**0**	**573**
	0116	Bull Trout	Adult					5	5
	0116	Mountain Whitefish	Adult					197	197
	0116	Mountain Whitefish	Immature					22	22
	0116	Mountain Whitefish	YOY					43	43
	0116	Largescale Sucker	Adult					3	3
	0116	Longnose Sucker	Adult					1	1
	0116	Northern Pikeminnow	Adult					1	1
	0116	Sculpin spp.	Adult					5	5
	0116	Slimy Sculpin	All					3	3
	0116	Sucker spp.	Adult					5	5
	0116	White Sucker	Adult					1	1
	Site 0116 Total			**0**	**0**	**0**	**0**	**286**	**286**
	0119	Bull Trout	Adult	5					5
	0119	Kokanee	Adult	2					2
	0119	Kokanee	All	2					2
	0119	Lake Trout	Adult	1					1
	0119	Mountain Whitefish	Adult	327					327
	0119	Mountain Whitefish	Immature	3					3
	0119	Mountain Whitefish	YOY	1					1
	0119	Rainbow Trout	Adult	4					4
	0119	Rainbow Trout	Immature	3					3
	0119	Largescale Sucker	Adult	7					7
	0119	Longnose Sucker	Adult	2					2
	0119	Sculpin spp.	Adult	4					4
	0119	Slimy Sculpin	All	1					1
	0119	Sucker spp.	Adult	30					30
	0119	White Sucker	Adult	3					3
	Site 0119 Total			**395**	**0**	**0**	**0**	**0**	**395**
Section 1 Total				**2384**	**1300**	**0**	**0**	**2458**	**6142**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Continued.

Section	Site[a]	Species	Size Class	Number of Fish[b]					Total
				Physical Cover Present[c]			Physical Cover Absent[d]		
				A1[e]	A2[e]	A3[e]	A2[e]	A3[e]	
3	0301	Arctic Grayling	Adult		2				2
	0301	Bull Trout	Adult		13				13
	0301	Bull Trout	Immature		3				3
	0301	Mountain Whitefish	Adult		386				386
	0301	Mountain Whitefish	Immature		185				185
	0301	Mountain Whitefish	YOY		18				18
	0301	Rainbow Trout	Adult		12				12
	0301	Rainbow Trout	Immature		3				3
	0301	Largescale Sucker	Adult		9				9
	0301	Longnose Sucker	Adult		36				36
	0301	Longnose Sucker	Immature		2				2
	0301	Northern Pikeminnow	Adult		3				3
	0301	Sculpin spp.	Adult		30				30
	0301	Sculpin spp.	Immature		10				10
	0301	Slimy Sculpin	All		2				2
	0301	Sucker spp.	Adult		123				123
	0301	Sucker spp.	Immature		3				3
	0301	White Sucker	Adult		2				2
	Site 0301 Total			**0**	**842**	**0**	**0**	**0**	**842**
	0302	Bull Trout	Adult		16				16
	0302	Bull Trout	Immature		2				2
	0302	Kokanee	Adult		2				2
	0302	Mountain Whitefish	Adult		518				518
	0302	Mountain Whitefish	Immature		538				538
	0302	Mountain Whitefish	YOY		248				248
	0302	Rainbow Trout	Adult		11				11
	0302	Rainbow Trout	Immature		21				21
	0302	Largescale Sucker	Adult		9				9
	0302	Largescale Sucker	Immature		2				2
	0302	Longnose Sucker	Adult		31				31
	0302	Longnose Sucker	Immature		5				5
	0302	Northern Pikeminnow	Adult		1				1
	0302	Northern Pikeminnow	Immature		1				1
	0302	Sculpin spp.	Adult		5				5
	0302	Slimy Sculpin	All		1				1
	0302	Sucker spp.	Adult		127				127
	0302	Sucker spp.	Immature		4				4
	0302	White Sucker	Adult		2				2
	Site 0302 Total			**0**	**1544**	**0**	**0**	**0**	**1544**
	0303	Bull Trout	Adult		7				7
	0303	Bull Trout	Immature		3				3
	0303	Mountain Whitefish	Adult		272				272
	0303	Mountain Whitefish	Immature		238				238
	0303	Mountain Whitefish	YOY		167				167
	0303	Rainbow Trout	Adult		8				8
	0303	Rainbow Trout	Immature		7				7
	0303	Largescale Sucker	Adult		3				3
	0303	Largescale Sucker	Immature		7				7
	0303	Longnose Sucker	Adult		39				39
	0303	Longnose Sucker	Immature		9				9
	0303	Northern Pikeminnow	Adult		2				2
	0303	Northern Pikeminnow	Immature		2				2
	0303	Sculpin spp.	Adult		7				7
	0303	Slimy Sculpin	All		1				1
	0303	Sucker spp.	Adult		201				201
	0303	Sucker spp.	Immature		5				5
	Site 0303 Total			**0**	**978**	**0**	**0**	**0**	**978**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Continued.

Section	Site[a]	Species	Size Class	Number of Fish[b]					Total
				Physical Cover Present[c]			Physical Cover Absent[d]		
				A1[e]	A2[e]	A3[e]	A2[e]	A3[e]	
3	0304	Arctic Grayling	Adult				1		1
	0304	Bull Trout	Adult				4		4
	0304	Mountain Whitefish	Adult				304		304
	0304	Mountain Whitefish	Immature				208		208
	0304	Mountain Whitefish	YOY				62		62
	0304	Northern Pike	Adult				7		7
	0304	Northern Pike	Immature				5		5
	0304	Northern Pike	YOY				1		1
	0304	Largescale Sucker	Adult				2		2
	0304	Longnose Sucker	Adult				1		1
	0304	Sculpin spp.	Adult				4		4
	0304	Slimy Sculpin	All				1		1
	0304	Sucker spp.	Adult				8		8
	Site 0304 Total			**0**	**0**	**0**	**608**	**0**	**608**
	0305	Bull Trout	Adult				15		15
	0305	Bull Trout	Immature				1		1
	0305	Kokanee	Adult				6		6
	0305	Mountain Whitefish	Adult				911		911
	0305	Mountain Whitefish	Immature				516		516
	0305	Mountain Whitefish	YOY				70		70
	0305	Rainbow Trout	Adult				7		7
	0305	Rainbow Trout	Immature				6		6
	0305	Largescale Sucker	Adult				16		16
	0305	Largescale Sucker	Immature				3		3
	0305	Longnose Sucker	Adult				57		57
	0305	Longnose Sucker	Immature				3		3
	0305	Northern Pikeminnow	Adult				4		4
	0305	Northern Pikeminnow	Immature				2		2
	0305	Sculpin spp.	Adult				21		21
	0305	Slimy Sculpin	All				2		2
	0305	Sucker spp.	Adult				266		266
	0305	Sucker spp.	Immature				22		22
	0305	White Sucker	Adult				1		1
	Site 0305 Total			**0**	**0**	**0**	**1929**	**0**	**1929**
	0306	Bull Trout	Adult					14	14
	0306	Mountain Whitefish	Adult					229	229
	0306	Mountain Whitefish	Immature					251	251
	0306	Mountain Whitefish	YOY					18	18
	0306	Longnose Sucker	Adult					2	2
	0306	Longnose Sucker	Immature					2	2
	0306	Northern Pikeminnow	Immature					1	1
	0306	Sculpin spp.	Adult					5	5
	0306	Sculpin spp.	Immature					1	1
	0306	Slimy Sculpin	All					1	1
	0306	Sucker spp.	Adult					13	13
	Site 0306 Total			**0**	**0**	**0**	**0**	**537**	**537**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Continued.

Section	Site[a]	Species	Size Class	Number of Fish[b]					Total
				Physical Cover Present[c]			Physical Cover Absent[d]		
				A1[e]	A2[e]	A3[e]	A2[e]	A3[e]	
3	0307	Bull Trout	Adult					1	1
	0307	Mountain Whitefish	Adult					174	174
	0307	Mountain Whitefish	Immature					188	188
	0307	Mountain Whitefish	YOY					60	60
	0307	Largescale Sucker	Immature					1	1
	0307	Longnose Sucker	Adult					12	12
	0307	Longnose Sucker	Immature					1	1
	0307	Sculpin spp.	Adult					3	3
	0307	Sculpin spp.	Immature					1	1
	0307	Sucker spp.	Adult					100	100
	Site 0307 Total			**0**	**0**	**0**	**0**	**541**	**541**
	0308	Bull Trout	Adult					6	6
	0308	Bull Trout	Immature					1	1
	0308	Mountain Whitefish	Adult					283	283
	0308	Mountain Whitefish	Immature					292	292
	0308	Mountain Whitefish	YOY					12	12
	0308	Rainbow Trout	Immature					1	1
	0308	Largescale Sucker	Adult					1	1
	0308	Longnose Sucker	Adult					6	6
	0308	Sculpin spp.	Adult					20	20
	0308	Slimy Sculpin	All					2	2
	0308	Sucker spp.	Adult					71	71
	0308	Sucker spp.	Immature					2	2
	Site 0308 Total			**0**	**0**	**0**	**0**	**697**	**697**
	0309	Bull Trout	Adult					2	2
	0309	Kokanee	All					1	1
	0309	Mountain Whitefish	Adult					144	144
	0309	Mountain Whitefish	Immature					348	348
	0309	Mountain Whitefish	YOY					48	48
	0309	Rainbow Trout	Immature					3	3
	0309	Largescale Sucker	Adult					3	3
	0309	Longnose Sucker	Adult					1	1
	0309	Northern Pikeminnow	Immature					1	1
	0309	Sculpin spp.	Immature					4	4
	0309	Sucker spp.	Adult					2	2
	Site 0309 Total			**0**	**0**	**0**	**0**	**557**	**557**
	0310	Bull Trout	Adult			5			5
	0310	Bull Trout	Immature			2			2
	0310	Mountain Whitefish	Adult			206			206
	0310	Mountain Whitefish	Immature			506			506
	0310	Mountain Whitefish	YOY			370			370
	0310	Rainbow Trout	Immature			4			4
	0310	Walleye	Adult			1			1
	0310	Lake Chub	All			1			1
	0310	Largescale Sucker	Adult			2			2
	0310	Longnose Sucker	Adult			7			7
	0310	Northern Pikeminnow	Adult			1			1
	0310	Sculpin spp.	Adult			32			32
	0310	Slimy Sculpin	All			5			5
	0310	Sucker spp.	Adult			37			37
	0310	White Sucker	Adult			1			1
	Site 0310 Total			**0**	**0**	**1180**	**0**	**0**	**1180**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Continued.

Section	Site[a]	Species	Size Class	Number of Fish[b]					Total
				Physical Cover Present[c]			Physical Cover Absent[d]		
				A1[e]	A2[e]	A3[e]	A2[e]	A3[e]	
3	0311	Arctic Grayling	Immature			1			1
	0311	Bull Trout	Adult			11			11
	0311	Bull Trout	Immature			1			1
	0311	Mountain Whitefish	Adult			455			455
	0311	Mountain Whitefish	Immature			455			455
	0311	Mountain Whitefish	YOY			53			53
	0311	Rainbow Trout	Adult			2			2
	0311	Rainbow Trout	Immature			4			4
	0311	Lake Chub	All			2			2
	0311	Largescale Sucker	Adult			9			9
	0311	Largescale Sucker	Immature			2			2
	0311	Longnose Sucker	Adult			21			21
	0311	Longnose Sucker	Immature			2			2
	0311	Northern Pikeminnow	Adult			10			10
	0311	Sculpin spp.	Adult			2			2
	0311	Sucker spp.	Adult			100			100
	0311	Sucker spp.	Immature			1			1
	0311	White Sucker	Adult			3			3
	Site 0311 Total			**0**	**0**	**1134**	**0**	**0**	**1134**
	0312	Bull Trout	Adult				16		16
	0312	Mountain Whitefish	Adult				357		357
	0312	Mountain Whitefish	Immature				569		569
	0312	Mountain Whitefish	YOY				60		60
	0312	Rainbow Trout	Adult				16		16
	0312	Rainbow Trout	Immature				6		6
	0312	Largescale Sucker	Adult				8		8
	0312	Longnose Sucker	Adult				22		22
	0312	Northern Pikeminnow	Adult				2		2
	0312	Northern Pikeminnow	Immature				1		1
	0312	Sculpin spp.	Adult				8		8
	0312	Slimy Sculpin	All				1		1
	0312	Sucker spp.	Adult				82		82
	Site 0312 Total			**0**	**0**	**0**	**1148**	**0**	**1148**
	0314	Arctic Grayling	Adult		1				1
	0314	Bull Trout	Adult		3				3
	0314	Mountain Whitefish	Adult		156				156
	0314	Mountain Whitefish	Immature		96				96
	0314	Mountain Whitefish	YOY		45				45
	0314	Rainbow Trout	Adult		5				5
	0314	Rainbow Trout	Immature		3				3
	0314	Largescale Sucker	Adult		3				3
	0314	Longnose Sucker	Adult		27				27
	0314	Sculpin spp.	Adult		43				43
	0314	Slimy Sculpin	All		4				4
	0314	Sucker spp.	Adult		37				37
	0314	Sucker spp.	Immature		2				2
	Site 0314 Total			**0**	**425**	**0**	**0**	**0**	**425**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Continued.

Section	Site[a]	Species	Size Class	Number of Fish[b]					Total
				Physical Cover Present[c]			Physical Cover Absent[d]		
				A1[e]	A2[e]	A3[e]	A2[e]	A3[e]	
3	0315	Arctic Grayling	Adult			1			1
	0315	Kokanee	All			1			1
	0315	Mountain Whitefish	Adult			419			419
	0315	Mountain Whitefish	Immature			316			316
	0315	Mountain Whitefish	YOY			71			71
	0315	Northern Pike	Adult			1			1
	0315	Rainbow Trout	Adult			4			4
	0315	Largescale Sucker	Adult			9			9
	0315	Longnose Sucker	Adult			63			63
	0315	Longnose Sucker	Immature			2			2
	0315	Northern Pikeminnow	Adult			1			1
	0315	Sculpin spp.	Adult			84			84
	0315	Slimy Sculpin	All			9			9
	0315	Sucker spp.	Adult			194			194
	0315	Sucker spp.	Immature			2			2
	0315	Sucker spp.	YOY			1			1
	0315	White Sucker	Adult			1			1
	Site 0315 Total			**0**	**0**	**1179**	**0**	**0**	**1179**
	0316	Arctic Grayling	Adult		1				1
	0316	Bull Trout	Adult		6				6
	0316	Bull Trout	Immature		2				2
	0316	Lake Whitefish	Adult		25				25
	0316	Lake Whitefish	Immature		7				7
	0316	Mountain Whitefish	Adult		306				306
	0316	Mountain Whitefish	Immature		232				232
	0316	Mountain Whitefish	YOY		23				23
	0316	Rainbow Trout	Adult		5				5
	0316	Rainbow Trout	Immature		2				2
	0316	Longnose Sucker	Adult		9				9
	0316	Longnose Sucker	Immature		2				2
	0316	Sculpin spp.	Adult		16				16
	0316	Sucker spp.	Adult		40				40
	0316	Sucker spp.	Immature		1				1
	0316	White Sucker	Adult		1				1
	Site 0316 Total			**0**	**678**	**0**	**0**	**0**	**678**
Section 3 Total				**0**	**4467**	**3493**	**3685**	**2332**	**13977**
5	0501	Arctic Grayling	Adult		2				2
	0501	Bull Trout	Adult		2				2
	0501	Bull Trout	Immature		3				3
	0501	Kokanee	Adult		1				1
	0501	Mountain Whitefish	Adult		602				602
	0501	Mountain Whitefish	Immature		384				384
	0501	Mountain Whitefish	YOY		165				165
	0501	Rainbow Trout	Adult		1				1
	0501	Largescale Sucker	Adult		2				2
	0501	Longnose Sucker	Adult		8				8
	0501	Longnose Sucker	Immature		2				2
	0501	Sculpin spp.	Adult		15				15
	0501	Sucker spp.	Adult		64				64
	0501	Sucker spp.	Immature		15				15
	Site 0501 Total			**0**	**1266**	**0**	**0**	**0**	**1266**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Continued.

Section	Site[a]	Species	Size Class	Number of Fish[b]					Total
				Physical Cover Present[c]			Physical Cover Absent[d]		
				A1[e]	A2[e]	A3[e]	A2[e]	A3[e]	
5	0502	Arctic Grayling	Immature		1				1
	0502	Bull Trout	Adult		6				6
	0502	Mountain Whitefish	Adult		636				636
	0502	Mountain Whitefish	Immature		365				365
	0502	Mountain Whitefish	YOY		202				202
	0502	Northern Pike	Adult		1				1
	0502	Rainbow Trout	Immature		1				1
	0502	Longnose Sucker	Adult		10				10
	0502	Longnose Sucker	Immature		7				7
	0502	Sculpin spp.	Adult		7				7
	0502	Slimy Sculpin	All		2				2
	0502	Sucker spp.	Adult		47				47
	0502	Sucker spp.	Immature		41				41
	Site 0502 Total			**0**	**1326**	**0**	**0**	**0**	**1326**
	0503	Bull Trout	Adult					2	2
	0503	Mountain Whitefish	Adult					418	418
	0503	Mountain Whitefish	Immature					836	836
	0503	Mountain Whitefish	YOY					163	163
	0503	Rainbow Trout	Adult					2	2
	0503	Rainbow Trout	Immature					1	1
	0503	Largescale Sucker	Adult					2	2
	0503	Longnose Dace	All					1	1
	0503	Longnose Sucker	Adult					8	8
	0503	Longnose Sucker	Immature					2	2
	0503	Sculpin spp.	Adult					4	4
	0503	Slimy Sculpin	All					1	1
	0503	Sucker spp.	Adult					54	54
	0503	Sucker spp.	Immature					1	1
	Site 0503 Total			**0**	**0**	**0**	**0**	**1495**	**1495**
	0504	Bull Trout	Adult					1	1
	0504	Mountain Whitefish	Adult					272	272
	0504	Mountain Whitefish	Immature					328	328
	0504	Mountain Whitefish	YOY					146	146
	0504	Longnose Sucker	Adult					1	1
	0504	Sculpin spp.	Adult					1	1
	0504	Slimy Sculpin	All					1	1
	0504	Sucker spp.	Adult					7	7
	0504	Sucker spp.	Immature					1	1
	0504	White Sucker	Adult					1	1
	Site 0504 Total			**0**	**0**	**0**	**0**	**759**	**759**
	0505	Arctic Grayling	Immature	1					1
	0505	Bull Trout	Adult	2					2
	0505	Mountain Whitefish	Adult	225					225
	0505	Mountain Whitefish	Immature	152					152
	0505	Mountain Whitefish	YOY	28					28
	0505	Northern Pike	Adult	1					1
	0505	Walleye	Adult	3					3
	0505	Largescale Sucker	Adult	4					4
	0505	Longnose Sucker	Adult	38					38
	0505	Longnose Sucker	Immature	2					2
	0505	Northern Pikeminnow	Adult	2					2
	0505	Sculpin spp.	Adult	3					3
	0505	Sucker spp.	Adult	141					141
	0505	White Sucker	Adult	4					4
	Site 0505 Total			**606**	**0**	**0**	**0**	**0**	**606**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Continued.

Section	Site[a]	Species	Size Class	Number of Fish[b]					Total
				Physical Cover Present[c]			Physical Cover Absent[d]		
				A1[e]	A2[e]	A3[e]	A2[e]	A3[e]	
5	0506	Bull Trout	Adult		3				3
	0506	Mountain Whitefish	Adult		139				139
	0506	Mountain Whitefish	Immature		134				134
	0506	Mountain Whitefish	YOY		51				51
	0506	Northern Pike	Adult		2				2
	0506	Walleye	Adult		16				16
	0506	Walleye	Immature		1				1
	0506	Largescale Sucker	Adult		14				14
	0506	Largescale Sucker	Immature		2				2
	0506	Longnose Sucker	Adult		67				67
	0506	Longnose Sucker	Immature		10				10
	0506	Sculpin spp.	Adult		2				2
	0506	Sucker spp.	Adult		250				250
	0506	Sucker spp.	Immature		6				6
	0506	Sucker spp.	YOY		2				2
	0506	White Sucker	Adult		5				5
	Site 0506 Total			**0**	**704**	**0**	**0**	**0**	**704**
	0507	Arctic Grayling	Adult		1				1
	0507	Bull Trout	Adult		4				4
	0507	Mountain Whitefish	Adult		448				448
	0507	Mountain Whitefish	Immature		108				108
	0507	Mountain Whitefish	YOY		28				28
	0507	Northern Pike	Adult		2				2
	0507	Lake Chub	All		1				1
	0507	Largescale Sucker	Adult		1				1
	0507	Longnose Sucker	Adult		8				8
	0507	Sculpin spp.	Adult		1				1
	0507	Sucker spp.	Adult		45				45
	0507	Sucker spp.	Immature		1				1
	Site 0507 Total			**0**	**648**	**0**	**0**	**0**	**648**
	0508	Bull Trout	Adult		1				1
	0508	Burbot	Adult		1				1
	0508	Mountain Whitefish	Adult		372				372
	0508	Mountain Whitefish	Immature		432				432
	0508	Mountain Whitefish	YOY		313				313
	0508	Rainbow Trout	Adult		3				3
	0508	Walleye	Adult		1				1
	0508	Largescale Sucker	Adult		3				3
	0508	Largescale Sucker	Immature		2				2
	0508	Longnose Sucker	Adult		51				51
	0508	Longnose Sucker	Immature		5				5
	0508	Northern Pikeminnow	Adult		2				2
	0508	Northern Pikeminnow	Immature		1				1
	0508	Sculpin spp.	Adult		16				16
	0508	Slimy Sculpin	All		2				2
	0508	Sucker spp.	Adult		203				203
	0508	Sucker spp.	Immature		19				19
	0508	White Sucker	Adult		5				5
	Site 0508 Total			**0**	**1432**	**0**	**0**	**0**	**1432**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Continued.

Section	Site[a]	Species	Size Class	Number of Fish[b]					Total
				Physical Cover Present[c]			Physical Cover Absent[d]		
				A1[e]	A2[e]	A3[e]	A2[e]	A3[e]	
5	0509	Bull Trout	Adult					3	3
	0509	Mountain Whitefish	Adult					453	453
	0509	Mountain Whitefish	Immature					499	499
	0509	Mountain Whitefish	YOY					153	153
	0509	Northern Pike	Adult					1	1
	0509	Rainbow Trout	Adult					1	1
	0509	Walleye	Adult					2	2
	0509	Largescale Sucker	Adult					5	5
	0509	Longnose Sucker	Adult					15	15
	0509	Longnose Sucker	Immature					1	1
	0509	Sculpin spp.	Adult					1	1
	0509	Sucker spp.	Adult					112	112
	0509	Sucker spp.	Immature					4	4
	0509	White Sucker	Adult					1	1
	Site 0509 Total			**0**	**0**	**0**	**0**	**1251**	**1251**
	0510	Bull Trout	Adult	8					8
	0510	Mountain Whitefish	Adult	410					410
	0510	Mountain Whitefish	Immature	195					195
	0510	Mountain Whitefish	YOY	65					65
	0510	Walleye	Adult	4					4
	0510	Largescale Sucker	Adult	8					8
	0510	Largescale Sucker	Immature	1					1
	0510	Longnose Sucker	Adult	27					27
	0510	Longnose Sucker	Immature	3					3
	0510	Northern Pikeminnow	Adult	2					2
	0510	Northern Pikeminnow	Immature	1					1
	0510	Sculpin spp.	Adult	7					7
	0510	Sucker spp.	Adult	107					107
	0510	Sucker spp.	Immature	14					14
	Site 0510 Total			**852**	**0**	**0**	**0**	**0**	**852**
	0511	Bull Trout	Adult		3				3
	0511	Mountain Whitefish	Adult		157				157
	0511	Mountain Whitefish	Immature		87				87
	0511	Mountain Whitefish	YOY		14				14
	0511	Rainbow Trout	Adult		2				2
	0511	Rainbow Trout	Immature		2				2
	0511	Walleye	Adult		1				1
	0511	Largescale Sucker	Adult		2				2
	0511	Largescale Sucker	Immature		1				1
	0511	Longnose Sucker	Adult		20				20
	0511	Longnose Sucker	Immature		1				1
	0511	Sculpin spp.	Adult		3				3
	0511	Sucker spp.	Adult		55				55
	Site 0511 Total			**0**	**348**	**0**	**0**	**0**	**348**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

Continued…

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

Table C4 Concluded.

Section	Site[a]	Species	Size Class	Number of Fish[b] Physical Cover Present[c] A1[e]	A2[e]	A3[e]	Physical Cover Absent[d] A2[e]	A3[e]	Total
5	0512	Bull Trout	Adult					2	2
	0512	Mountain Whitefish	Adult					166	166
	0512	Mountain Whitefish	Immature					256	256
	0512	Mountain Whitefish	YOY					214	214
	0512	Rainbow Trout	Immature					1	1
	0512	Walleye	Adult					4	4
	0512	Largescale Sucker	Adult					2	2
	0512	Largescale Sucker	Immature					1	1
	0512	Longnose Sucker	Adult					17	17
	0512	Sucker spp.	Adult					71	71
	0512	Sucker spp.	Immature					2	2
	0512	White Sucker	Adult					4	4
	Site 0512 Total			**0**	**0**	**0**	**0**	**740**	**740**
	0513	Bull Trout	Adult					1	1
	0513	Mountain Whitefish	Adult					298	298
	0513	Mountain Whitefish	Immature					184	184
	0513	Mountain Whitefish	YOY					111	111
	0513	Rainbow Trout	Immature					1	1
	0513	Largescale Sucker	Adult					2	2
	0513	Longnose Sucker	Adult					7	7
	0513	Longnose Sucker	Immature					1	1
	0513	Redside Shiner	All					1	1
	0513	Sculpin spp.	Adult					9	9
	0513	Slimy Sculpin	All					1	1
	0513	Sucker spp.	Adult					62	62
	Site 0513 Total			**0**	**0**	**0**	**0**	**678**	**678**
	0514	Mountain Whitefish	Adult					199	199
	0514	Mountain Whitefish	Immature					106	106
	0514	Mountain Whitefish	YOY					38	38
	0514	Northern Pike	Adult					1	1
	0514	Largescale Sucker	Adult					2	2
	0514	Longnose Sucker	Adult					13	13
	0514	Longnose Sucker	Immature					1	1
	0514	Sculpin spp.	Adult					91	91
	0514	Sculpin spp.	All					1	1
	0514	Slimy Sculpin	All					8	8
	0514	Sucker spp.	Adult					61	61
	0514	Sucker spp.	YOY					3	3
	Site 0514 Total			**0**	**0**	**0**	**0**	**524**	**524**
	0515	Arctic Grayling	Adult					1	1
	0515	Arctic Grayling	Immature					1	1
	0515	Mountain Whitefish	Adult					222	222
	0515	Mountain Whitefish	Immature					187	187
	0515	Mountain Whitefish	YOY					106	106
	0515	Walleye	Adult					1	1
	0515	Largescale Sucker	Adult					3	3
	0515	Largescale Sucker	Immature					1	1
	0515	Longnose Dace	All					1	1
	0515	Longnose Sucker	Adult					29	29
	0515	Longnose Sucker	Immature					3	3
	0515	Northern Pikeminnow	Adult					1	1
	0515	Sculpin spp.	Adult					3	3
	0515	Sucker spp.	Adult					74	74
	0515	White Sucker	Adult					1	1
	Site 0515 Total			**0**	**0**	**0**	**0**	**634**	**634**
Section 5 Total				**1458**	**5724**	**0**	**0**	**6081**	**13263**
GrandTotal				**3842**	**11491**	**3493**	**3685**	**10871**	**33382**

[a] See Appendix A, Figures A1 to A3 for sample site locations.

[b] Includes captured fish and observed fish identified to species.

[c] Nearshore habitat with physical cover as assigned by P&E and Gazey (2003).

[d] Nearshore habitat without physical cover as assigned by P&E and Gazey (2003).

[e] Bank Habitat Type as assigned by R.L.&L. (2001). See Appendix C, Table C2 for a description of each bank habitat type.

APPENDIX D

Catch And Effort Data

Table D1 Number of fish caught and observed during boat electroshocking surveys and their frequency of occurrence in sampled sections of Peace River, 2002 to 2014.

	2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014	
Species	n^a	%[b]	n^a	%[b]	n^a	%[b]	n^a	%[b]	n^a	%[b]	n^a	%[b]	n^a	%[b]	n^a	%[b]	n^a	%[b]	n^a	%[b]	n^a	%[b]	n^a	%[b]	n^a	%[b]
Sportfish		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*
Arctic Grayling	13	*<1*	53	*1*	267	*3*	275	*3*	92	*2*	343	*3*	201	*2*	122	*1*	40	*<1*	114	*1*	43	*<1*	27	*<1*	12	*<1*
Brook Trout																									1	*<1*
Bull Trout	105	*2*	77	*1*	101	*1*	146	*1*	69	*1*	150	*1*	166	*1*	153	*2*	97	*1*	199	*1*	187	*2*	182	*2*	225	*3*
Burbot	1	*<1*			5	*<1*	2	*<1*	5	*<1*	4	*<1*			2	*<1*	2	*<1*	1	*<1*	3	*<1*	1	*<1*	1	*<1*
Kokanee	24	*<1*	5	*<1*	18	*<1*	43	*<1*	16	*<1*	154	*1*	49	*<1*	28	*<1*	28	*<1*	59	*<1*	99	*1*	27	*<1*	48	*1*
Lake Trout					1	*<1*	1	*<1*			2	*<1*			3	*<1*	1	*<1*	2	*<1*	4	*<1*	5	*<1*	2	*<1*
Lake Whitefish	2	*<1*	2	*<1*	13	*<1*			1	*<1*	4	*<1*	1	*<1*	3	*<1*			7	*<1*	3	*<1*			32	*<1*
Mountain Whitefish[c]	5449	*96*	5102	*96*	9291	*95*	9177	*94*	5669	*96*	9597	*92*	10 992	*94*	9648	*95*	10 642	*97*	12 955	*96*	10 694	*95*	8310	*96*	7399	*93*
Northern Pike					1	*<1*	4	*<1*	1	*<1*	7	*<1*	8	*<1*	8	*<1*	5	*<1*	11	*<1*	7	*<1*	5	*<1*	22	*<1*
Rainbow Trout	51	*1*	63	*1*	106	*1*	91	*1*	39	*1*	102	*1*	169	*1*	171	*2*	132	*1*	146	*1*	138	*1*	67	*1*	176	*2*
Walleye	3	*<1*			6	*<1*	5	*<1*			17	*<1*	57	*<1*	17	*<1*	3	*<1*	49	*<1*	47	*<1*	43	*<1*	35	*<1*
Yellow Perch											1	*<1*														
Sportfish subtotal	5648	*91*	5302	*92*	9809	*91*	9744	*90*	5892	*96*	10 381	*92*	11 643	*91*	10 155	*93*	10 950	*95*	13 543	*95*	11 225	*91*	8667	*89*	7953	*61*
Non-sportfish		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*		*0*
Finescale Dace																							1	*<1*		
Lake Chub																									4	*<1*
Northern Pikeminnow	20	*4*	25	*5*	57	*6*	34	*3*	6	*2*	24	*3*	28	*2*	16	*2*	13	*3*	21	*3*	41	*4*	37	*4*	50	*1*
Peamouth	3	*1*																			1	*<1*				
Redside Shiner	2	*<1*																							1	*<1*
Sculpin spp.[d]	2	*<1*																							919	*18*
Sucker spp.[d]	529	*95*	433	*95*	877	*94*	1084	*97*	238	*98*	833	*97*	1096	*98*	790	*98*	503	*97*	722	*97*	1118	*96*	1011	*96*	4029	*80*
Non-sportfish subtotal	556	*9*	458	*8*	934	*9*	1118	*10*	244	*4*	857	*8*	1124	*9*	806	*7*	516	*5*	743	*5*	1160	*9*	1049	*11*	5003	*39*
All species	6204		5760		10 743		10 862		6136		11 238		12 767		10 961		11 466		14 286		12 385		9716		12 958	

[a] Includes fish observed and identified to species; does not include recaptured fish.
[b] Percent composition of sportfish or non-sportfish catch.
[c] Excludes observed fish.
[d] Species combined for table or not identified to species.

Table D2 Summary of boat electroshocking sportfish catch (includes fish captured and observed and identified to species) and catch-per-unit-effort (CPUE = no. fish/km/hour) in the Peace River, 25 August to 04 October 2014.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/h) Arctic Grayling		Brook Trout		Bull Trout		Burbot		Kokanee		Lake Trout		Lake Whitefish		Mountain Whitefish		Northern Pike		Rainbow Trout		Walleye		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 1	1	0101	25-Aug-2014	345	0.60															28	486.96							28	486.96
		0102	26-Aug-2014	361	0.98															169	1728.53							169	1728.53
		0103	25-Aug-2014	1200	1.20															26	65			1	2.5			27	67.5
		0105	25-Aug-2014	900	1.10															8	29.09							8	29.09
		0107	26-Aug-2014	530	0.55															20	247			2	24.7			22	271.7
		0108	26-Aug-2014	627	0.85															3	20.26							3	20.26
		0109	26-Aug-2014	676	0.98					1	5.46			1	5.46					58	316.8							60	327.72
		0110	26-Aug-2014	540	0.61									1	10.93					18	196.72			1	10.93			20	218.58
		0111	26-Aug-2014	600	1.00															21	126							21	126
		0112	26-Aug-2014	673	1.07					2	10									66	329.95							68	339.95
		0113	26-Aug-2014	442	0.75					4	43.44									81	879.64							85	923.08
		0114	26-Aug-2014	660	0.95					1	5.74									93	533.97			1	5.74			95	545.45
		0116	26-Aug-2014	617	0.98															22	130.32							22	130.32
		0119	26-Aug-2014	529	0.75															34	308.51			1	9.07			35	317.58
	Session Summary			**621**	**12.40**	**0**	**0**	**0**	**0**	**8**	**3.74**	**0**	**0**	**2**	**0.94**	**0**	**0**	**0**	**0**	**647**	**302.48**	**0**	**0**	**6**	**2.81**	**0**	**0**	**663**	**309.96**
Section 1	2	0101	01-Sep-2014	273	0.55															67	1606.39							67	1606.39
		0102	01-Sep-2014	359	0.98															84	863.94							84	863.94
		0103	31-Aug-2014	800	1.20															19	71.25			1	3.75			20	75
		0107	31-Aug-2014	549	0.55					1	11.92									20	238.45							21	250.37
		0108	31-Aug-2014	634	0.75															24	181.7							24	181.7
		0109	31-Aug-2014	727	0.98															60	304.73							60	304.73
		0110	31-Aug-2014	614	0.65															25	225.51							25	225.51
		0111	01-Sep-2014	864	0.60					1	6.94									5	34.72							6	41.67
		0112	01-Sep-2014	600	1.07					3	16.82									128	717.76							131	734.58
		0113	01-Sep-2014	335	0.75					2	28.66									50	716.42							52	745.07
		0114	01-Sep-2014	512	0.95					2	14.8									134	991.78			2	14.8			138	1021.38
		0116	01-Sep-2014	572	0.98															90	575.06							90	575.06
		0119	31-Aug-2014	536	0.75					2	17.91			2	17.91					64	573.13							68	608.96
	Session Summary			**567**	**10.80**	**0**	**0**	**0**	**0**	**11**	**6.47**	**0**	**0**	**2**	**1.18**	**0**	**0**	**0**	**0**	**770**	**452.67**	**0**	**0**	**3**	**1.76**	**0**	**0**	**786**	**462.08**
Section 1	3	0101	08-Sep-2014	271	0.50					1	26.57									117	3108.49							118	3135.06
		0102	08-Sep-2014	366	0.98					1	10.09									73	736.44							74	746.53
		0103	08-Sep-2014	734	1.20					1	4.09									86	351.5							87	355.59
		0104	08-Sep-2014	441	0.50					1	16.33									24	391.84							25	408.16
		0105	08-Sep-2014	482	1.10					1	6.79			1	6.79					63	427.76			1	6.79			66	448.13
		0107	08-Sep-2014	436	0.55					1	15.01									20	300.25			5	75.06			26	390.33
		0108	09-Sep-2014	684	0.85															32	198.14							32	198.14
		0109	09-Sep-2014	585	0.98			1	6.31											183	1155.03							184	1161.34
		0110	09-Sep-2014	595	0.65					4	37.23									32	297.87							36	335.1
		0111	09-Sep-2014	600	1.00					1	6									35	210			1	6			37	222
		0112	09-Sep-2014	660	1.07					2	10.2									104	530.16							106	540.36
		0113	09-Sep-2014	450	0.75					1	10.67									117	1248							118	1258.67
		0114	09-Sep-2014	541	0.95					1	7									110	770.5			1	7			112	784.51
		0116	09-Sep-2014	557	0.98					2	13.12									58	380.57							60	393.7
		0119	08-Sep-2014	429	0.75					1	11.19					1	11.19			48	537.06			4	44.76			54	604.2
	Session Summary			**522**	**12.80**	**0**	**0**	**1**	**0.54**	**18**	**9.7**	**0**	**0**	**1**	**0.54**	**1**	**0.54**	**0**	**0**	**1102**	**593.75**	**0**	**0**	**12**	**6.47**	**0**	**0**	**1135**	**611.53**

Table D2 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/h)																							
						Arctic Grayling		Brook Trout		Bull Trout		Burbot		Kokanee		Lake Trout		Lake Whitefish		Mountain Whitefish		Northern Pike		Rainbow Trout		Walleye		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 1	4	0101	16-Sep-2014	243	0.60															140	3456.79							140	3456.79
		0102	16-Sep-2014	300	0.98															58	713.85							58	713.85
		0103	16-Sep-2014	699	1.20					1	4.29									48	206.01							49	210.3
		0104	16-Sep-2014	437	0.50					1	16.48			1	16.48					22	362.47			1	16.48			25	411.9
		0105	16-Sep-2014	465	1.10					1	7.04									52	365.98			1	7.04			54	380.06
		0107	16-Sep-2014	365	0.55					1	17.93									32	573.85							33	591.78
		0108	16-Sep-2014	635	0.85															23	153.4							23	153.4
		0109	17-Sep-2014	569	0.98															90	584.02							90	584.02
		0110	17-Sep-2014	593	0.65					4	37.36									49	457.65							53	495.01
		0111	17-Sep-2014	509	1.00															19	134.38							19	134.38
		0112	17-Sep-2014	580	1.07					1	5.8									84	487.27			2	11.6			87	504.67
		0113	17-Sep-2014	370	0.75															61	791.35							61	791.35
		0114	17-Sep-2014	458	0.95															68	562.63							68	562.63
		0116	17-Sep-2014	646	0.98															44	248.94							44	248.94
		0119	16-Sep-2014	331	0.75															54	783.08			1	14.5			55	797.58
	Session Summary			**480**	**12.90**	**0**	**0**	**0**	**0**	**9**	**5.23**	**0**	**0**	**1**	**0.58**	**0**	**0**	**0**	**0**	**844**	**490.7**	**0**	**0**	**5**	**2.91**	**0**	**0**	**859**	**499.42**
Section 1	5	0101	22-Sep-2014	265	0.60															145	3283.02							145	3283.02
		0102	22-Sep-2014	322	0.98															65	745.34							65	745.34
		0103	22-Sep-2014	852	1.20					5	17.61									102	359.15							107	376.76
		0104	22-Sep-2014	378	0.50					1	19.05			3	57.14					55	1047.62							59	1123.81
		0105	22-Sep-2014	690	1.10															34	161.26							34	161.26
		0107	22-Sep-2014	427	0.55									4	61.32					79	1210.99							83	1272.3
		0108	22-Sep-2014	621	0.85									2	13.64					59	402.39							61	416.03
		0109	22-Sep-2014	572	0.98															182	1174.83							182	1174.83
		0110	22-Sep-2014	482	0.65											1	11.49			70	804.34							71	815.83
		0111	22-Sep-2014	528	1.00															42	286.36			2	13.64			44	300
		0112	22-Sep-2014	568	1.07					4	23.69									93	550.88					1	5.92	98	580.49
		0113	22-Sep-2014	401	0.75					5	59.85									132	1580.05							137	1639.9
		0114	22-Sep-2014	284	0.55					2	46.09									46	1060.18							48	1106.27
		0116	22-Sep-2014	477	0.98					1	7.66									44	337.13							45	344.79
		0119	22-Sep-2014	397	0.75									1	12.09					87	1051.89			1	12.09			89	1076.07
	Session Summary			**484**	**12.50**	**0**	**0**	**0**	**0**	**18**	**10.71**	**0**	**0**	**10**	**5.95**	**1**	**0.6**	**0**	**0**	**1235**	**734.88**	**0**	**0**	**3**	**1.79**	**1**	**0.6**	**1268**	**754.51**
Section 1	6	0101	25-Sep-2014	376	0.60															93	1484.04							93	1484.04
		0102	25-Sep-2014	339	0.98															76	827.77							76	827.77
		0103	25-Sep-2014	805	1.20									4	14.91					43	160.25			2	7.45			49	182.61
		0104	25-Sep-2014	432	0.50									4	66.67					39	650							43	716.67
		0105	25-Sep-2014	901	1.10									1	3.63					10	36.32							11	39.96
		0107	25-Sep-2014	519	0.55									5	63.06					37	466.63							42	529.69
		0108	25-Sep-2014	734	0.85									3	17.31					17	98.09							20	115.4
		0109	25-Sep-2014	637	0.98					2	11.59			2	11.59					93	539.07							97	562.25
		0110	25-Sep-2014	593	0.65									1	9.34					42	392.27							43	401.61
		0111	04-Oct-2014	580	1.00															13	80.69			1	6.21			14	86.9
		0112	25-Sep-2014	592	1.07															73	414.88							73	414.88
		0113	25-Sep-2014	425	0.75															87	982.59							87	982.59
		0114	25-Sep-2014	550	0.95					3	20.67									76	523.64			2	13.78			81	558.09
		0116	25-Sep-2014	613	0.98					2	11.92									4	23.85							6	35.77
		0119	25-Sep-2014	454	0.75					2	21.15			1	10.57					44	465.2							47	496.92
	Session Summary			**570**	**12.90**	**0**	**0**	**0**	**0**	**9**	**4.41**	**0**	**0**	**21**	**10.28**	**0**	**0**	**0**	**0**	**747**	**365.73**	**0**	**0**	**5**	**2.45**	**0**	**0**	**782**	**382.86**
Section Total All Samples				**46920**	**74.24**	**0**	**0**	**1**	**0**	**73**	**0**	**0**	**0**	**37**	**0**	**2**	**0**	**0**	**0**	**5345**	**0**	**0**	**0**	**34**	**0**	**1**	**0**	**5493**	**0**
Section Average All Samples				**539**	**0.85**	**0**	**0**	**0**	**0.09**	**1**	**6.57**	**0**	**0**	**0**	**3.33**	**0**	**0.18**	**0**	**0**	**61**	**480.87**	**0**	**0**	**0**	**3.06**	**0**	**0.09**	**63**	**494.18**
Section Standard Error of Mean						**0**	**0**	**0.01**	**0.07**	**0.13**	**1.29**	**0**	**0**	**0.11**	**1.44**	**0.02**	**0.18**	**0**	**0**	**4.37**	**68.35**	**0**	**0**	**0.09**	**1.1**	**0.01**	**0.07**	**4.38**	**68.5**

Table D2 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/h) Arctic Grayling No.	Arctic Grayling CPUE	Brook Trout No.	Brook Trout CPUE	Bull Trout No.	Bull Trout CPUE	Burbot No.	Burbot CPUE	Kokanee No.	Kokanee CPUE	Lake Trout No.	Lake Trout CPUE	Lake Whitefish No.	Lake Whitefish CPUE	Mountain Whitefish No.	Mountain Whitefish CPUE	Northern Pike No.	Northern Pike CPUE	Rainbow Trout No.	Rainbow Trout CPUE	Walleye No.	Walleye CPUE	All Species No.	All Species CPUE
Section 3	1	0301	28-Aug-2014	1075	1.80	1	*1.86*			3	*5.58*									83	*154.42*							87	*161.86*
		0302	28-Aug-2014	1005	1.90					3	*5.66*									125	*235.66*			8	*15.08*			136	*256.4*
		0303	28-Aug-2014	879	1.45					2	*5.65*									92	*259.86*			1	*2.82*			95	*268.33*
		0304	28-Aug-2014	902	1.35															121	*357.72*							121	*357.72*
		0305	28-Aug-2014	891	1.55					3	*7.82*									287	*748.13*			2	*5.21*			292	*761.16*
		0306	28-Aug-2014	741	0.97					1	*5.01*									92	*460.79*							93	*465.8*
		0307	27-Aug-2014	673	0.95															107	*602.49*							107	*602.49*
		0308	27-Aug-2014	686	1.35															90	*349.85*							90	*349.85*
		0309	27-Aug-2014	590	0.95					1	*6.42*									121	*777.16*			2	*12.85*			124	*796.43*
		0310	27-Aug-2014	725	1.20					1	*4.14*									166	*686.9*			3	*12.41*			170	*703.45*
		0311	27-Aug-2014	720	1.25					1	*4*									328	*1312*			1	*4*			330	*1320*
		0312	27-Aug-2014	825	1.17					4	*14.92*									145	*540.79*			7	*26.11*			156	*581.82*
		0314	28-Aug-2014	679	0.98															32	*174.01*			2	*10.88*			34	*184.89*
		0315	27-Aug-2014	1631	1.70	1	*1.3*													57	*74.01*			2	*2.6*			60	*77.9*
		0316	27-Aug-2014	850	1.48	1	*2.87*			2	*5.74*									112	*321.6*			4	*11.49*			119	*341.69*
	Session Summary			**858**	**20.00**	**3**	***0.63***	**0**	***0***	**21**	***4.41***	**0**	***0***	**0**	***0***	**0**	***0***	**0**	***0***	**1958**	***410.77***	**0**	***0***	**32**	***6.71***	**0**	***0***	**2014**	***422.52***
Section 3	2	0301	05-Sep-2014	1009	1.78															46	*92.2*			3	*6.01*			49	*98.22*
		0302	05-Sep-2014	1130	1.90					5	*8.38*									93	*155.94*			4	*6.71*			102	*171.03*
		0303	05-Sep-2014	832	1.45															53	*158.16*							53	*158.16*
		0304	05-Sep-2014	655	1.35					2	*8.14*									123	*500.76*							125	*508.91*
		0305	04-Sep-2014	991	1.55					1	*2.34*									238	*557.79*			2	*4.69*			241	*564.83*
		0306	04-Sep-2014	872	1.00					1	*4.13*									95	*392.2*							96	*396.33*
		0307	03-Sep-2014	749	0.95															48	*242.85*							48	*242.85*
		0308	03-Sep-2014	608	1.35															125	*548.25*							125	*548.25*
		0309	04-Sep-2014	832	0.95					1	*4.55*			1	*4.55*					108	*491.9*			1	*4.55*			111	*505.57*
		0310	04-Sep-2014	889	1.20					3	*10.12*									166	*560.18*			1	*3.37*			170	*573.68*
		0311	04-Sep-2014	916	1.25					3	*9.43*									100	*314.41*			4	*12.58*			107	*336.42*
		0312	04-Sep-2014	968	0.97					2	*7.67*									269	*1031.35*			6	*23*			277	*1062.03*
		0314	04-Sep-2014	868	0.98					1	*4.25*									28	*119.11*			2	*8.51*			31	*131.87*
		0315	03-Sep-2014	1145	1.70															88	*162.75*			1	*1.85*			89	*164.6*
		0316	03-Sep-2014	864	1.48					2	*5.65*									80	*225.99*			1	*2.82*			83	*234.46*
	Session Summary			**889**	**19.90**	**0**	***0***	**0**	***0***	**21**	***4.27***	**0**	***0***	**1**	***0.2***	**0**	***0***	**0**	***0***	**1660**	***337.8***	**0**	***0***	**25**	***5.09***	**0**	***0***	**1707**	***347.36***
Section 3	3	0301	10-Sep-2014	1221	1.80					5	*8.19*									152	*248.98*			3	*4.91*			160	*262.08*
		0302	10-Sep-2014	1213	1.90					5	*7.81*									319	*498.29*			6	*9.37*			330	*515.47*
		0303	10-Sep-2014	861	1.45					3	*8.65*									152	*438.3*			6	*17.3*			161	*464.26*
		0304	11-Sep-2014	854	1.33															84	*266.24*							84	*266.24*
		0305	10-Sep-2014	884	1.55					1	*2.63*									190	*499.2*							191	*501.82*
		0306	11-Sep-2014	807	1.00					7	*31.23*									74	*330.11*							81	*361.34*
		0307	11-Sep-2014	495	0.95															115	*880.38*							115	*880.38*
		0308	12-Sep-2014	748	1.35					3	*10.7*									163	*581.11*			1	*3.57*			167	*595.37*
		0309	12-Sep-2014	728	0.95															194	*1009.83*							194	*1009.83*
		0310	12-Sep-2014	824	1.20					1	*3.64*									219	*797.33*							220	*800.97*
		0311	12-Sep-2014	669	1.25	1	*4.3*			4	*17.22*									214	*921.26*							219	*942.78*
		0312	12-Sep-2014	1137	1.17					4	*10.82*									167	*451.93*			5	*13.53*			176	*476.29*
		0314	11-Sep-2014	758	0.98	1	*4.87*													75	*365.33*			1	*4.87*			77	*375.08*
		0315	11-Sep-2014	1330	1.70															327	*520.65*							327	*520.65*
		0316	12-Sep-2014	869	1.48					1	*2.81*									161	*452.19*							162	*454.99*
	Session Summary			**893**	**20.10**	**2**	***0.4***	**0**	***0***	**34**	***6.82***	**0**	***0***	**0**	***0***	**0**	***0***	**0**	***0***	**2606**	***522.67***	**0**	***0***	**22**	***4.41***	**0**	***0***	**2664**	***534.3***

Table D2 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Arctic Grayling No.	Arctic Grayling CPUE	Brook Trout No.	Brook Trout CPUE	Bull Trout No.	Bull Trout CPUE	Burbot No.	Burbot CPUE	Kokanee No.	Kokanee CPUE	Lake Trout No.	Lake Trout CPUE	Lake Whitefish No.	Lake Whitefish CPUE	Mountain Whitefish No.	Mountain Whitefish CPUE	Northern Pike No.	Northern Pike CPUE	Rainbow Trout No.	Rainbow Trout CPUE	Walleye No.	Walleye CPUE	All Species No.	All Species CPUE
Section 3	4	0301	17-Sep-2014	989	1.80					3	6.07									154	311.43			1	2.02			158	319.51
		0302	17-Sep-2014	870	1.90					2	4.36									235	511.8			10	21.78			247	537.93
		0303	18-Sep-2014	964	1.45					2	5.15									120	309.06							122	314.21
		0304	18-Sep-2014	843	1.35	1	3.16			2	6.33									86	272.04							89	281.53
		0305	18-Sep-2014	1146	1.55					9	18.24			4	8.11					258	522.88			2	4.05			273	553.28
		0306	18-Sep-2014	809	1.00					2	8.9									67	298.15							69	307.05
		0307	19-Sep-2014	624	0.95					1	6.07									79	479.76							80	485.83
		0308	19-Sep-2014	618	1.35															90	388.35							90	388.35
		0309	19-Sep-2014	635	0.95															40	238.71							40	238.71
		0310	19-Sep-2014	755	1.20					2	7.95									378	1501.99							380	1509.93
		0311	18-Sep-2014	665	1.25					2	8.66									146	632.3							148	640.96
		0312	19-Sep-2014	799	1.17					3	11.55									225	866.47			3	11.55			231	889.57
		0314	18-Sep-2014	947	0.98					1	3.9									64	249.53			1	3.9			66	257.33
		0315	18-Sep-2014	1169	1.70															158	286.22			1	1.81			159	288.03
		0316	19-Sep-2014	861	1.48															115	325.99			2	5.67			117	331.66
	Session Summary			**846**	**20.10**	**1**	**0.21**	**0**	**0**	**29**	**6.14**	**0**	**0**	**4**	**0.85**	**0**	**0**	**0**	**0**	**2215**	**468.93**	**0**	**0**	**20**	**4.23**	**0**	**0**	**2269**	**480.36**
Section 3	5	0301	23-Sep-2014	1006	1.80	1	1.99			4	7.95									89	176.94			4	7.95			98	194.83
		0302	23-Sep-2014	928	1.90					1	2.04			1	2.04					377	769.74			2	4.08			381	777.9
		0303	23-Sep-2014	981	1.45					2	5.06									133	336.6			7	17.72			142	359.38
		0304	23-Sep-2014	859	1.35															62	192.47	13	40.36					75	232.83
		0305	23-Sep-2014	1097	1.55					2	4.23									221	467.9			3	6.35			226	478.49
		0306	23-Sep-2014	901	1.00															90	359.6							90	359.6
		0307	23-Sep-2014	640	0.95															36	213.16							36	213.16
		0308	23-Sep-2014	759	1.35					3	10.54									82	288.1							85	298.64
		0309	23-Sep-2014	709	0.95															42	224.48							42	224.48
		0310	23-Sep-2014	806	1.20															118	439.21							118	439.21
		0311	23-Sep-2014	681	1.25					1	4.23									140	592.07			1	4.23			142	600.53
		0312	23-Sep-2014	960	1.17					2	6.41									142	455.13			1	3.21			145	464.74
		0314	23-Sep-2014	917	0.98					1	4.03									69	277.83			2	8.05			72	289.91
		0315	23-Sep-2014	1232	1.70									1	1.72					130	223.45	1	1.72					132	226.89
		0316	23-Sep-2014	840	1.48					3	8.72									84	244.07							87	252.78
	Session Summary			**888**	**20.10**	**1**	**0.2**	**0**	**0**	**19**	**3.83**	**0**	**0**	**2**	**0.4**	**0**	**0**	**0**	**0**	**1815**	**366.08**	**14**	**2.82**	**20**	**4.03**	**0**	**0**	**1871**	**377.37**
Section 3	6	0301	26-Sep-2014	1224	1.80					1	1.63									65	106.21			4	6.54			70	114.38
		0302	26-Sep-2014	989	1.90					2	3.83			1	1.92					155	296.95			2	3.83			160	306.53
		0303	26-Sep-2014	914	1.45					1	2.72									127	344.98			1	2.72			129	350.41
		0304	26-Sep-2014	858	1.35															98	304.58							98	304.58
		0305	26-Sep-2014	943	1.55									2	4.93					303	746.28			4	9.85			309	761.06
		0306	26-Sep-2014	846	1.00					3	12.77									80	340.43							83	353.19
		0307	04-Oct-2014	602	0.95															37	232.91							37	232.91
		0308	04-Oct-2014	681	1.35					1	3.92									37	144.88							38	148.8
		0309	04-Oct-2014	590	0.95															35	224.8							35	224.8
		0310	04-Oct-2014	799	1.20															35	131.41					1	3.75	36	135.17
		0311	04-Oct-2014	751	1.25					1	3.83									35	134.22							36	138.06
		0312	04-Oct-2014	748	0.92					1	5.23									38	198.79							39	204.02
		0314	26-Sep-2014	832	0.98															29	128.7							29	128.7
		0315	04-Oct-2014	1087	1.70															46	89.62							46	89.62
		0316	04-Oct-2014	771	1.48													32	101.3	9	28.49							41	129.79
	Session Summary			**842**	**19.80**	**0**	**0**	**0**	**0**	**10**	**2.16**	**0**	**0**	**3**	**0.65**	**0**	**0**	**32**	**6.91**	**1129**	**243.79**	**0**	**0**	**11**	**2.38**	**1**	**0.22**	**1186**	**256.1**
Section Total All Samples				**78243**	**119.90**	**7**	**0**	**0**	**0**	**134**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**32**	**0**	**11383**	**0**	**14**	**0**	**130**	**0**	**1**	**0**	**11711**	**0**
Section Average All Samples				**869**	**1.33**	**0**	**0.24**	**0**	**0**	**1**	**4.63**	**0**	**0**	**0**	**0.35**	**0**	**0**	**0**	**1.11**	**126**	**393.3**	**0**	**0.48**	**1**	**4.49**	**0**	**0.03**	**130**	**404.63**
Section Standard Error of Mean						**0.03**	**0.09**	**0**	**0**	**0.18**	**0.54**	**0**	**0**	**0.05**	**0.12**	**0**	**0**	**0.36**	**1.13**	**8.77**	**28.42**	**0.14**	**0.45**	**0.23**	**0.62**	**0.01**	**0.04**	**8.85**	**28.49**

Table D2 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Arctic Grayling No.	Arctic Grayling CPUE	Brook Trout No.	Brook Trout CPUE	Bull Trout No.	Bull Trout CPUE	Burbot No.	Burbot CPUE	Kokanee No.	Kokanee CPUE	Lake Trout No.	Lake Trout CPUE	Lake Whitefish No.	Lake Whitefish CPUE	Mountain Whitefish No.	Mountain Whitefish CPUE	Northern Pike No.	Northern Pike CPUE	Rainbow Trout No.	Rainbow Trout CPUE	Walleye No.	Walleye CPUE	All Species No.	All Species CPUE
Section 5	1	0501	29-Aug-2014	529	0.98	1	6.91			1	6.91									89	614.89			1	6.91			92	635.62
		0502	29-Aug-2014	597	0.95	1	6.35			1	6.35									119	755.36							121	768.05
		0503	29-Aug-2014	541	0.82															140	1136.11							140	1136.11
		0504	29-Aug-2014	621	0.85															95	647.91							95	647.91
		0505	29-Aug-2014	743	1.00					1	4.85									81	392.46							82	397.31
		0506	29-Aug-2014	898	1.00															34	136.3							34	136.3
		0507	29-Aug-2014	787	0.78					1	5.86									64	375.33							65	381.19
		0508	30-Aug-2014	806	0.92															165	796.73			2	9.66			167	806.38
		0509	30-Aug-2014	564	0.98					1	6.55									134	877.25					1	6.55	136	890.34
		0510	30-Aug-2014	769	1.13															80	331.43					2	8.29	82	339.71
		0511	30-Aug-2014	450	0.72															39	433.33			3	33.33			42	466.67
		0512	30-Aug-2014	952	1.23					1	3.07									75	230.58			1	3.07			77	236.73
		0513	30-Aug-2014	674	0.77															66	457.82							66	457.82
		0514	30-Aug-2014	480	0.56															31	415.18							31	415.18
		0515	30-Aug-2014	683	0.95															75	416.12							75	416.12
	Session Summary			**673**	**13.60**	**2**	**0.79**	**0**	**0**	**6**	**2.36**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1287**	**506.21**	**0**	**0**	**7**	**2.75**	**3**	**1.18**	**1305**	**513.29**
Section 5	2	0501	06-Sep-2014	497	1.00	1	7.28			2	14.56									89	647.91							92	669.75
		0502	06-Sep-2014	592	0.95					1	6.4									125	800.14			1	6.4			127	812.94
		0503	06-Sep-2014	520	0.82															170	1435.27							170	1435.27
		0504	06-Sep-2014	478	0.85															113	1001.23							113	1001.23
		0505	06-Sep-2014	610	1.00															64	377.7							64	377.7
		0506	06-Sep-2014	963	1.00															41	153.27	1	3.74			3	11.21	45	168.22
		0507	06-Sep-2014	432	0.78					2	21.37									82	876.07							84	897.44
		0508	07-Sep-2014	711	0.92															123	673.28							123	673.28
		0509	06-Sep-2014	637	0.98															159	921.63			1	5.8	1	5.8	161	933.22
		0510	07-Sep-2014	895	1.13					1	3.56									107	380.88							108	384.44
		0511	07-Sep-2014	556	0.68					1	9.52									21	199.96			1	9.52			23	219
		0512	07-Sep-2014	810	1.28															169	586.81							169	586.81
		0513	07-Sep-2014	615	0.77															89	676.59							89	676.59
		0514	07-Sep-2014	457	0.56															84	1181.62							84	1181.62
		0515	07-Sep-2014	645	0.97															103	592.66							103	592.66
	Session Summary			**628**	**13.70**	**1**	**0.42**	**0**	**0**	**7**	**2.93**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1539**	**643.96**	**1**	**0.42**	**3**	**1.26**	**4**	**1.67**	**1555**	**650.66**
Section 5	3	0501	13-Sep-2014	552	1.00					2	13.11									384	2516.93							386	2530.04
		0502	13-Sep-2014	545	0.95					2	13.91									246	1710.48	1	6.95					249	1731.34
		0503	13-Sep-2014	491	0.82															398	3558.69			1	8.94			399	3567.63
		0504	13-Sep-2014	468	0.85															217	1963.8							217	1963.8
		0505	13-Sep-2014	577	1.00															89	555.29					2	12.48	91	567.76
		0506	13-Sep-2014	948	1.00					1	3.8									27	102.53	1	3.8			5	18.99	34	129.11
		0507	13-Sep-2014	761	0.78					1	6.06									76	460.93	2	12.13					79	479.13
		0508	14-Sep-2014	671	0.92															186	1078.83							186	1078.83
		0509	13-Sep-2014	546	0.98															261	1765							261	1765
		0510	14-Sep-2014	672	1.13															177	839.13							177	839.13
		0511	14-Sep-2014	454	0.72					1	11.01									92	1013.22					1	11.01	94	1035.24
		0512	14-Sep-2014	609	1.26															126	591.13					2	9.38	128	600.52
		0513	14-Sep-2014	553	0.77															119	1006.08			1	8.45			120	1014.54
		0514	14-Sep-2014	449	0.56															75	1073.81							75	1073.81
		0515	14-Sep-2014	660	0.97	1	5.62													99	556.7					1	5.62	101	567.95
	Session Summary			**597**	**13.70**	**1**	**0.44**	**0**	**0**	**7**	**3.08**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2572**	**1132.08**	**4**	**1.76**	**2**	**0.88**	**11**	**4.84**	**2597**	**1143.09**

Number Caught (CPUE = no. fish/km/h)

Table D2 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/h)																							
						Arctic Grayling		Brook Trout		Bull Trout		Burbot		Kokanee		Lake Trout		Lake Whitefish		Mountain Whitefish		Northern Pike		Rainbow Trout		Walleye		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 5	4	0501	20-Sep-2014	458	1.00															318	***2512.12***							318	***2512.12***
		0502	20-Sep-2014	576	0.95					2	***13.16***									359	***2361.84***							361	***2375***
		0503	20-Sep-2014	555	0.82					1	***7.91***									288	***2278.18***			2	***15.82***			291	***2301.91***
		0504	20-Sep-2014	643	0.85															99	***652.09***							99	***652.09***
		0505	20-Sep-2014	950	1.00															64	***242.53***	1	***3.79***					65	***246.32***
		0506	20-Sep-2014	1115	1.00					1	***3.23***									63	***203.41***					5	***16.14***	69	***222.78***
		0507	20-Sep-2014	414	0.78															190	***2118.17***							190	***2118.17***
		0508	21-Sep-2014	825	0.92					1	***4.72***									298	***1405.8***			1	***4.72***	1	***4.72***	301	***1419.95***
		0509	20-Sep-2014	569	0.98															325	***2108.96***							325	***2108.96***
		0510	21-Sep-2014	733	1.13					2	***8.69***									120	***521.56***					2	***8.69***	124	***538.94***
		0511	21-Sep-2014	414	0.72															66	***797.1***							66	***797.1***
		0512	21-Sep-2014	771	1.28															79	***288.18***					1	***3.65***	80	***291.83***
		0513	21-Sep-2014	577	0.77															126	***1020.95***							126	***1020.95***
		0514	21-Sep-2014	465	0.56															25	***345.62***							25	***345.62***
		0515	21-Sep-2014	736	0.97	1	***5.04***													130	***655.54***							131	***660.58***
	Session Summary			**653**	**13.70**	**1**	***0.4***	**0**	***0***	**7**	***2.82***	**0**	***0***	**0**	***0***	**0**	***0***	**0**	***0***	**2550**	***1026.15***	**1**	***0.4***	**3**	***1.21***	**9**	***3.62***	**2571**	***1034.6***
Section 5	5	0501	24-Sep-2014	450	1.00															201	***1616.08***							201	***1616.08***
		0502	24-Sep-2014	670	0.95															246	***1391.36***							246	***1391.36***
		0503	24-Sep-2014	572	0.82					1	***7.68***									404	***3100.8***							405	***3108.48***
		0504	24-Sep-2014	675	0.85					1	***6.27***									176	***1104.31***							177	***1110.59***
		0505	24-Sep-2014	622	1.00	1	***5.79***			1	***5.79***									76	***439.87***					1	***5.79***	79	***457.23***
		0506	24-Sep-2014	938	1.00															142	***544.99***					4	***15.35***	146	***560.34***
		0507	24-Sep-2014	432	0.78	1	***10.68***													151	***1613.25***							152	***1623.93***
		0508	24-Sep-2014	780	0.92							1	***4.99***							165	***823.28***							166	***828.27***
		0509	24-Sep-2014	594	0.98					1	***6.22***									181	***1125.1***							182	***1131.31***
		0510	24-Sep-2014	827	1.13					5	***19.26***									155	***597.1***							160	***616.37***
		0511	24-Sep-2014	422	0.72															23	***272.51***							23	***272.51***
		0512	24-Sep-2014	839	1.28					1	***3.35***									172	***576.58***					1	***3.35***	174	***583.28***
		0513	24-Sep-2014	628	0.77					1	***7.44***									153	***1139.05***							154	***1146.5***
		0514	24-Sep-2014	526	0.56															110	***1344.38***	1	***12.22***					111	***1356.6***
		0515	24-Sep-2014	639	0.97															82	***476.26***							82	***476.26***
	Session Summary			**641**	**13.70**	**2**	***0.82***	**0**	***0***	**11**	***4.51***	**1**	***0.41***	**0**	***0***	**0**	***0***	**0**	***0***	**2437**	***999.03***	**1**	***0.41***	**0**	***0***	**6**	***2.46***	**2458**	***1007.64***
Section 5	6	0501	03-Oct-2014	393	1.00									1	***9.21***					70	***644.44***							71	***653.65***
		0502	03-Oct-2014	478	0.95															108	***856.2***							108	***856.2***
		0503	03-Oct-2014	438	0.82															17	***170.4***							17	***170.4***
		0504	03-Oct-2014	360	0.85															46	***541.18***							46	***541.18***
		0505	03-Oct-2014	587	1.00															31	***190.12***							31	***190.12***
		0506	03-Oct-2014	894	1.00					1	***4.03***									17	***68.46***							18	***72.48***
		0507	03-Oct-2014	377	0.78															21	***257.09***							21	***257.09***
		0508	03-Oct-2014	530	0.92															180	***1321.77***							180	***1321.77***
		0509	03-Oct-2014	550	0.98					1	***6.71***									45	***302.1***	1	***6.71***					47	***315.52***
		0510	03-Oct-2014	603	1.13															31	***163.78***							31	***163.78***
		0511	03-Oct-2014	214	0.72					1	***23.36***									17	***397.2***							18	***420.56***
		0512	03-Oct-2014	603	1.28															15	***69.96***							15	***69.96***
		0513	03-Oct-2014	535	0.77															40	***349.56***							40	***349.56***
		0514	03-Oct-2014	356	0.56															18	***325.04***							18	***325.04***
		0515	03-Oct-2014	510	0.97															26	***189.21***							26	***189.21***
	Session Summary			**495**	**13.70**	**0**	***0***	**0**	***0***	**3**	***1.59***	**0**	***0***	**1**	***0.53***	**0**	***0***	**0**	***0***	**682**	***362.04***	**1**	***0.53***	**0**	***0***	**0**	***0***	**687**	***364.7***
Section Total All Samples				**55311**	**82.21**	**7**	***0***	**0**	***0***	**41**	***0***	**1**	***0***	**1**	***0***	**0**	***0***	**0**	***0***	**11067**	***0***	**8**	***0***	**15**	***0***	**33**	***0***	**11173**	***0***
Section Average All Samples				**615**	**0.91**	**0**	***0.5***	**0**	***0***	**0**	***2.92***	**0**	***0.07***	**0**	***0.07***	**0**	***0***	**0**	***0***	**123**	***788.01***	**0**	***0.57***	**0**	***1.07***	**0**	***2.35***	**124**	***795.56***
Section Standard Error of Mean						**0.03**	***0.2***	**0**	***0***	**0.08**	***0.54***	**0.01**	***0.06***	**0.01**	***0.1***	**0**	***0***	**0**	***0***	**9.68**	***73.61***	**0.03**	***0.23***	**0.05**	***0.46***	**0.1**	***0.42***	**9.68**	***73.62***
All Sections Total All Samples				**180474**	**276.35**	***28377***	***2.05***	***14***	***0***	***1***	***0***	***248***	***0.02***	***1***	***0***	***48***	***0***	***2***	***0***	***32***	***0***	***27795***	***2.01***	***22***	***0***	***179***	***0.01***	***35***	***0***
All Sections Average All Samples						***106***	***546.9***	***0***	***0.27***	***0***	***0.02***	***1***	***4.78***	***0***	***0.02***	***0***	***0.93***	***0***	***0.04***	***0***	***0.62***	***104***	***535.68***	***0***	***0.42***	***1***	***3.45***	***0***	***0.67***
All Sections Standard Error of Mean						***4.98***	***36.34***	***0.01***	***0.07***	***0***	***0.02***	***0.08***	***0.5***	***0***	***0.02***	***0.04***	***0.49***	***0.01***	***0.06***	***0.12***	***0.38***	***4.96***	***36.33***	***0.05***	***0.17***	***0.09***	***0.45***	***0.04***	***0.15***

Table D3 Summary of boat electroshocking non-sportfish catch (includes fish captured and observed and identified to species) and catch-per-unit-effort (CPUE = no. fish/km/hour) in the Peace River, 25 August to 25 September 2014.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/h) Lake Chub		Longnose Dace		Northern Pikeminnow		Redside Shiner		Sculpin spp.		Sucker spp.		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 1	1	0103	25-Aug-2014	1200	1.20									3	7.5			3	7.5
		0104	25-Aug-2014	840	0.50									1	8.57			1	8.57
		0107	26-Aug-2014	530	0.55											1	12.35	1	12.35
		0108	26-Aug-2014	627	0.85									2	13.51			2	13.51
		0109	26-Aug-2014	676	0.98									4	21.85	1	5.46	5	27.31
		0110	26-Aug-2014	540	0.61									7	76.5			7	76.5
		0111	26-Aug-2014	600	1.00									3	18			3	18
		0112	26-Aug-2014	673	1.07									5	25	3	15	8	39.99
		0114	26-Aug-2014	660	0.95									2	11.48			2	11.48
		0119	26-Aug-2014	529	0.75									3	27.22	1	9.07	4	36.29
	Session Summary			**688**	**8.50**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**30**	**18.47**	**6**	**3.69**	**36**	**22.16**
Section 1	2	0103	31-Aug-2014	800	1.20									61	228.75			61	228.75
		0107	31-Aug-2014	549	0.55									23	274.22			23	274.22
		0108	31-Aug-2014	634	0.75									5	37.85			5	37.85
		0109	31-Aug-2014	727	0.98									33	167.6			33	167.6
		0110	31-Aug-2014	614	0.65									11	99.22	3	27.06	14	126.28
		0111	01-Sep-2014	864	0.60									18	125			18	125
		0112	01-Sep-2014	600	1.07									3	16.82	1	5.61	4	22.43
		0114	01-Sep-2014	512	0.95									5	37.01			5	37.01
		0116	01-Sep-2014	572	0.98									6	38.34			6	38.34
	Session Summary			**652**	**7.70**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**165**	**118.32**	**4**	**2.87**	**169**	**121.19**
Section 1	3	0102	08-Sep-2014	366	0.98									1	10.09			1	10.09
		0103	08-Sep-2014	734	1.20											1	4.09	1	4.09
		0104	08-Sep-2014	441	0.50									3	48.98	1	16.33	4	65.31
		0105	08-Sep-2014	482	1.10									1	6.79			1	6.79
		0107	08-Sep-2014	436	0.55					3	45.04					13	195.16	16	240.2
		0108	09-Sep-2014	684	0.85									7	43.34	2	12.38	9	55.73
		0109	09-Sep-2014	585	0.98					1	6.31					11	69.43	12	75.74
		0110	09-Sep-2014	595	0.65											12	111.7	12	111.7
		0112	09-Sep-2014	660	1.07											14	71.37	14	71.37
		0114	09-Sep-2014	541	0.95											8	56.04	8	56.04
		0116	09-Sep-2014	557	0.98											1	6.56	1	6.56
		0119	08-Sep-2014	429	0.75											10	111.89	10	111.89
	Session Summary			**542**	**10.60**	**0**	**0**	**0**	**0**	**4**	**2.51**	**0**	**0**	**12**	**7.52**	**73**	**45.74**	**89**	**55.77**

Table D3 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/h)													
						Lake Chub		Longnose Dace		Northern Pikeminnow		Redside Shiner		Sculpin spp.		Sucker spp.		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 1	4	0103	16-Sep-2014	699	1.20									10	*42.92*			10	*42.92*
		0104	16-Sep-2014	437	0.50					1	*16.48*			5	*82.38*			6	*98.86*
		0107	16-Sep-2014	365	0.55					1	*17.93*			6	*107.6*	3	*53.8*	10	*179.33*
		0108	16-Sep-2014	635	0.85									26	*173.41*	1	*6.67*	27	*180.08*
		0109	17-Sep-2014	569	0.98									7	*45.42*	11	*71.38*	18	*116.8*
		0110	17-Sep-2014	593	0.65											4	*37.36*	4	*37.36*
		0111	17-Sep-2014	509	1.00											1	*7.07*	1	*7.07*
		0112	17-Sep-2014	580	1.07									4	*23.2*	3	*17.4*	7	*40.61*
		0113	17-Sep-2014	370	0.75											1	*12.97*	1	*12.97*
		0114	17-Sep-2014	458	0.95											1	*8.27*	1	*8.27*
		0116	17-Sep-2014	646	0.98					1	*5.66*			1	*5.66*	1	*5.66*	3	*16.97*
		0119	16-Sep-2014	331	0.75											11	*159.52*	11	*159.52*
	Session Summary			**516**	**10.20**	**0**	***0***	**0**	***0***	**3**	***2.05***	**0**	***0***	**59**	***40.36***	**37**	***25.31***	**99**	***67.72***
Section 1	5	0103	22-Sep-2014	852	1.20									11	*38.73*			11	*38.73*
		0104	22-Sep-2014	378	0.50									5	*95.24*	2	*38.1*	7	*133.33*
		0105	22-Sep-2014	690	1.10					2	*9.49*			1	*4.74*			3	*14.23*
		0107	22-Sep-2014	427	0.55									8	*122.63*			8	*122.63*
		0108	22-Sep-2014	621	0.85									1	*6.82*	4	*27.28*	5	*34.1*
		0109	22-Sep-2014	572	0.98									4	*25.82*	40	*258.2*	44	*284.02*
		0110	22-Sep-2014	482	0.65											2	*22.98*	2	*22.98*
		0111	22-Sep-2014	528	1.00									1	*6.82*			1	*6.82*
		0112	22-Sep-2014	568	1.07											11	*65.16*	11	*65.16*
		0113	22-Sep-2014	401	0.75											2	*23.94*	2	*23.94*
		0114	22-Sep-2014	284	0.55											3	*69.14*	3	*69.14*
		0116	22-Sep-2014	477	0.98											1	*7.66*	1	*7.66*
		0119	22-Sep-2014	397	0.75									2	*24.18*	10	*120.91*	12	*145.09*
	Session Summary			**514**	**10.90**	**0**	***0***	**0**	***0***	**2**	***1.29***	**0**	***0***	**33**	***21.2***	**75**	***48.19***	**110**	***70.68***
Section 1	6	0103	25-Sep-2014	805	1.20									15	*55.9*			15	*55.9*
		0104	25-Sep-2014	432	0.50									14	*233.33*			14	*233.33*
		0105	25-Sep-2014	901	1.10									3	*10.9*			3	*10.9*
		0107	25-Sep-2014	519	0.55									3	*37.83*	2	*25.22*	5	*63.06*
		0108	25-Sep-2014	734	0.85									24	*138.48*			24	*138.48*
		0109	25-Sep-2014	637	0.98									29	*168.1*	5	*28.98*	34	*197.08*
		0110	25-Sep-2014	593	0.65									7	*65.38*			7	*65.38*
		0112	25-Sep-2014	592	1.07									8	*45.47*	2	*11.37*	10	*56.83*
		0113	25-Sep-2014	425	0.75									2	*22.59*	2	*22.59*	4	*45.18*
		0114	25-Sep-2014	550	0.95									10	*68.9*	2	*13.78*	12	*82.68*
		0116	25-Sep-2014	613	0.98									1	*5.96*	7	*41.74*	8	*47.7*
		0119	25-Sep-2014	454	0.75											10	*105.73*	10	*105.73*
	Session Summary			**605**	**10.30**	**0**	***0***	**0**	***0***	**0**	***0***	**0**	***0***	**116**	***67.01***	**30**	***17.33***	**146**	***84.35***
Section Total All Samples				**39381**	**58.23**	**0**	***0***	**0**	***0***	**9**	***0***	**0**	***0***	**415**	***0***	**225**	***0***	**649**	***0***
Section Average All Samples				**579**	**0.86**	**0**	***0***	**0**	***0***	**0**	***0.96***	**0**	***0***	**6**	***44.31***	**3**	***24.02***	**10**	***69.3***
Section Standard Error of Mean						**0**	***0***	**0**	***0***	**0.06**	***0.76***	**0**	***0***	**1.22**	***7.61***	**0.73**	***6***	**1.29**	***8.65***

Table D3 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/h)													
						Lake Chub		Longnose Dace		Northern Pikeminnow		Redside Shiner		Sculpin spp.		Sucker spp.		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 3	1	0301	28-Aug-2014	1075	1.80											12	22.33	12	22.33
		0302	28-Aug-2014	1005	1.90									1	1.89	20	37.71	21	39.59
		0303	28-Aug-2014	879	1.45											22	62.14	22	62.14
		0304	28-Aug-2014	902	1.35											2	5.91	2	5.91
		0305	28-Aug-2014	891	1.55									1	2.61	104	271.1	105	273.7
		0306	28-Aug-2014	741	0.97									3	15.03	1	5.01	4	20.03
		0307	27-Aug-2014	673	0.95											46	259.01	46	259.01
		0308	27-Aug-2014	686	1.35											12	46.65	12	46.65
		0309	27-Aug-2014	590	0.95											1	6.42	1	6.42
		0310	27-Aug-2014	725	1.20											10	41.38	10	41.38
		0311	27-Aug-2014	720	1.25	1	4			1	4					30	120	32	128
		0312	27-Aug-2014	825	1.17					1	3.73			3	11.19	23	85.78	27	100.7
		0314	28-Aug-2014	679	0.98									11	59.82	10	54.38	21	114.2
		0315	27-Aug-2014	1631	1.70									27	35.06	41	53.23	68	88.29
		0316	27-Aug-2014	850	1.48									5	14.36	9	25.84	14	40.2
	Session Summary			**858**	**20.00**	**1**	**0.21**	**0**	**0**	**2**	**0.42**	**0**	**0**	**51**	**10.7**	**343**	**71.96**	**397**	**83.29**
Section 3	2	0301	05-Sep-2014	1009	1.78									1	2	51	102.23	52	104.23
		0302	05-Sep-2014	1130	1.90									1	1.68	86	144.2	87	145.88
		0303	05-Sep-2014	832	1.45											70	208.89	70	208.89
		0304	05-Sep-2014	655	1.35											1	4.07	1	4.07
		0305	04-Sep-2014	991	1.55					3	7.03			1	2.34	122	285.93	126	295.3
		0306	04-Sep-2014	872	1.00									2	8.26	1	4.13	3	12.39
		0307	03-Sep-2014	749	0.95											32	161.9	32	161.9
		0308	03-Sep-2014	608	1.35											43	188.6	43	188.6
		0309	04-Sep-2014	832	0.95									4	18.22	4	18.22	8	36.44
		0310	04-Sep-2014	889	1.20									34	114.74	7	23.62	41	138.36
		0311	04-Sep-2014	916	1.25					4	12.58			2	6.29	29	91.18	35	110.04
		0312	04-Sep-2014	968	0.97					1	3.83			5	19.17	31	118.85	37	141.86
		0314	04-Sep-2014	868	0.98									18	76.57	29	123.36	47	199.93
		0315	03-Sep-2014	1145	1.70									31	57.33	63	116.52	94	173.85
		0316	03-Sep-2014	864	1.48											19	53.67	19	53.67
	Session Summary			**889**	**19.90**	**0**	**0**	**0**	**0**	**8**	**1.63**	**0**	**0**	**99**	**20.15**	**588**	**119.65**	**695**	**141.43**
Section 3	3	0301	10-Sep-2014	1221	1.80					1	1.64			1	1.64	55	90.09	57	93.37
		0302	10-Sep-2014	1213	1.90					2	3.12			2	3.12	46	71.85	50	78.1
		0303	10-Sep-2014	861	1.45					4	11.53					97	279.71	101	291.24
		0304	11-Sep-2014	854	1.33											2	6.34	2	6.34
		0305	10-Sep-2014	884	1.55					3	7.88					31	81.45	34	89.33
		0306	11-Sep-2014	807	1.00					1	4.46					2	8.92	3	13.38
		0307	11-Sep-2014	495	0.95											33	252.63	33	252.63
		0308	12-Sep-2014	748	1.35									8	28.52	19	67.74	27	96.26
		0309	12-Sep-2014	728	0.95					1	5.21					1	5.21	2	10.41
		0310	12-Sep-2014	824	1.20					1	3.64					14	50.97	15	54.61
		0311	12-Sep-2014	669	1.25											11	47.35	11	47.35
		0312	12-Sep-2014	1137	1.17					1	2.71					23	62.24	24	64.95
		0314	11-Sep-2014	758	0.98											3	14.61	3	14.61
		0315	11-Sep-2014	1330	1.70											41	65.28	41	65.28
		0316	12-Sep-2014	869	1.48									7	19.66	8	22.47	15	42.13
	Session Summary			**893**	**20.10**	**0**	**0**	**0**	**0**	**14**	**2.81**	**0**	**0**	**18**	**3.61**	**386**	**77.42**	**418**	**83.84**

Table D3 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/h)													
						Lake Chub		Longnose Dace		Northern Pikeminnow		Redside Shiner		Sculpin spp.		Sucker spp.		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 3	4	0301	17-Sep-2014	989	1.80					2	4.04					48	97.07	50	101.11
		0302	17-Sep-2014	870	1.90											12	26.13	12	26.13
		0303	18-Sep-2014	964	1.45											55	141.65	55	141.65
		0304	18-Sep-2014	843	1.35									1	3.16	2	6.33	3	9.49
		0305	18-Sep-2014	1146	1.55											53	107.41	53	107.41
		0306	18-Sep-2014	809	1.00									1	4.45	7	31.15	8	35.6
		0307	19-Sep-2014	624	0.95											1	6.07	1	6.07
		0308	19-Sep-2014	618	1.35											2	8.63	2	8.63
		0310	19-Sep-2014	755	1.20											6	23.84	6	23.84
		0311	18-Sep-2014	665	1.25					2	8.66					53	229.53	55	238.2
		0312	19-Sep-2014	799	1.17											25	96.27	25	96.27
		0314	18-Sep-2014	947	0.98									3	11.7	20	77.98	23	89.68
		0315	18-Sep-2014	1169	1.70									6	10.87	82	148.54	88	159.41
		0316	19-Sep-2014	861	1.48									2	5.67	12	34.02	14	39.69
	Session Summary			**861**	**19.10**	**0**	**0**	**0**	**0**	**4**	**0.88**	**0**	**0**	**13**	**2.85**	**378**	**82.75**	**395**	**86.47**
Section 3	5	0301	23-Sep-2014	1006	1.80											7	13.92	7	13.92
		0302	23-Sep-2014	928	1.90									1	2.04	14	28.58	15	30.63
		0303	23-Sep-2014	981	1.45									2	5.06	5	12.65	7	17.72
		0304	23-Sep-2014	859	1.35									1	3.1	3	9.31	4	12.42
		0305	23-Sep-2014	1097	1.55									17	35.99	39	82.57	56	118.56
		0306	23-Sep-2014	901	1.00											6	23.97	6	23.97
		0307	23-Sep-2014	640	0.95									3	17.76	2	11.84	5	29.61
		0308	23-Sep-2014	759	1.35									14	49.19	4	14.05	18	63.24
		0310	23-Sep-2014	806	1.20	1	3.72							2	7.44	9	33.5	12	44.67
		0311	23-Sep-2014	681	1.25	1	4.23			3	12.69					13	54.98	17	71.89
		0312	23-Sep-2014	960	1.17									1	3.21	9	28.85	10	32.05
		0314	23-Sep-2014	917	0.98											7	28.19	7	28.19
		0315	23-Sep-2014	1232	1.70					1	1.72			25	42.97	28	48.13	54	92.82
		0316	23-Sep-2014	840	1.48											4	11.62	4	11.62
	Session Summary			**900**	**19.10**	**2**	**0.42**	**0**	**0**	**4**	**0.84**	**0**	**0**	**66**	**13.82**	**150**	**31.41**	**222**	**46.49**
Section 3	6	0301	26-Sep-2014	1224	1.80									40	65.36	2	3.27	42	68.63
		0302	26-Sep-2014	989	1.90									1	1.92	2	3.83	3	5.75
		0303	26-Sep-2014	914	1.45									6	16.3	15	40.75	21	57.04
		0304	26-Sep-2014	858	1.35									3	9.32	1	3.11	4	12.43
		0305	26-Sep-2014	943	1.55									4	9.85	19	46.8	23	56.65
		0306	26-Sep-2014	846	1.00									1	4.26			1	4.26
		0307	04-Oct-2014	602	0.95									1	6.29			1	6.29
		0310	04-Oct-2014	799	1.20									1	3.75	1	3.75	2	7.51
		0311	04-Oct-2014	751	1.25											2	7.67	2	7.67
		0312	04-Oct-2014	748	0.92											1	5.23	1	5.23
		0314	26-Sep-2014	832	0.98									15	66.57			15	66.57
		0315	04-Oct-2014	1087	1.70									4	7.79	17	33.12	21	40.91
		0316	04-Oct-2014	771	1.48									2	6.33	1	3.17	3	9.5
	Session Summary			**874**	**17.50**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**78**	**18.36**	**61**	**14.36**	**139**	**32.72**
Section Total All Samples				**75628**	**115.70**	**3**	**0**	**0**	**0**	**32**	**0**	**0**	**0**	**325**	**0**	**1906**	**0**	**2266**	**0**
Section Average All Samples				**879**	**1.35**	**0**	**0.11**	**0**	**0**	**0**	**1.13**	**0**	**0**	**4**	**11.5**	**22**	**67.47**	**26**	**80.21**
Section Standard Error of Mean						**0.02**	**0.08**	**0**	**0**	**0.1**	**0.3**	**0**	**0**	**0.86**	**2.22**	**2.81**	**7.79**	**2.98**	**7.97**

Table D3 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/h)													
						Lake Chub		Longnose Dace		Northern Pikeminnow		Redside Shiner		Sculpin spp.		Sucker spp.		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 5	1	0501	29-Aug-2014	529	0.98									1	6.91	16	110.54	17	117.45
		0502	29-Aug-2014	597	0.95									1	6.35	8	50.78	9	57.13
		0503	29-Aug-2014	541	0.82									1	8.12	8	64.92	9	73.04
		0505	29-Aug-2014	743	1.00					1	4.85			2	9.69	35	169.58	38	184.12
		0506	29-Aug-2014	898	1.00									2	8.02	30	120.27	32	128.29
		0507	29-Aug-2014	787	0.78											13	76.24	13	76.24
		0508	30-Aug-2014	806	0.92											20	96.57	20	96.57
		0509	30-Aug-2014	564	0.98									1	6.55	21	137.48	22	144.03
		0510	30-Aug-2014	769	1.13									4	16.57	25	103.57	29	120.14
		0511	30-Aug-2014	450	0.72									1	11.11	15	166.67	16	177.78
		0512	30-Aug-2014	952	1.23											17	52.26	17	52.26
		0513	30-Aug-2014	674	0.77									3	20.81	3	20.81	6	41.62
		0514	30-Aug-2014	480	0.56									3	40.18	9	120.54	12	160.71
		0515	30-Aug-2014	683	0.95									2	11.1	4	22.19	6	33.29
	Session Summary			**677**	**12.80**	**0**	***0***	**0**	***0***	**1**	***0.42***	**0**	***0***	**21**	***8.72***	**224**	***93.06***	**246**	***102.2***
Section 5	2	0501	06-Sep-2014	497	1.00									1	7.28	55	400.39	56	407.67
		0502	06-Sep-2014	592	0.95									8	51.21	71	454.48	79	505.69
		0503	06-Sep-2014	520	0.82			1	8.44					3	25.33	42	354.6	46	388.37
		0504	06-Sep-2014	478	0.85									1	8.86	8	70.88	9	79.74
		0505	06-Sep-2014	610	1.00											36	212.46	36	212.46
		0506	06-Sep-2014	963	1.00											91	340.19	91	340.19
		0507	06-Sep-2014	432	0.78	1	10.68							1	10.68	11	117.52	13	138.89
		0508	07-Sep-2014	711	0.92											24	131.37	24	131.37
		0509	06-Sep-2014	637	0.98											54	313.01	54	313.01
		0510	07-Sep-2014	895	1.13					1	3.56					52	185.1	53	188.66
		0511	07-Sep-2014	556	0.68											18	171.39	18	171.39
		0512	07-Sep-2014	810	1.28											35	121.53	35	121.53
		0513	07-Sep-2014	615	0.77									2	15.2	37	281.28	39	296.48
		0514	07-Sep-2014	457	0.56											37	520.48	37	520.48
		0515	07-Sep-2014	645	0.97			1	5.75							29	166.87	30	172.62
	Session Summary			**628**	**13.70**	**1**	***0.42***	**2**	***0.84***	**1**	***0.42***	**0**	***0***	**16**	***6.69***	**600**	***251.06***	**620**	***259.43***
Section 5	3	0501	13-Sep-2014	552	1.00											17	111.43	17	111.43
		0502	13-Sep-2014	545	0.95											18	125.16	18	125.16
		0503	13-Sep-2014	491	0.82											13	116.24	13	116.24
		0505	13-Sep-2014	577	1.00					1	6.24					42	262.05	43	268.28
		0506	13-Sep-2014	948	1.00											33	125.32	33	125.32
		0507	13-Sep-2014	761	0.78											8	48.52	8	48.52
		0508	14-Sep-2014	671	0.92									1	5.8	45	261.01	46	266.81
		0509	13-Sep-2014	546	0.98											23	155.54	23	155.54
		0510	14-Sep-2014	672	1.13					1	4.74					33	156.45	34	161.19
		0511	14-Sep-2014	454	0.72											29	319.38	29	319.38
		0512	14-Sep-2014	609	1.26											15	70.37	15	70.37
		0513	14-Sep-2014	553	0.77									2	16.91	16	135.27	18	152.18
		0514	14-Sep-2014	449	0.56									13	186.13	21	300.67	34	486.8
		0515	14-Sep-2014	660	0.97											2	11.25	2	11.25
	Session Summary			**606**	**12.90**	**0**	***0***	**0**	***0***	**2**	***0.92***	**0**	***0***	**16**	***7.37***	**315**	***145.06***	**333**	***153.35***

Table D3 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/h)													
						Lake Chub		Longnose Dace		Northern Pikeminnow		Redside Shiner		Sculpin spp.		Sucker spp.		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 5	4	0502	20-Sep-2014	576	0.95											6	39.47	6	39.47
		0503	20-Sep-2014	555	0.82									1	7.91	3	23.73	4	31.64
		0504	20-Sep-2014	643	0.85									1	6.59			1	6.59
		0505	20-Sep-2014	950	1.00											42	159.16	42	159.16
		0506	20-Sep-2014	1115	1.00											103	332.56	103	332.56
		0507	20-Sep-2014	414	0.78											5	55.74	5	55.74
		0508	21-Sep-2014	825	0.92					1	4.72			11	51.89	105	495.33	117	551.94
		0509	20-Sep-2014	569	0.98											12	77.87	12	77.87
		0510	21-Sep-2014	733	1.13											19	82.58	19	82.58
		0511	21-Sep-2014	414	0.72											8	96.62	8	96.62
		0512	21-Sep-2014	771	1.28											10	36.48	10	36.48
		0513	21-Sep-2014	577	0.77											15	121.54	15	121.54
		0514	21-Sep-2014	465	0.56									29	400.92	1	13.82	30	414.75
		0515	21-Sep-2014	736	0.97											1	5.04	1	5.04
	Session Summary			**667**	**12.70**	**0**	**0**	**0**	**0**	**1**	**0.42**	**0**	**0**	**42**	**17.85**	**330**	**140.24**	**373**	**158.52**
Section 5	5	0501	24-Sep-2014	450	1.00									13	104.52	3	24.12	16	128.64
		0502	24-Sep-2014	670	0.95											2	11.31	2	11.31
		0503	24-Sep-2014	572	0.82											1	7.68	1	7.68
		0504	24-Sep-2014	675	0.85											2	12.55	2	12.55
		0505	24-Sep-2014	622	1.00									1	5.79	32	185.21	33	191
		0506	24-Sep-2014	938	1.00											98	376.12	98	376.12
		0507	24-Sep-2014	432	0.78											16	170.94	16	170.94
		0508	24-Sep-2014	780	0.92					1	4.99			3	14.97	41	204.57	45	224.53
		0509	24-Sep-2014	594	0.98											28	174.05	28	174.05
		0510	24-Sep-2014	827	1.13					1	3.85			1	3.85	28	107.86	30	115.57
		0511	24-Sep-2014	422	0.72									1	11.85	9	106.64	10	118.48
		0512	24-Sep-2014	839	1.28											20	67.04	20	67.04
		0513	24-Sep-2014	628	0.77							1	7.44	3	22.33			4	29.78
		0514	24-Sep-2014	526	0.56									54	659.97	12	146.66	66	806.63
		0515	24-Sep-2014	639	0.97					1	5.81					72	418.18	73	423.99
	Session Summary			**641**	**13.70**	**0**	**0**	**0**	**0**	**3**	**1.23**	**1**	**0.41**	**76**	**31.16**	**364**	**149.22**	**444**	**182.01**
Section 5	6	0505	03-Oct-2014	587	1.00											2	12.27	2	12.27
		0506	03-Oct-2014	894	1.00											1	4.03	1	4.03
		0507	03-Oct-2014	377	0.78											2	24.48	2	24.48
		0508	03-Oct-2014	530	0.92					1	7.34			3	22.03	53	389.19	57	418.56
		0510	03-Oct-2014	603	1.13									2	10.57	3	15.85	5	26.42
		0511	03-Oct-2014	214	0.72									1	23.36			1	23.36
		0513	03-Oct-2014	535	0.77											1	8.74	1	8.74
		0514	03-Oct-2014	356	0.56									1	18.06			1	18.06
		0515	03-Oct-2014	510	0.97									1	7.28	3	21.83	4	29.11
	Session Summary			**512**	**7.90**	**0**	**0**	**0**	**0**	**1**	**0.89**	**0**	**0**	**8**	**7.12**	**65**	**57.85**	**74**	**65.86**
Section Total All Samples				**50942**	**73.64**	**1**	**0**	**2**	**0**	**9**	**0**	**1**	**0**	**179**	**0**	**1898**	**0**	**2090**	**0**
Section Average All Samples				**629**	**0.91**	**0**	**0.08**	**0**	**0.16**	**0**	**0.7**	**0**	**0.08**	**2**	**13.91**	**23**	**147.5**	**26**	**162.43**
Section Standard Error of Mean						**0.01**	**0.13**	**0.02**	**0.13**	**0.04**	**0.18**	**0.01**	**0.09**	**0.79**	**9.72**	**2.71**	**14.37**	**2.81**	**17.42**
All Sections Total All Samples				**165951**	**247.57**	**5005**	**0.44**	**4**	**0**	**2**	**0**	**50**	**0**	**1**	**0**	**919**	**0.08**	**4029**	**0.35**
All Sections Average All Samples						**21**	**103.06**	**0**	**0.08**	**0**	**0.04**	**0**	**1.03**	**0**	**0.02**	**4**	**18.92**	**17**	**82.96**
All Sections Standard Error of Mean						**1.58**	**7.62**	**0.01**	**0.05**	**0.01**	**0.04**	**0.04**	**0.25**	**0**	**0.03**	**0.55**	**4.17**	**1.51**	**6.66**

Table D3 Summary of boat electroshocking non-sportfish catch (includes fish captured and observed and identified to species) and catch-per-unit-effort (CPUE = no. fish/km/hour) in the Peace River, 25 August to 25 September 2014.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/hr)																					
						Lake Chub		Largescale Sucker		Longnose Dace		Longnose Sucker		Northern Pikeminnow		Prickly Sculpin		Redside Shiner		Sculpin spp.		Slimy Sculpin		Sucker spp.		White Sucker		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 1	1	103	2014-08-25	1200	1.2											1	2.5			2	5							3	7.5
		104	2014-08-25	840	0.5															1	8.57							1	8.57
		107	2014-08-26	530	0.55																			1	12.35			1	12.35
		108	2014-08-26	627	0.85															2	13.51							2	13.51
		109	2014-08-26	676	0.975							1	5.46							4	21.85							5	27.31
		110	2014-08-26	540	0.61															6	65.57	1	10.93					7	76.5
		111	2014-08-26	600	1															3	18							3	18
		112	2014-08-26	673	1.07															5	25			3	15			8	39.99
		114	2014-08-26	660	0.95															1	5.74	1	5.74					2	11.48
		119	2014-08-26	529	0.75															2	18.15	1	9.07			1	9.07	4	36.29
	Session Summary			**688**	**8.5**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0.62**	**0**	**0**	**1**	**0.62**	**0**	**0**	**26**	**16.01**	**3**	**1.85**	**4**	**2.46**	**1**	**0.62**	**36**	**22.16**
Section 1	2	103	2014-08-31	800	1.2											2	7.5			57	213.75	2	7.5					61	228.75
		107	2014-08-31	549	0.55															20	238.45	3	35.77					23	274.22
		108	2014-08-31	634	0.75															4	30.28	1	7.57					5	37.85
		109	2014-08-31	727	0.975															32	162.52	1	5.08					33	167.6
		110	2014-08-31	614	0.65							1	9.02							10	90.2	1	9.02	2	18.04			14	126.28
		111	2014-09-01	864	0.6															17	118.06	1	6.94					18	125
		112	2014-09-01	600	1.07							1	5.61							3	16.82							4	22.43
		114	2014-09-01	512	0.95															3	22.2	2	14.8					5	37.01
		116	2014-09-01	572	0.985															5	31.95	1	6.39					6	38.34
	Session Summary			**652**	**7.7**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**1.43**	**0**	**0**	**2**	**1.43**	**0**	**0**	**151**	**108.28**	**12**	**8.6**	**2**	**1.43**	**0**	**0**	**169**	**121.19**
Section 1	3	102	2014-09-08	366	0.975																	1	10.09					1	10.09
		103	2014-09-08	734	1.2																					1	4.09	1	4.09
		104	2014-09-08	441	0.5			1	16.33											3	48.98							4	65.31
		105	2014-09-08	482	1.1															1	6.79							1	6.79
		107	2014-09-08	436	0.55							3	45.04	3	45.04									10	150.13			16	240.2
		108	2014-09-09	684	0.85															6	37.15	1	6.19	1	6.19	1	6.19	9	55.73
		109	2014-09-09	585	0.975			2	12.62			5	31.56	1	6.31									4	25.25			12	75.74
		110	2014-09-09	595	0.65			1	9.31															10	93.08	1	9.31	12	111.7
		112	2014-09-09	660	1.07							3	15.29											11	56.07			14	71.37
		114	2014-09-09	541	0.95							3	21.01											5	35.02			8	56.04
		116	2014-09-09	557	0.985							1																1	
		119	2014-09-08	429	0.75																			8	89.51	2	22.38	10	111.89
	Session Summary			**542**	**10.6**	**0**	**0**	**4**	**2.51**	**0**	**0**	**15**	**9.4**	**4**	**2.51**	**0**	**0**	**0**	**0**	**10**	**6.27**	**2**	**1.25**	**49**	**30.7**	**5**	**3.13**	**89**	**55.77**

Table D3 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/hr)																							
						Lake Chub		Largescale Sucker		Longnose Dace		Longnose Sucker		Northern Pikeminnow		Prickly Sculpin		Redside Shiner		Sculpin spp.		Slimy Sculpin		Sucker spp.		White Sucker		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 1	4	103	2014-09-16	699	1.2															10	42.92							10	42.92
		104	2014-09-16	437	0.5									1	16.48					5	82.38							6	98.86
		107	2014-09-16	365	0.55							1	17.93	1	17.93					6	107.6			1	17.93	1	17.93	10	179.33
		108	2014-09-16	635	0.85															25	166.74	1	6.67	1	6.67			27	180.08
		109	2014-09-17	569	0.975							1	6.49							6	38.93	1	6.49	10	64.89			18	116.8
		110	2014-09-17	593	0.65							3	28.02											1	9.34			4	37.36
		111	2014-09-17	509	1																			1	7.07			1	7.07
		112	2014-09-17	580	1.07							1	5.8							4	23.2			2	11.6			7	40.61
		113	2014-09-17	370	0.75																			1	12.97			1	12.97
		114	2014-09-17	458	0.95																			1	8.27			1	8.27
		116	2014-09-17	646	0.985									1	5.66							1	5.66	1	5.66			3	16.97
		119	2014-09-16	331	0.75			1	14.5															10	145.02			11	159.52
	Session Summary			**516**	**10.2**	**0**	**0**	**1**	**0.68**	**0**	**0**	**6**	**4.1**	**3**	**2.05**	**0**	**0**	**0**	**0**	**56**	**38.3**	**3**	**2.05**	**29**	**19.84**	**1**	**0.68**	**99**	**67.72**
Section 1	5	103	2014-09-22	852	1.2															9	31.69	2	7.04					11	38.73
		104	2014-09-22	378	0.5			1	19.05											4	76.19	1	19.05	1	19.05			7	133.33
		105	2014-09-22	690	1.1									2	9.49					1	4.74							3	14.23
		107	2014-09-22	427	0.55															8	122.63							8	122.63
		108	2014-09-22	621	0.85			2	13.64											1	6.82			2	13.64			5	34.1
		109	2014-09-22	572	0.975			5	32.28			2	12.91							4	25.82			33	213.02			44	284.02
		110	2014-09-22	482	0.65																			2	22.98			2	22.98
		111	2014-09-22	528	1															1	6.82							1	6.82
		112	2014-09-22	568	1.07			1	5.92															10	59.23			11	65.16
		113	2014-09-22	401	0.75																			2	23.94			2	23.94
		114	2014-09-22	284	0.55							1	23.05											2	46.09			3	69.14
		116	2014-09-22	477	0.985			1	7.66																			1	7.66
		119	2014-09-22	397	0.75			2	24.18			2	24.18							2	24.18			6	72.54			12	145.09
	Session Summary			**514**	**10.9**	**0**	**0**	**12**	**7.71**	**0**	**0**	**5**	**3.21**	**2**	**1.29**	**0**	**0**	**0**	**0**	**30**	**19.28**	**3**	**1.93**	**58**	**37.27**	**0**	**0**	**110**	**70.68**
Section 1	6	103	2014-09-25	805	1.2															14	52.17	1	3.73					15	55.9
		104	2014-09-25	432	0.5															14	233.33							14	233.33
		105	2014-09-25	901	1.1															3	10.9							3	10.9
		107	2014-09-25	519	0.55															3	37.83			2	25.22			5	63.06
		108	2014-09-25	734	0.85											1	5.77			22	126.94	1	5.77					24	138.48
		109	2014-09-25	637	0.975			2	11.59											27	156.5	2	11.59	3	17.39			34	197.08
		110	2014-09-25	593	0.65															7	65.38							7	65.38
		112	2014-09-25	592	1.07															7	39.78	1	5.68	2	11.37			10	56.83
		113	2014-09-25	425	0.75															2	22.59			2	22.59			4	45.18
		114	2014-09-25	550	0.95															10	68.9			2	13.78			12	82.68
		116	2014-09-25	613	0.985			2	11.92													1	5.96	4	23.85	1	5.96	8	47.7
		119	2014-09-25	454	0.75			4	42.29															6	63.44			10	105.73
	Session Summary			**605**	**10.3**	**0**	**0**	**8**	**4.62**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0.58**	**0**	**0**	**109**	**62.97**	**6**	**3.47**	**21**	**12.13**	**1**	**0.58**	**146**	**84.35**
Section Total All Samples				**39381**	**58.23**	**0**		**25**		**0**		**29**		**9**		**4**		**0**		**382**		**29**		**163**		**8**		**649**	
Section Average All Samples				**579**	**0.86**	**0**	**0**	**0**	**2.67**	**0**	**0**	**0**	**3.1**	**0**	**0.96**	**0**	**0.43**	**0**	**0**	**6**	**40.79**	**0**	**3.1**	**2**	**17.4**	**0**	**0.85**	**10**	**69.3**
Section Standard Error of Mean						**0**	**0**	**0.11**	**0.98**	**0**	**0**	**0.12**	**1.09**	**0.06**	**0.76**	**0.04**	**0.14**	**0**	**0**	**1.14**	**7.17**	**0.08**	**0.71**	**0.59**	**4.8**	**0.04**	**0.47**	**1.29**	**8.65**

Table D3 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/hr)																							
						Lake Chub		Largescale Sucker		Longnose Dace		Longnose Sucker		Northern Pikeminnow		Prickly Sculpin		Redside Shiner		Sculpin spp.		Slimy Sculpin		Sucker spp.		White Sucker		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 3	1	301	2014-08-28	1075	1.8							2	*3.72*											10	*18.6*			12	*22.33*
		302	2014-08-28	1005	1.9			2	*3.77*			2	*3.77*							1	*1.89*			16	*30.16*			21	*39.59*
		303	2014-08-28	879	1.45							8	*22.6*											14	*39.54*			22	*62.14*
		304	2014-08-28	902	1.35																			2	*5.91*			2	*5.91*
		305	2014-08-28	891	1.55			6	*15.64*			20	*52.13*							1	*2.61*			77	*200.72*	1	*2.61*	105	*273.7*
		306	2014-08-28	741	0.97							1	*5.01*							3	*15.03*							4	*20.03*
		307	2014-08-27	673	0.95			1	*5.63*			4	*22.52*											41	*230.86*			46	*259.01*
		308	2014-08-27	686	1.35							1	*3.89*											11	*42.76*			12	*46.65*
		309	2014-08-27	590	0.95																			1	*6.42*			1	*6.42*
		310	2014-08-27	725	1.2			1	*4.14*															9	*37.24*			10	*41.38*
		311	2014-08-27	720	1.25	1	*4*	3	*12*			5	*20*	1	*4*									21	*84*	1	*4*	32	*128*
		312	2014-08-27	825	1.17			3	*11.19*			6	*22.38*	1	*3.73*					3	*11.19*			14	*52.21*			27	*100.7*
		314	2014-08-28	679	0.975							3	*16.31*							11	*59.82*			7	*38.07*			21	*114.2*
		315	2014-08-27	1631	1.7							14	*18.18*							24	*31.16*	3	*3.9*	27	*35.06*			68	*88.29*
		316	2014-08-27	850	1.475							3	*8.61*							5	*14.36*			6	*17.23*			14	*40.2*
	Session Summary			**858**	**20**	**1**	***0.21***	**16**	***3.36***	**0**	***0***	**69**	***14.48***	**2**	***0.42***	**0**	***0***	**0**	***0***	**48**	***10.07***	**3**	***0.63***	**256**	***53.71***	**2**	***0.42***	**397**	***83.29***
Section 3	2	301	2014-09-05	1009	1.78			1	*2*			11	*22.05*							1	*2*			39	*78.17*			52	*104.23*
		302	2014-09-05	1130	1.9			4	*6.71*			15	*25.15*							1	*1.68*			67	*112.34*			87	*145.88*
		303	2014-09-05	832	1.45							8	*23.87*											62	*185.01*			70	*208.89*
		304	2014-09-05	655	1.35																			1	*4.07*			1	*4.07*
		305	2014-09-04	991	1.55			4	*9.37*			24	*56.25*	3	*7.03*					1	*2.34*			94	*220.31*			126	*295.3*
		306	2014-09-04	872	1															1	*4.13*	1	*4.13*	1	*4.13*			3	*12.39*
		307	2014-09-03	749	0.95							4	*20.24*											28	*141.66*			32	*161.9*
		308	2014-09-03	608	1.35							1	*4.39*											42	*184.21*			43	*188.6*
		309	2014-09-04	832	0.95			2	*9.11*			1	*4.55*							4	*18.22*			1	*4.55*			8	*36.44*
		310	2014-09-04	889	1.2							3	*10.12*							29	*97.86*	5	*16.87*	3	*10.12*	1	*3.37*	41	*138.36*
		311	2014-09-04	916	1.25			3	*9.43*			12	*37.73*	4	*12.58*					2	*6.29*			13	*40.87*	1	*3.14*	35	*110.04*
		312	2014-09-04	968	0.97			3	*11.5*			12	*46.01*	1	*3.83*					5	*19.17*			16	*61.34*			37	*141.86*
		314	2014-09-04	868	0.975			1	*4.25*			17	*72.31*							14	*59.55*	4	*17.02*	11	*46.79*			47	*199.93*
		315	2014-09-03	1145	1.7							20	*36.99*							31	*57.33*			43	*79.53*			94	*173.85*
		316	2014-09-03	864	1.475							4	*11.3*											14	*39.55*	1	*2.82*	19	*53.67*
	Session Summary			**889**	**19.9**	**0**	***0***	**18**	***3.66***	**0**	***0***	**132**	***26.86***	**8**	***1.63***	**0**	***0***	**0**	***0***	**89**	***18.11***	**10**	***2.03***	**435**	***88.52***	**3**	***0.61***	**695**	***141.43***
Section 3	3	301	2014-09-10	1221	1.8			4	*6.55*			14	*22.93*	1	*1.64*					1	*1.64*			35	*57.33*	2	*3.28*	57	*93.37*
		302	2014-09-10	1213	1.9			3	*4.69*			15	*23.43*	2	*3.12*					2	*3.12*			26	*40.61*	2	*3.12*	50	*78.1*
		303	2014-09-10	861	1.45			10	*28.84*			27	*77.86*	4	*11.53*									60	*173.01*			101	*291.24*
		304	2014-09-11	854	1.33																			2	*6.34*			2	*6.34*
		305	2014-09-10	884	1.55			3	*7.88*			10	*26.27*	3	*7.88*									18	*47.29*			34	*89.33*
		306	2014-09-11	807	1							2	*8.92*	1	*4.46*													3	*13.38*
		307	2014-09-11	495	0.95							5	*38.28*											28	*214.35*			33	*252.63*
		308	2014-09-12	748	1.35							4	*14.26*							8	*28.52*			15	*53.48*			27	*96.26*
		309	2014-09-12	728	0.95			1	*5.21*					1	*5.21*													2	*10.41*
		310	2014-09-12	824	1.2									1	*3.64*									14	*50.97*			15	*54.61*
		311	2014-09-12	669	1.25							2	*8.61*											8	*34.44*	1	*4.3*	11	*47.35*
		312	2014-09-12	1137	1.17							3	*8.12*	1	*2.71*									20	*54.12*			24	*64.95*
		314	2014-09-11	758	0.975							1	*4.87*											2	*9.74*			3	*14.61*
		315	2014-09-11	1330	1.7			2				11												27		1		41	
		316	2014-09-12	869	1.475							2	*5.62*							7	*19.66*			6	*16.85*			15	*42.13*
	Session Summary			**893**	**20.1**	**0**	***0***	**23**	***4.61***	**0**	***0***	**96**	***19.25***	**14**	***2.81***	**0**	***0***	**0**	***0***	**18**	***3.61***	**0**	***0***	**261**	***52.35***	**6**	***1.2***	**418**	***83.84***

Table D3 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/hr)																					
						Lake Chub		Largescale Sucker		Longnose Dace		Longnose Sucker		Northern Pikeminnow		Prickly Sculpin		Redside Shiner		Sculpin spp.		Slimy Sculpin		Sucker spp.		White Sucker		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 3	4	301	2014-09-17	989	1.8			4	8.09			8	16.18	2	4.04									36	72.8			50	101.11
		302	2014-09-17	870	1.9			1	2.18			2	4.36											9	19.6			12	26.13
		303	2014-09-18	964	1.45							2	5.15											53	136.5			55	141.65
		304	2014-09-18	843	1.35			1	3.16											1	3.16			1	3.16			3	9.49
		305	2014-09-18	1146	1.55			2	4.05			4	8.11											47	95.25			53	107.41
		306	2014-09-18	809	1							1	4.45							1	4.45			6	26.7			8	35.6
		307	2014-09-19	624	0.95																			1	6.07			1	6.07
		308	2014-09-19	618	1.35			1	4.31															1	4.31			2	8.63
		310	2014-09-19	755	1.2							2	7.95											4	15.89			6	23.84
		311	2014-09-18	665	1.25			2	8.66			2	8.66	2	8.66									49	212.21			55	238.2
		312	2014-09-19	799	1.17			2	7.7			1	3.85											22	84.72			25	96.27
		314	2014-09-18	947	0.975			2	7.8			4	15.6							3	11.7			14	54.59			23	89.68
		315	2014-09-18	1169	1.7			3	5.43			12	21.74							5	9.06	1	1.81	67	121.37			88	159.41
		316	2014-09-19	861	1.475							2	5.67							2	5.67			10	28.35			14	39.69
	Session Summary			**861**	**19.1**	**0**	**0**	**18**	**3.94**	**0**	**0**	**40**	**8.76**	**4**	**0.88**	**0**	**0**	**0**	**0**	**12**	**2.63**	**1**	**0.22**	**320**	**70.05**	**0**	**0**	**395**	**86.47**
Section 3	5	301	2014-09-23	1006	1.8							2	3.98											5	9.94			7	13.92
		302	2014-09-23	928	1.9			1	2.04			2	4.08									1	2.04	11	22.46			15	30.63
		303	2014-09-23	981	1.45							1	2.53							2	5.06			4	10.12			7	17.72
		304	2014-09-23	859	1.35							1	3.1							1	3.1			2	6.21			4	12.42
		305	2014-09-23	1097	1.55			3	6.35			1	2.12							16	33.88	1	2.12	35	74.1			56	118.56
		306	2014-09-23	901	1																			6	23.97			6	23.97
		307	2014-09-23	640	0.95															3	17.76			2	11.84			5	29.61
		308	2014-09-23	759	1.35															12	42.16	2	7.03	4	14.05			18	63.24
		310	2014-09-23	806	1.2	1	3.72	1	3.72			1	3.72							2	7.44			7	26.05			12	44.67
		311	2014-09-23	681	1.25	1	4.23	3	12.69			1	4.23	3	12.69									9	38.06			17	71.89
		312	2014-09-23	960	1.17																	1	3.21	9	28.85			10	32.05
		314	2014-09-23	917	0.975							2	8.05											5	20.13			7	28.19
		315	2014-09-23	1232	1.7			2	3.44			5	8.59	1	1.72					23	39.53	2	3.44	21	36.1			54	92.82
		316	2014-09-23	840	1.475																			4	11.62			4	11.62
	Session Summary			**900**	**19.1**	**2**	**0.42**	**10**	**2.09**	**0**	**0**	**16**	**3.35**	**4**	**0.84**	**0**	**0**	**0**	**0**	**59**	**12.36**	**7**	**1.47**	**124**	**25.97**	**0**	**0**	**222**	**46.49**
Section 3	6	301	2014-09-26	1224	1.8							1	1.63							38	62.09	2	3.27	1	1.63			42	68.63
		302	2014-09-26	989	1.9															1	1.92			2	3.83			3	5.75
		303	2014-09-26	914	1.45							2	5.43							5	13.58	1	2.72	13	35.31			21	57.04
		304	2014-09-26	858	1.35			1	3.11											2	6.22	1	3.11					4	12.43
		305	2014-09-26	943	1.55			1	2.46			1	2.46							3	7.39	1	2.46	17	41.87			23	56.65
		306	2014-09-26	846	1															1	4.26							1	4.26
		307	2014-10-04	602	0.95															1	6.29							1	6.29
		310	2014-10-04	799	1.2							1	3.75							1	3.75							2	7.51
		311	2014-10-04	751	1.25							1	3.83											1	3.83			2	7.67
		312	2014-10-04	748	0.92																			1	5.23			1	5.23
		314	2014-09-26	832	0.975															15	66.57							15	66.57
		315	2014-10-04	1087	1.7			2	3.9			3	5.84							1	1.95	3	5.84	12	23.38			21	40.91
		316	2014-10-04	771	1.475															2	6.33			1	3.17			3	9.5
	Session Summary			**874**	**17.5**	**0**	**0**	**4**	**0.94**	**0**	**0**	**9**	**2.12**	**0**	**0**	**0**	**0**	**0**	**0**	**70**	**16.48**	**8**	**1.88**	**48**	**11.3**	**0**	**0**	**139**	**32.72**
Section Total All Samples				**75628**	**115.7**	**3**		**89**		**0**		**362**		**32**		**0**		**0**		**296**		**29**		**1444**		**11**		**2266**	
Section Average All Samples				**879**	**1.35**	**0**	**0.11**	**1**	**3.15**	**0**	**0**	**4**	**12.81**	**0**	**1.13**	**0**	**0**	**0**	**0**	**3**	**10.48**	**0**	**1.03**	**17**	**51.11**	**0**	**0.39**	**26**	**80.21**
Section Standard Error of Mean						**0.02**	**0.08**	**0.18**	**0.51**	**0**	**0**	**0.64**	**1.71**	**0.1**	**0.3**	**0**	**0**	**0**	**0**	**0.79**	**2.01**	**0.1**	**0.31**	**2.17**	**6.36**	**0.04**	**0.11**	**2.98**	**7.97**

Table D3 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/hr): Lake Chub		Largescale Sucker		Longnose Dace		Longnose Sucker		Northern Pikeminnow		Prickly Sculpin		Redside Shiner		Sculpin spp.		Slimy Sculpin		Sucker spp.		White Sucker		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 5	1	501	2014-08-29	529	0.985							3	20.73							1	6.91			13	89.82			17	117.45
		502	2014-08-29	597	0.95							2	12.7							1	6.35			6	38.09			9	57.13
		503	2014-08-29	541	0.82																	1	8.12	8	64.92			9	73.04
		505	2014-08-29	743	1							9	43.61	1	4.85					2	9.69			25	121.13	1	4.85	38	184.12
		506	2014-08-29	898	1			2	8.02			12	48.11							2	8.02			16	64.14			32	128.29
		507	2014-08-29	787	0.78							4	23.46											9	52.78			13	76.24
		508	2014-08-30	806	0.925							3	14.49											17	82.09			20	96.57
		509	2014-08-30	564	0.975							6	39.28							1	6.55			15	98.2			22	144.03
		510	2014-08-30	769	1.13			1	4.14			7	29							4	16.57			17	70.43			29	120.14
		511	2014-08-30	450	0.72							6	66.67							1	11.11			9	100			16	177.78
		512	2014-08-30	952	1.23							4	12.3											13	39.97			17	52.26
		513	2014-08-30	674	0.77															2	13.87	1	6.94	3	20.81			6	41.62
		514	2014-08-30	480	0.56							2	26.79							1	13.39	2	26.79	7	93.75			12	160.71
		515	2014-08-30	683	0.95															2	11.1			4	22.19			6	33.29
	Session Summary			**677**	**12.8**	**0**	**0**	**3**	**1.25**	**0**	**0**	**58**	**24.1**	**1**	**0.42**	**0**	**0**	**0**	**0**	**17**	**7.06**	**4**	**1.66**	**162**	**67.3**	**1**	**0.42**	**246**	**102.2**
Section 5	2	501	2014-09-06	497	0.995							5	36.4							1	7.28			50	363.99			56	407.67
		502	2014-09-06	592	0.95							15	96.02							6	38.41	2	12.8	56	358.46			79	505.69
		503	2014-09-06	520	0.82			2	16.89	1	8.44	8	67.54							3	25.33			32	270.17			46	388.37
		504	2014-09-06	478	0.85							1	8.86							1	8.86			6	53.16	1	8.86	9	79.74
		505	2014-09-06	610	1			1	5.9			13	76.72											22	129.84			36	212.46
		506	2014-09-06	963	1			5	18.69			22	82.24											62	231.78	2	7.48	91	340.19
		507	2014-09-06	432	0.78	1	10.68					1	10.68							1	10.68			10	106.84			13	138.89
		508	2014-09-07	711	0.925							11	60.21											13	71.16			24	131.37
		509	2014-09-06	637	0.975			4	23.19			4	23.19											46	266.63			54	313.01
		510	2014-09-07	895	1.13			6	21.36			15	53.39	1	3.56									31	110.35			53	188.66
		511	2014-09-07	556	0.68			1	9.52			8	76.17											9	85.7			18	171.39
		512	2014-09-07	810	1.28			1	3.47			10	34.72											21	72.92	3	10.42	35	121.53
		513	2014-09-07	615	0.77			2	15.2			5	38.01							2	15.2			30	228.06			39	296.48
		514	2014-09-07	457	0.56			2	28.13			5	70.33											30	422.01			37	520.48
		515	2014-09-07	645	0.97			2	11.51	1	5.75	8	46.03											19	109.33			30	172.62
	Session Summary			**628**	**13.7**	**1**	**0.42**	**26**	**10.88**	**2**	**0.84**	**131**	**54.81**	**1**	**0.42**	**0**	**0**	**0**	**0**	**14**	**5.86**	**2**	**0.84**	**437**	**182.85**	**6**	**2.51**	**620**	**259.43**
Section 5	3	501	2014-09-13	552	0.995			1	6.55															16	104.87			17	111.43
		502	2014-09-13	545	0.95																			18	125.16			18	125.16
		503	2014-09-13	491	0.82							1	8.94											12	107.3			13	116.24
		505	2014-09-13	577	1			1	6.24			6	37.44	1	6.24									33	205.89	2	12.48	43	268.28
		506	2014-09-13	948	1			1	3.8			5	18.99											25	94.94	2	7.59	33	125.32
		507	2014-09-13	761	0.78			1	6.06			1	6.06											6	36.39			8	48.52
		508	2014-09-14	671	0.925							7	40.6							1	5.8			38	220.41			46	266.81
		509	2014-09-13	546	0.975							2	13.52											20	135.25	1	6.76	23	155.54
		510	2014-09-14	672	1.13			1	4.74			4	18.96	1	4.74									28	132.74			34	161.19
		511	2014-09-14	454	0.72			1	11.01			5	55.07											23	253.3			29	319.38
		512	2014-09-14	609	1.26							2	9.38											13	60.99			15	70.37
		513	2014-09-14	553	0.77							1	8.45							2	16.91			15	126.82			18	152.18
		514	2014-09-14	449	0.56							5								11		2		16				34	
		515	2014-09-14	660	0.97							1	5.62											1	5.62			2	11.25
	Session Summary			**606**	**12.9**	**0**	**0**	**6**	**2.76**	**0**	**0**	**40**	**18.42**	**2**	**0.92**	**0**	**0**	**0**	**0**	**14**	**6.45**	**2**	**0.92**	**264**	**121.57**	**5**	**2.3**	**333**	**153.35**

Table D3 Continued.

Section	Session	Site	Date	Time Sampled (s)	Length Sampled (km)	Number Caught (CPUE = no. fish/km/hr)																									
						Lake Chub		Largescale Sucker		Longnose Dace		Longnose Sucker		Northern Pikeminnow		Prickly Sculpin		Redside Shiner		Sculpin spp.		Slimy Sculpin		Sucker spp.		White Sucker		All Species	
						No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE
Section 5	4	502	2014-09-20	576	0.95																			6	39.47			6	39.47
		503	2014-09-20	555	0.82							1	7.91							1	7.91			2	15.82			4	31.64
		504	2014-09-20	643	0.85																	1	6.59					1	6.59
		505	2014-09-20	950	1							8	30.32											34	128.84			42	159.16
		506	2014-09-20	1115	1			4	12.91			16	51.66											82	264.75	1	3.23	103	332.56
		507	2014-09-20	414	0.78																			5	55.74			5	55.74
		508	2014-09-21	825	0.925			2	9.43			14	66.04	1	4.72					10	47.17	1	4.72	84	396.27	5	23.59	117	551.94
		509	2014-09-20	569	0.975							3	19.47											9	58.4			12	77.87
		510	2014-09-21	733	1.13							1	4.35											18	78.23			19	82.58
		511	2014-09-21	414	0.72							1	12.08											7	84.54			8	96.62
		512	2014-09-21	771	1.28							1	3.65											8	29.18	1	3.65	10	36.48
		513	2014-09-21	577	0.77							2	16.21											13	105.34			15	121.54
		514	2014-09-21	465	0.56							1	13.82							28	387.1	1	13.82					30	414.75
		515	2014-09-21	736	0.97																			1	5.04			1	5.04
	Session Summary			**667**	**12.7**	**0**	**0**	**6**	**2.55**	**0**	**0**	**48**	**20.4**	**1**	**0.42**	**0**	**0**	**0**	**0**	**39**	**16.57**	**3**	**1.27**	**269**	**114.32**	**7**	**2.97**	**373**	**158.52**
Section 5	5	501	2014-09-24	450	0.995			1	8.04			2	16.08							13	104.52							16	128.64
		502	2014-09-24	670	0.95																			2	11.31			2	11.31
		503	2014-09-24	572	0.82																			1	7.68			1	7.68
		504	2014-09-24	675	0.85																			2	12.55			2	12.55
		505	2014-09-24	622	1			2	11.58			4	23.15							1	5.79			26	150.48			33	191
		506	2014-09-24	938	1			4	15.35			21	80.6											73	280.17			98	376.12
		507	2014-09-24	432	0.78							1	10.68											15	160.26			16	170.94
		508	2014-09-24	780	0.925			2	9.98			16	79.83	1	4.99					2	9.98	1	4.99	23	114.76			45	224.53
		509	2014-09-24	594	0.975			1	6.22			1	6.22											26	161.62			28	174.05
		510	2014-09-24	827	1.13			1	3.85			2	7.7	1	3.85					1	3.85			25	96.31			30	115.57
		511	2014-09-24	422	0.72			1	11.85			1	11.85							1	11.85			7	82.94			10	118.48
		512	2014-09-24	839	1.28			2	6.7															18	60.34			20	67.04
		513	2014-09-24	628	0.77													1	7.44	3	22.33							4	29.78
		514	2014-09-24	526	0.56							1	12.22							51	623.3	3	36.66	11	134.44			66	806.63
		515	2014-09-24	639	0.97			2	11.62			23	133.59	1	5.81									47	272.98			73	423.99
	Session Summary			**641**	**13.7**	**0**	**0**	**16**	**6.56**	**0**	**0**	**72**	**29.52**	**3**	**1.23**	**0**	**0**	**1**	**0.41**	**72**	**29.52**	**4**	**1.64**	**276**	**113.14**	**0**	**0**	**444**	**182.01**
Section 5	6	505	2014-10-03	587	1																			1	6.13	1	6.13	2	12.27
		506	2014-10-03	894	1							1	4.03															1	4.03
		507	2014-10-03	377	0.78							1	12.24											1	12.24			2	24.48
		508	2014-10-03	530	0.925			1	7.34			5	36.72	1	7.34					3	22.03			47	345.13			57	418.56
		510	2014-10-03	603	1.13							1	5.28							2	10.57			2	10.57			5	26.42
		511	2014-10-03	214	0.72															1	23.36							1	23.36
		513	2014-10-03	535	0.77																			1	8.74			1	8.74
		514	2014-10-03	356	0.56															1	18.06							1	18.06
		515	2014-10-03	510	0.97															1	7.28			2	14.55	1	7.28	4	29.11
	Session Summary			**512**	**7.9**	**0**	**0**	**1**	**0.89**	**0**	**0**	**8**	**7.12**	**1**	**0.89**	**0**	**0**	**0**	**0**	**8**	**7.12**	**0**	**0**	**54**	**48.06**	**2**	**1.78**	**74**	**65.86**
Section Total All Samples				**50942**	**73.645**	**1**		**58**		**2**		**357**		**9**		**0**		**1**		**164**		**15**		**1462**		**21**		**2090**	
Section Average All Samples				**629**	**0.91**	**0**	**0.08**	**1**	**4.51**	**0**	**0.16**	**4**	**27.74**	**0**	**0.7**	**0**	**0**	**0**	**0.08**	**2**	**12.75**	**0**	**1.17**	**18**	**113.62**	**0**	**1.63**	**26**	**162.43**
Section Standard Error of Mean						**0.01**	**0.13**	**0.14**	**0.71**	**0.02**	**0.13**	**0.61**	**3.18**	**0.04**	**0.18**	**0**	**0**	**0.01**	**0.09**	**0.74**	**9.19**	**0.06**	**0.7**	**2.08**	**11.48**	**0.09**	**0.41**	**2.81**	**17.42**
All Sections Total All Samples				**165951**	**247.575**	**4**	**0**	**172**	**0.02**	**2**	**0**	**748**	**0.07**	**50**	**0**	**4**	**0**	**1**	**0**	**842**	**0.07**	**73**	**0.01**	**3069**	**0.27**	**40**	**0**	**5005**	**0.44**
All Sections Average All Samples						**0**	**0.08**	**1**	**3.54**	**0**	**0.04**	**3**	**15.4**	**0**	**1.03**	**0**	**0.08**	**0**	**0.02**	**4**	**17.34**	**0**	**1.5**	**13**	**63.19**	**0**	**0.82**	**21**	**103.06**
All Sections Standard Error of Mean						**0.01**	**0.05**	**0.09**	**0.42**	**0.01**	**0.04**	**0.34**	**1.42**	**0.04**	**0.25**	**0.01**	**0.04**	**0**	**0.03**	**0.52**	**3.93**	**0.05**	**0.34**	**1.17**	**5.34**	**0.04**	**0.2**	**1.58**	**7.62**

Table D4 Summary of the number (N) of fish captured and recaptured in sampled sections of the Peace River, 25 August to 04 October 2014.

Species Name	Section	Session	N Captured	N Marked	N Recaptured (within year)	N Recaptured (between years)
Arctic Grayling	Section 1	1	0	0	-	0
		2	0	0	0	0
		3	0	0	0	0
		4	0	0	0	0
		5	0	0	0	0
		6	0	0	0	0
	Section 1 subtotal		0	0	0	0
	Section 3	1	2	2	-	0
		2	0	0	0	0
		3	2	2	0	0
		4	1	1	0	0
		5	1	0	1	0
		6	0	0	0	0
	Section 3 subtotal		6	5	1	0
	Section 5	1	1	1	-	0
		2	1	1	0	0
		3	1	1	0	0
		4	1	1	0	0
		5	2	1	1	0
		6	0	0	0	0
	Section 5 subtotal		6	5	1	0
Arctic Grayling Total			12	10	2	0
Bull Trout	Section 1	1	6	5	-	1
		2	8	6	1	1
		3	15	14	1	0
		4	8	7	0	1
		5	9	5	4	0
		6	7	7	0	0
	Section 1 subtotal		53	44	6	3
	Section 3	1	20	16	-	4
		2	17	13	2	2
		3	20	16	3	1
		4	18	11	4	3
		5	11	9	1	1
		6	4	1	2	1
	Section 3 subtotal		90	66	12	12
	Section 5	1	5	4	-	1
		2	4	2	2	0
		3	5	4	1	0
		4	4	2	2	0
		5	4	4	0	0
		6	2	1	0	1
	Section 5 subtotal		24	17	5	2
Bull Trout Total			167	127	23	17

Continued...

Table D4 Concluded.

Species Name	Section	Session	N Captured	N Marked	N Recaptured (within year)	N Recaptured (between years)
Mountain Whitefish	Section 1	1	253	205	-	44
		2	290	243	6	37
		3	371	279	12	78
		4	236	175	13	47
		5	338	254	26	58
		6	285	229	18	38
	Section 1 subtotal		1773	1385	75	302
	Section 3	1	616	498	-	98
		2	552	476	10	63
		3	670	539	22	105
		4	502	421	17	64
		5	497	408	23	66
		6	386	330	13	43
	Section 3 subtotal		3223	2672	85	439
	Section 5	1	438	384	-	52
		2	475	413	7	53
		3	493	431	10	52
		4	540	485	15	37
		5	485	414	20	51
		6	203	177	7	19
	Section 5 subtotal		2634	2304	59	264
Mountain Whitefish Total			7630	6361	219	1005

APPENDIX E

Life History Information

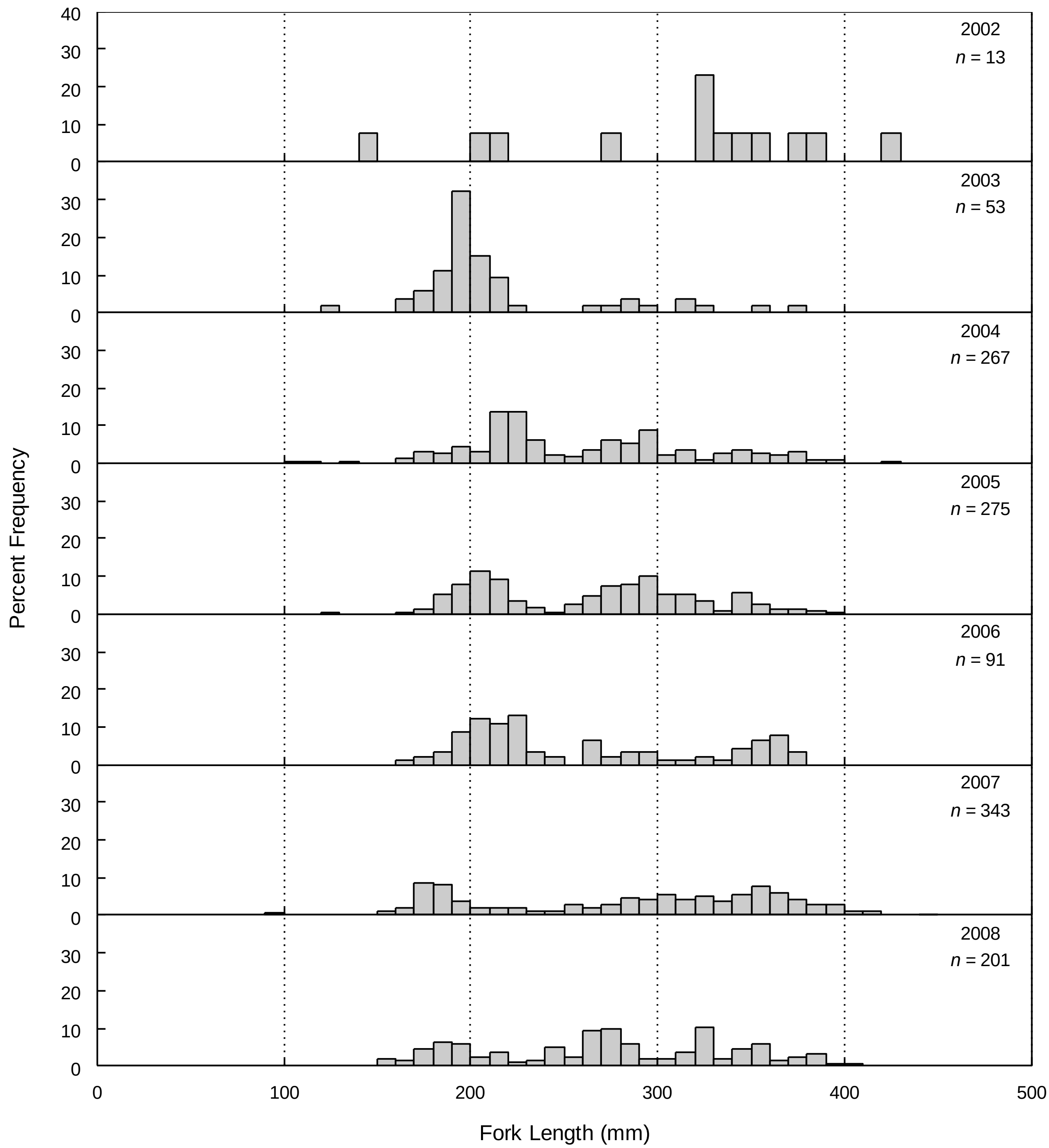


Figure E1 Length-frequency distributions by year for Arctic Grayling captured by boat electroshocking in sampled sections of Peace River, 2002 to 2014.

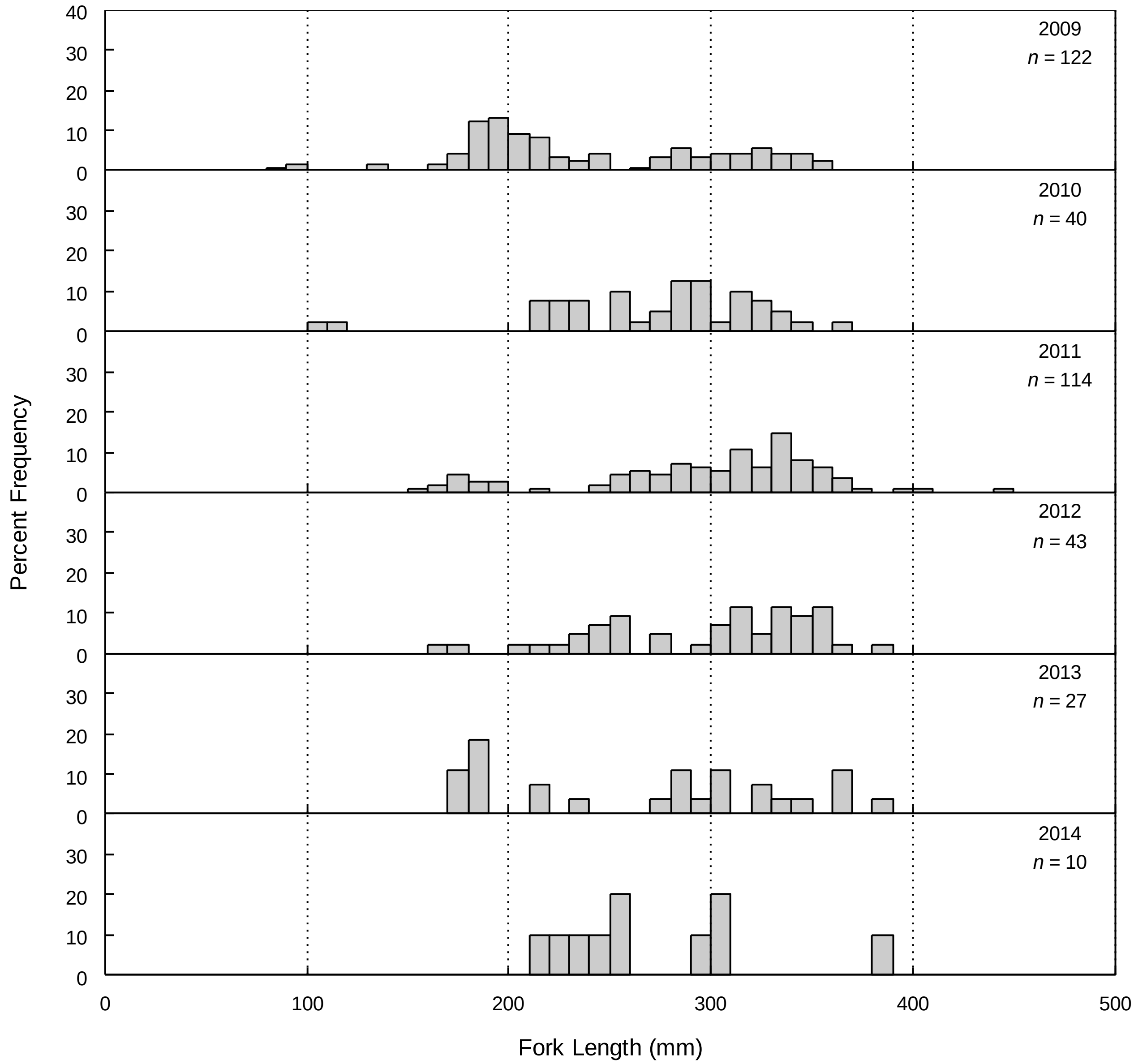


Figure E1 Concluded.

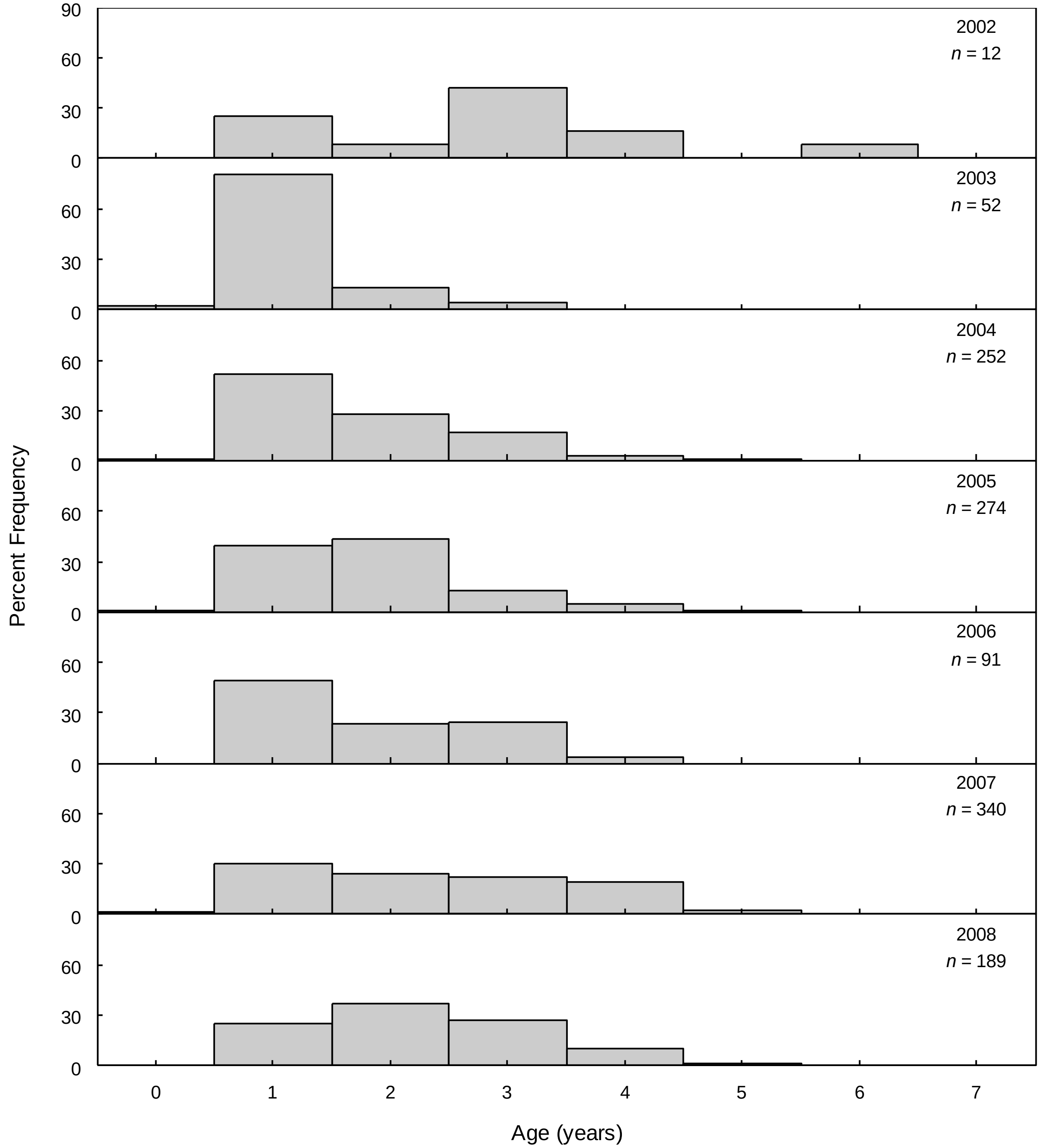


Figure E2 *Age-frequency distributions by year for Arctic Grayling captured by boat electroshocking in sampled sections of Peace River, 2002 to 2014.*

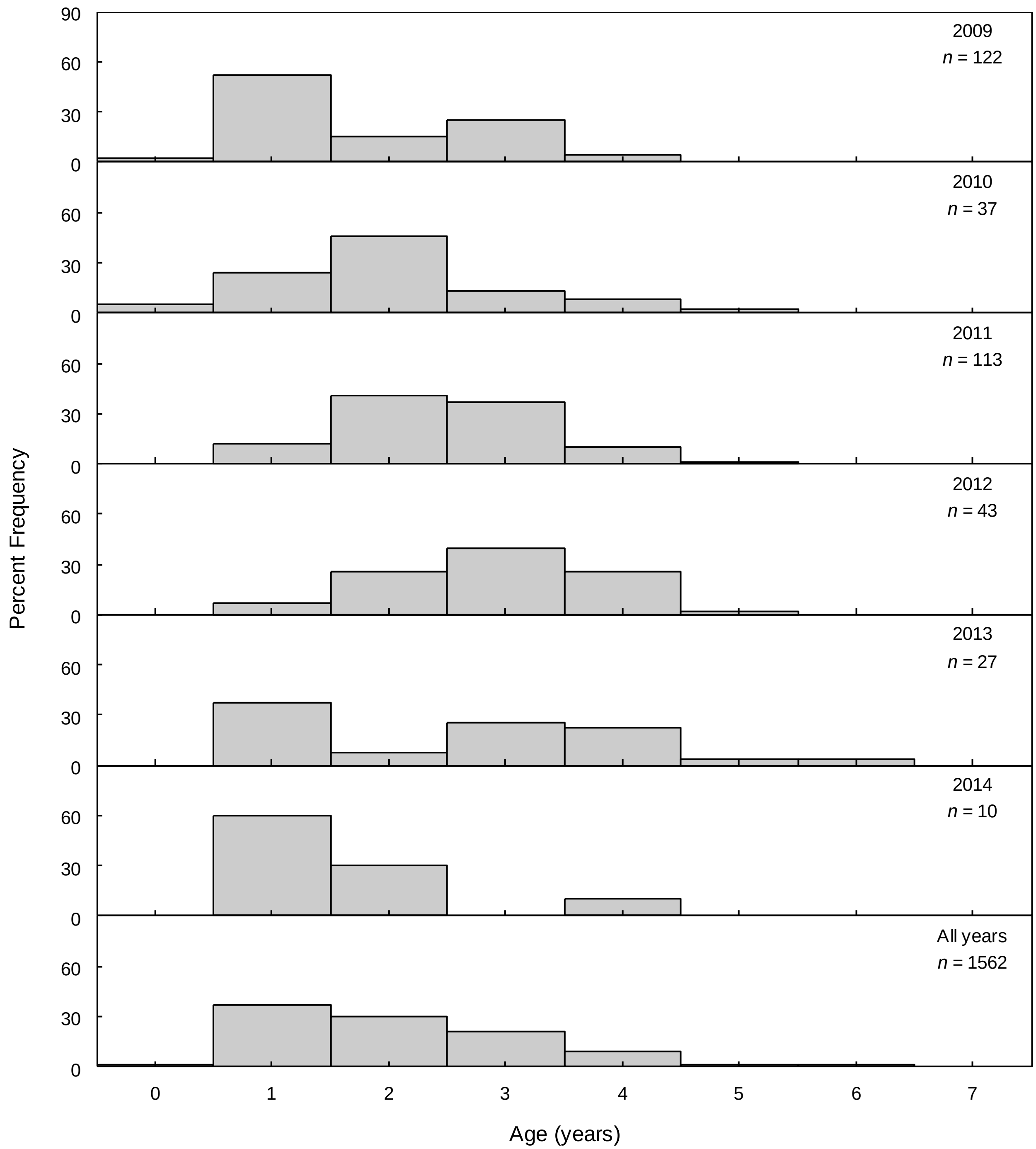


Figure E2 Concluded.

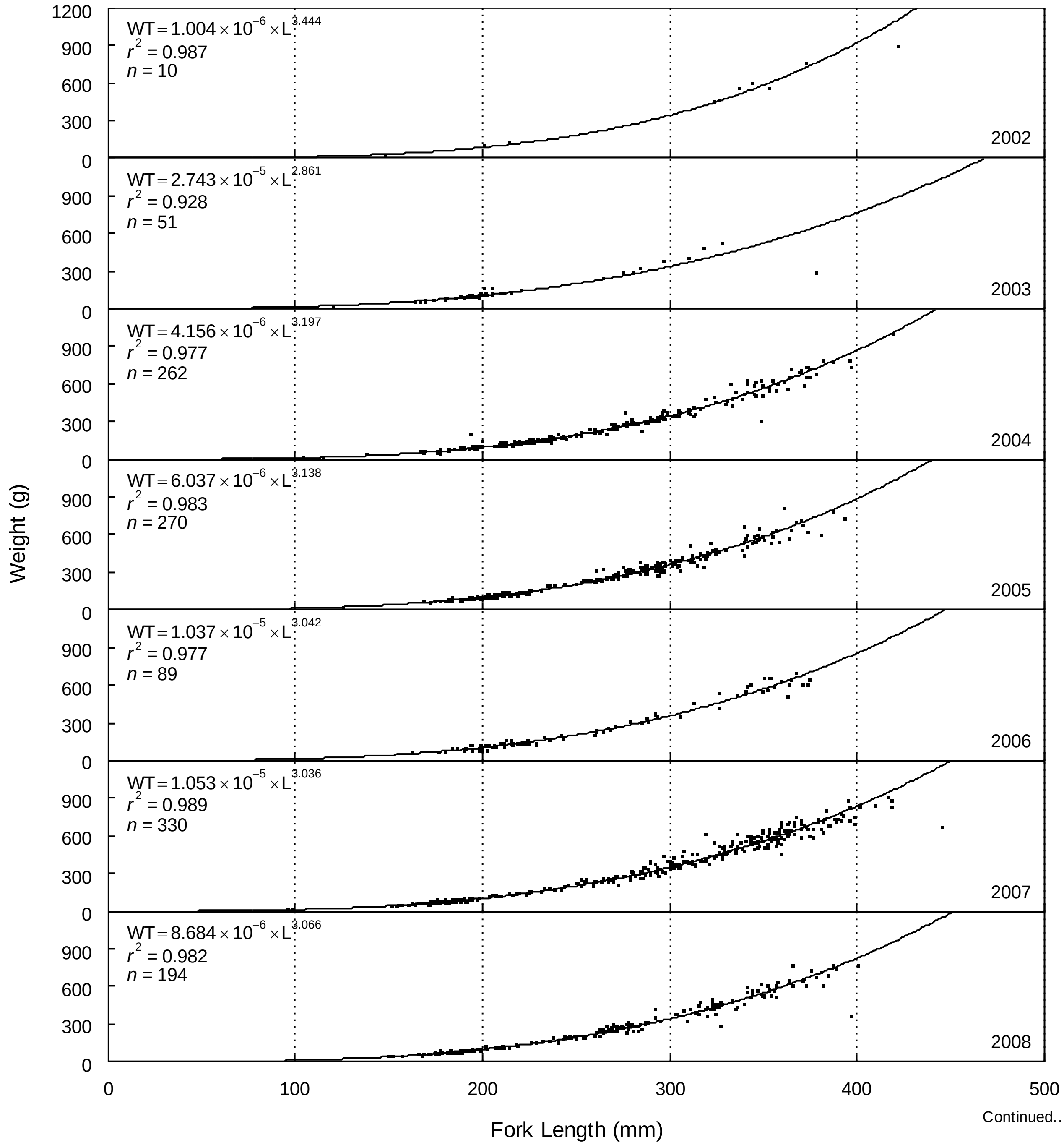


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Figure E3 Length-weight regressions for Arctic Grayling captured by boat electroshocking in sampled sections of the Peace River, 2002 to 2014.

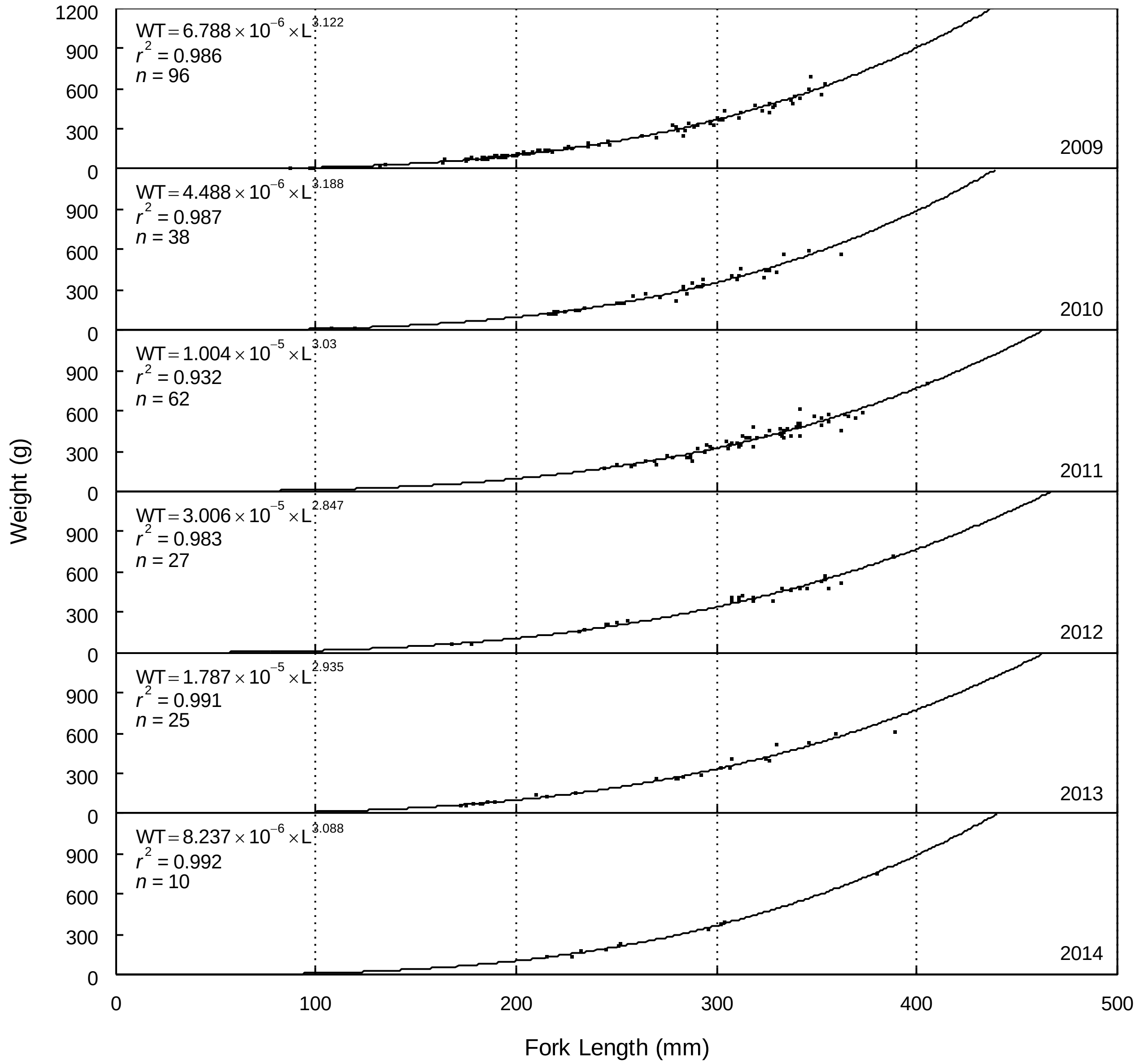

Figure E3 Concluded.

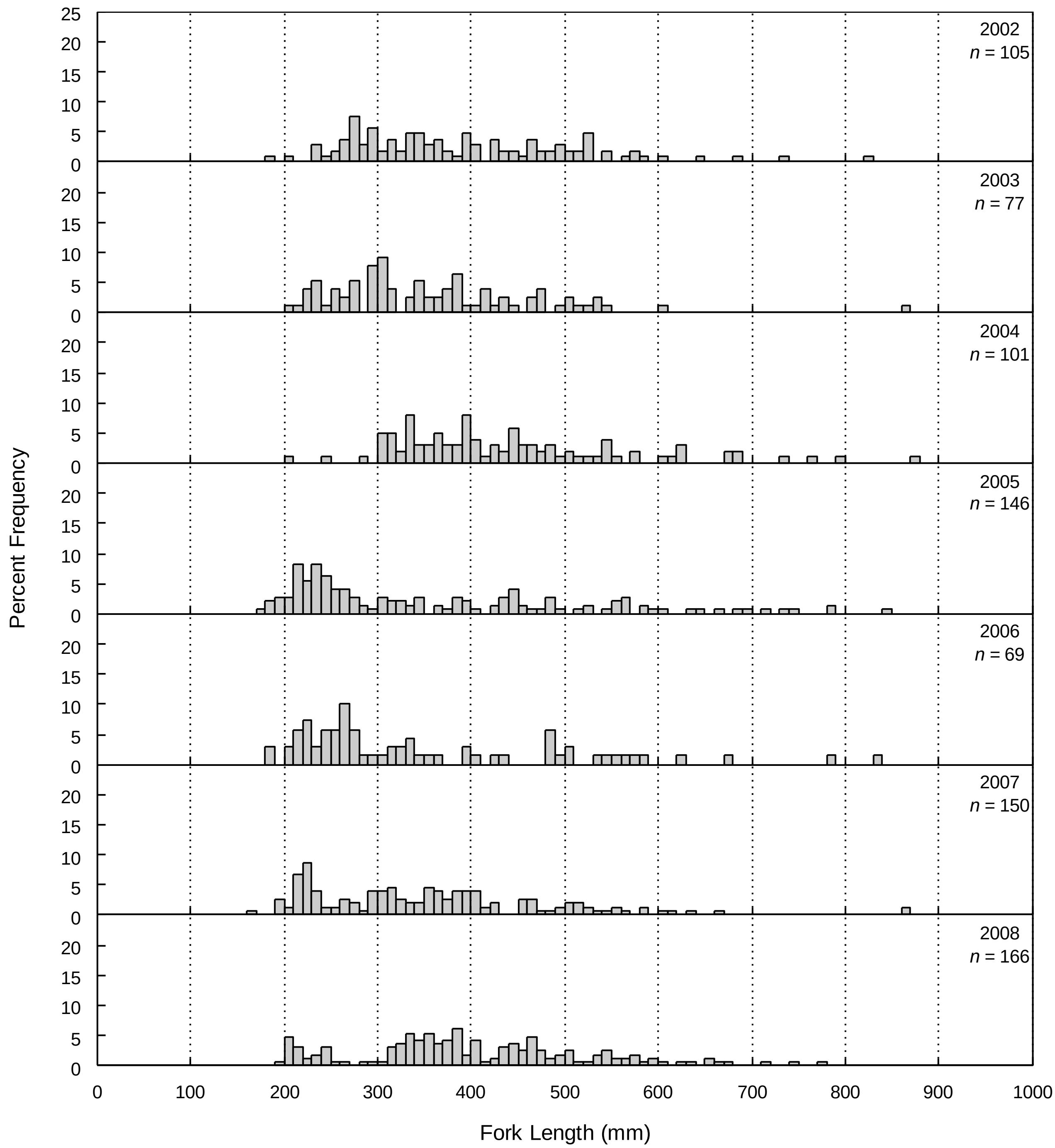

Figure E4 Length-frequency distributions by year for Bull Trout captured by boat electroshocking in sampled sections of Peace River, 2002 to 2014.

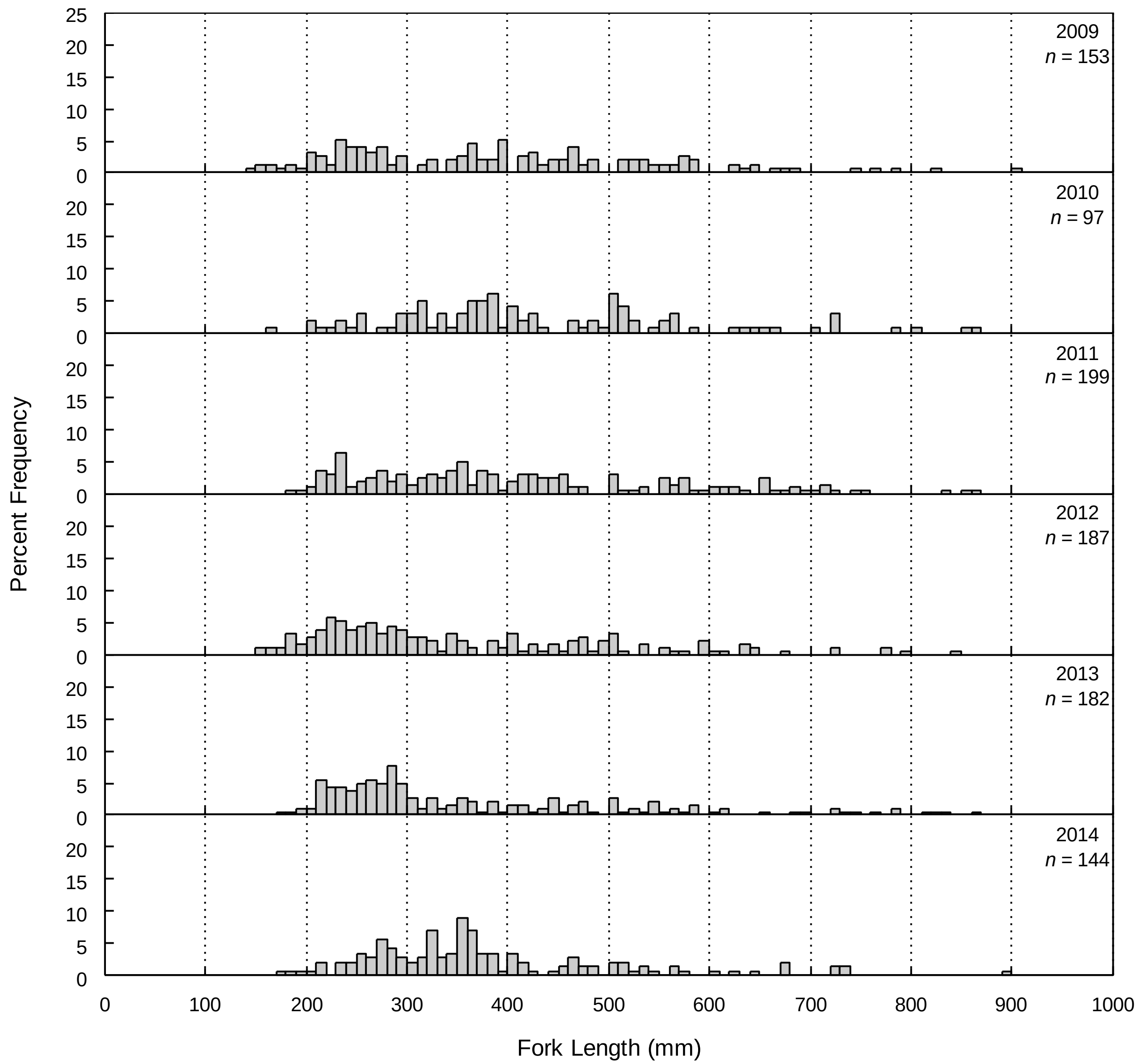

Figure E4 Concluded.

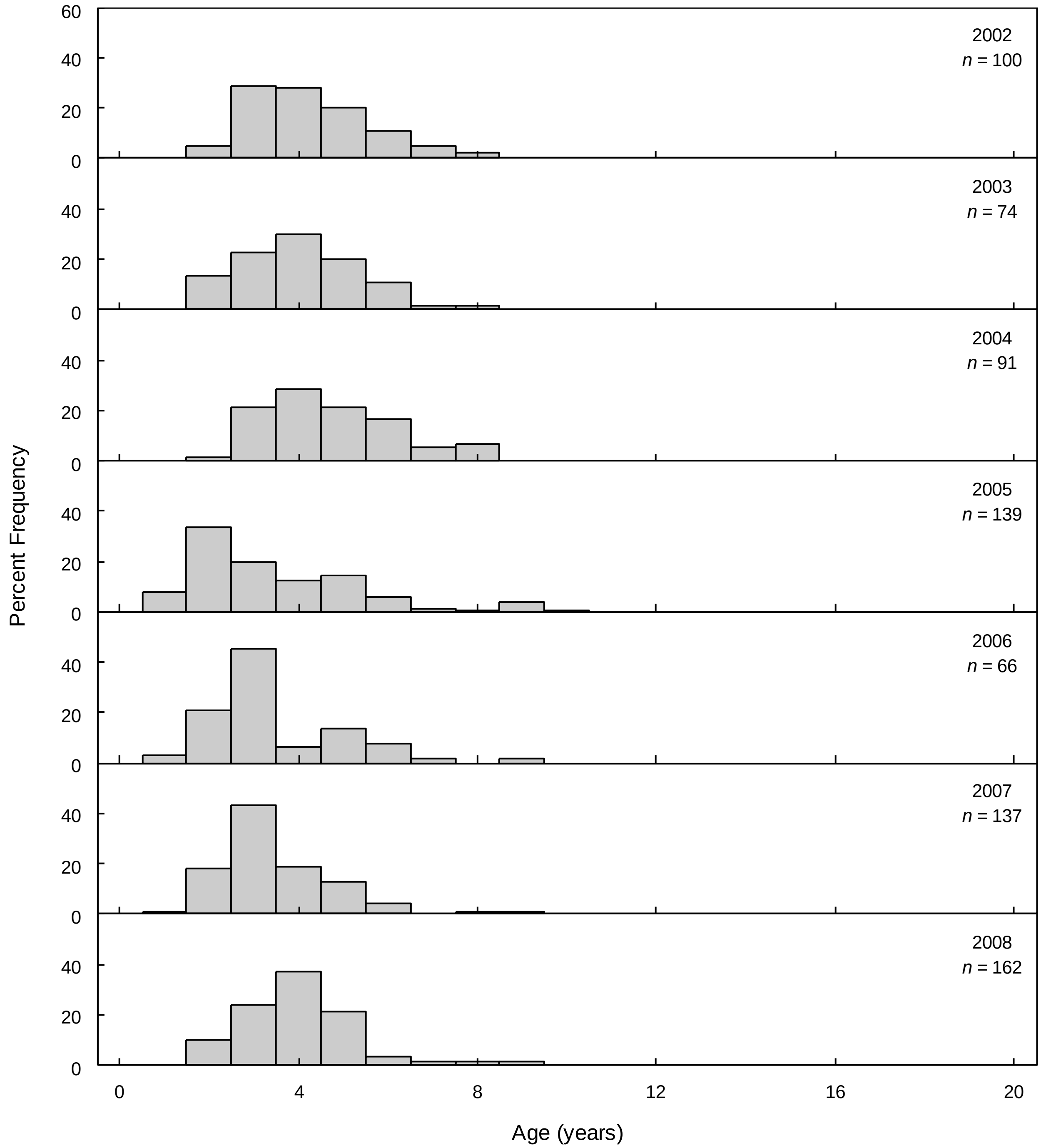

Figure E5 Age-frequency distributions by year for Bull Trout captured by boat electroshocking in sampled sections of Peace River, 2002 to 2014.

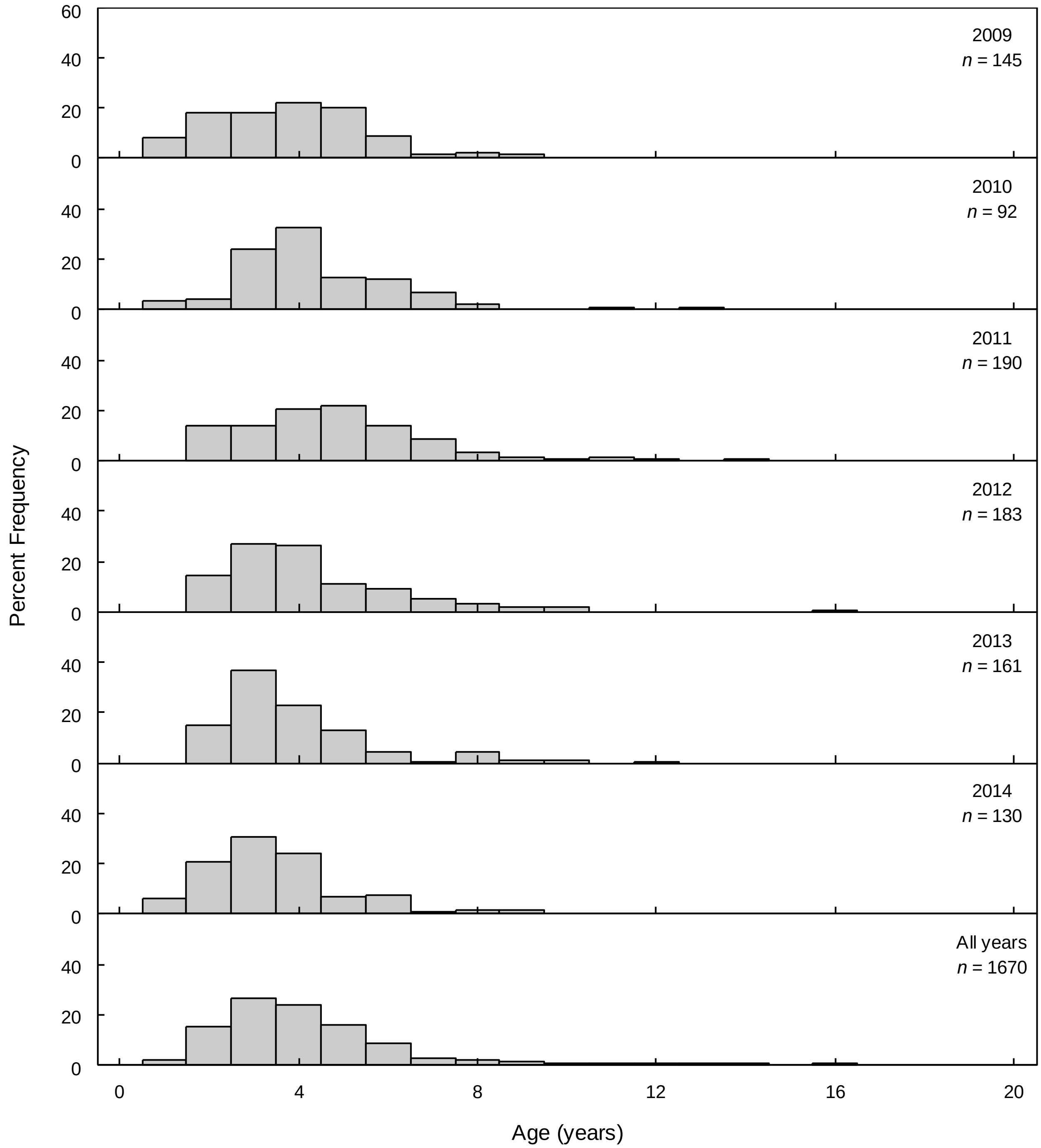

Figure E5 Concluded.

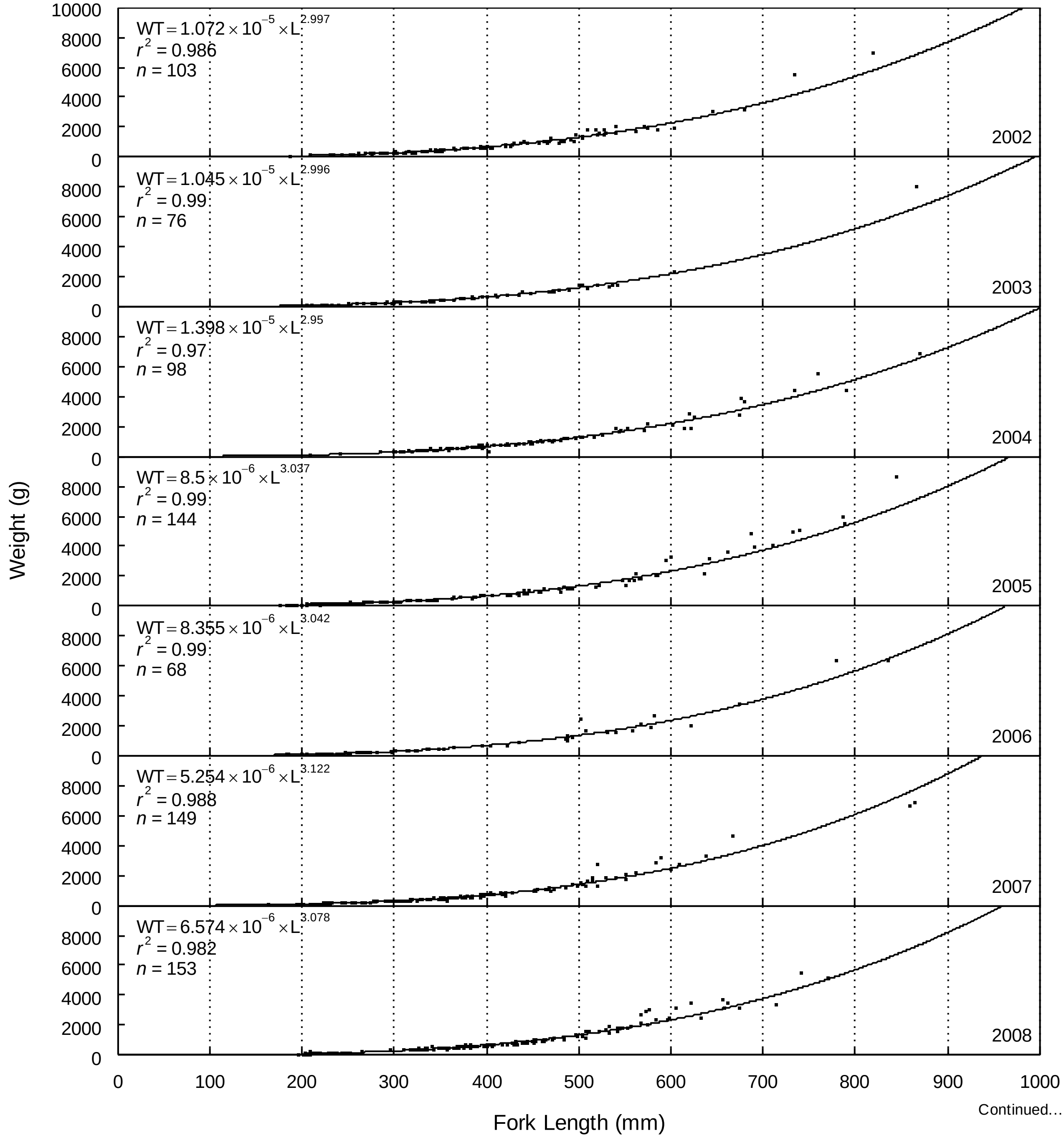

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Figure E6 Length-weight regressions for Bull Trout captured by boat electroshocking in sampled sections of the Peace River, 2002 to 2014.

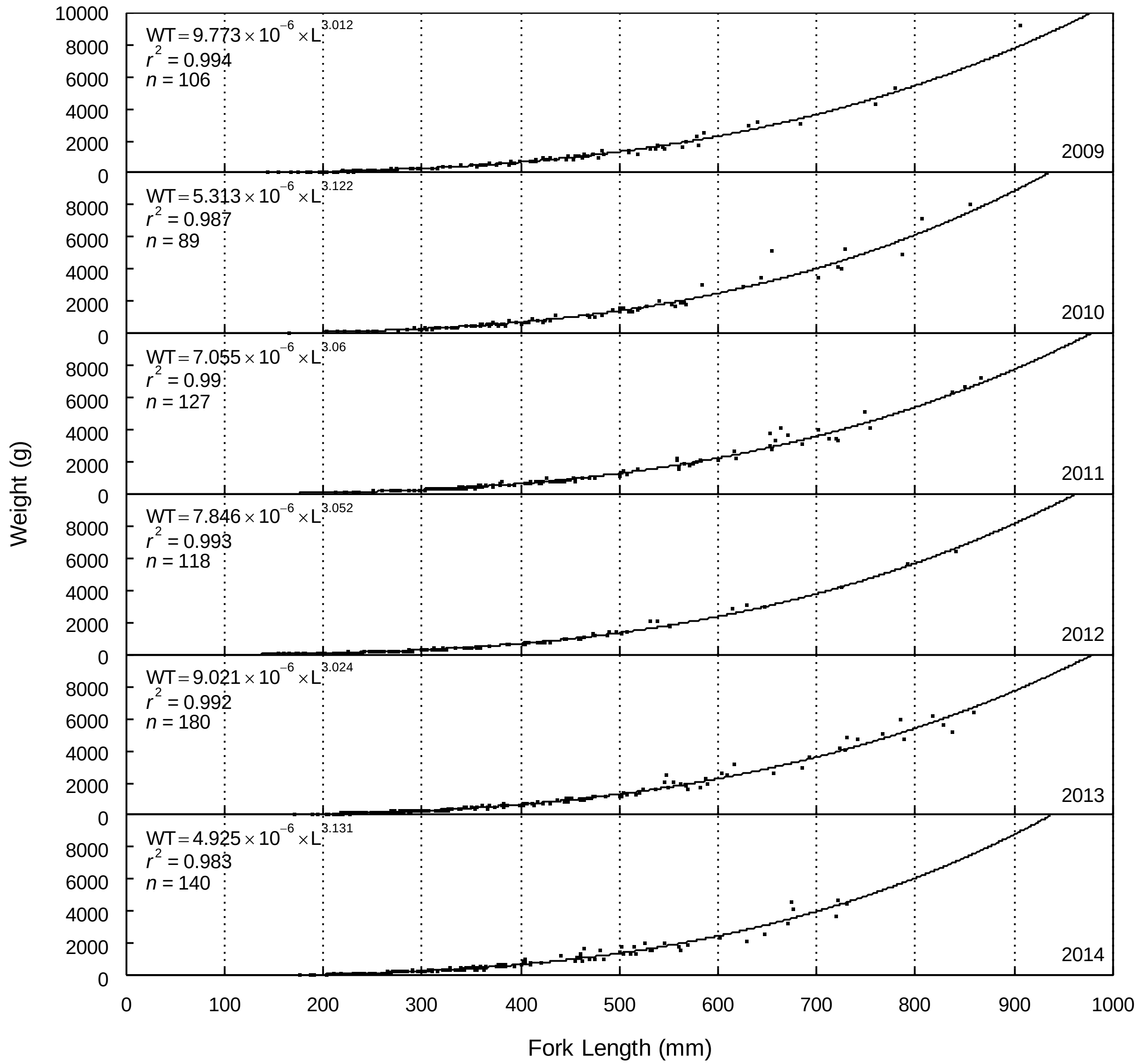


Figure E6 Concluded.

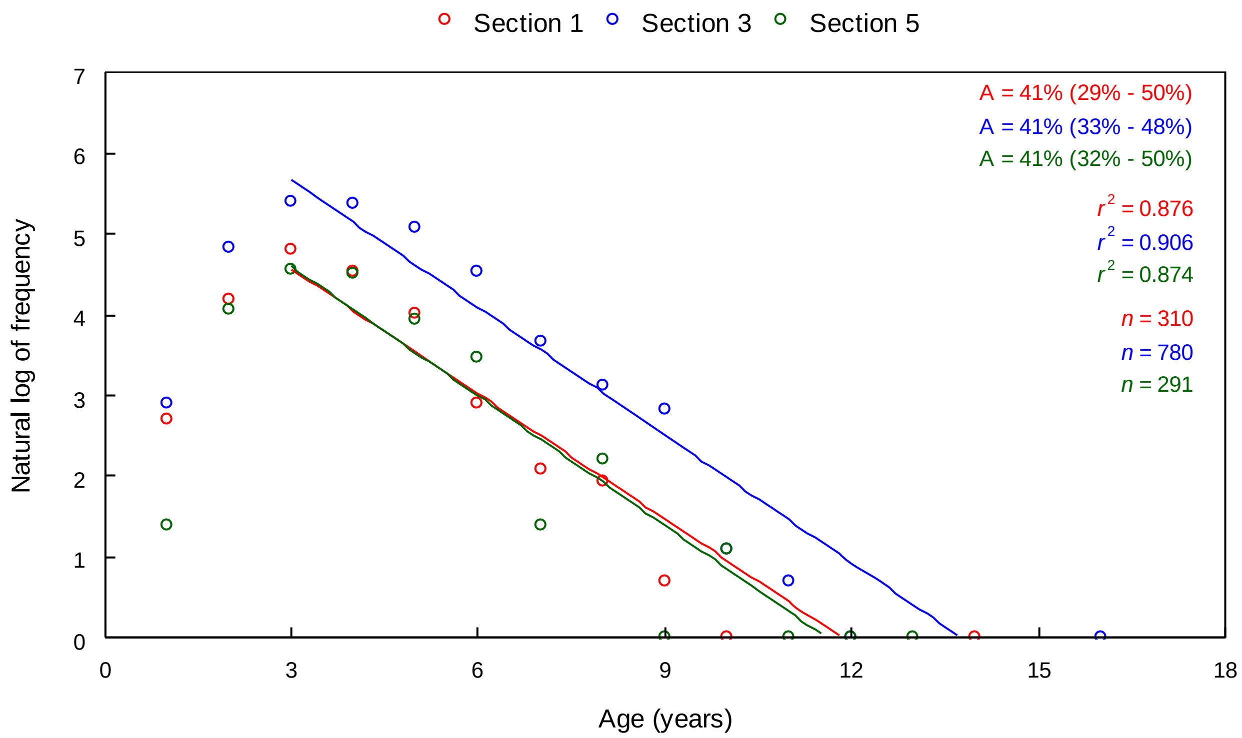


Figure E7 Catch curve and annual mortality estimates (A; mean and 95% confidence intervals) for Bull Trout, calculated for each sample section using data from 2003 to 2014 combined. Sample size, and r^2 of the catch curve regression are provided for each section.

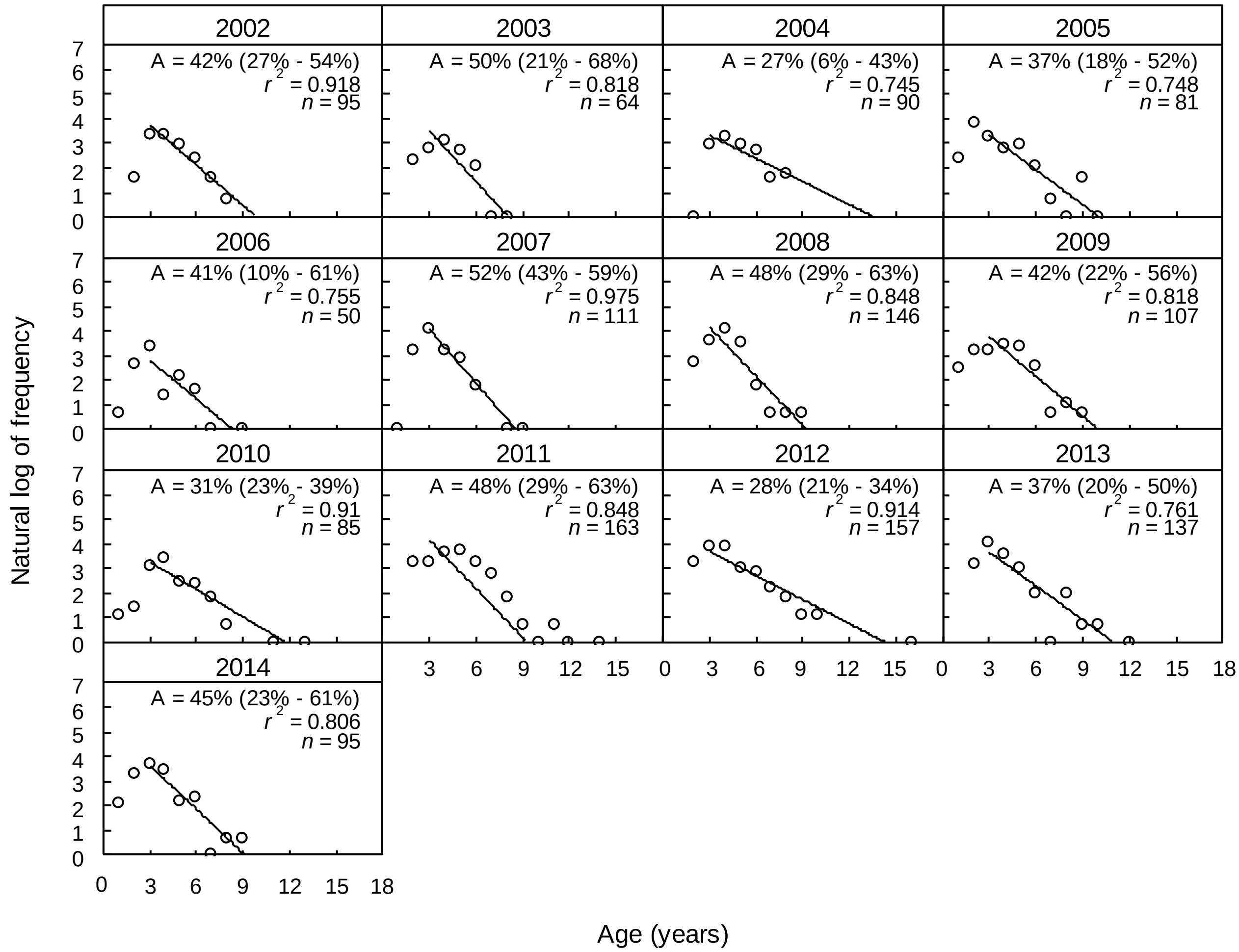


Figure E8 Catch curve and annual mortality estimates (A; mean and 95% confidence intervals) for Bull Trout, calculated for each sample year using data from Sections 1, 3, and 5. Sample size and r^2 of the catch curve regression are provided for each sample year.

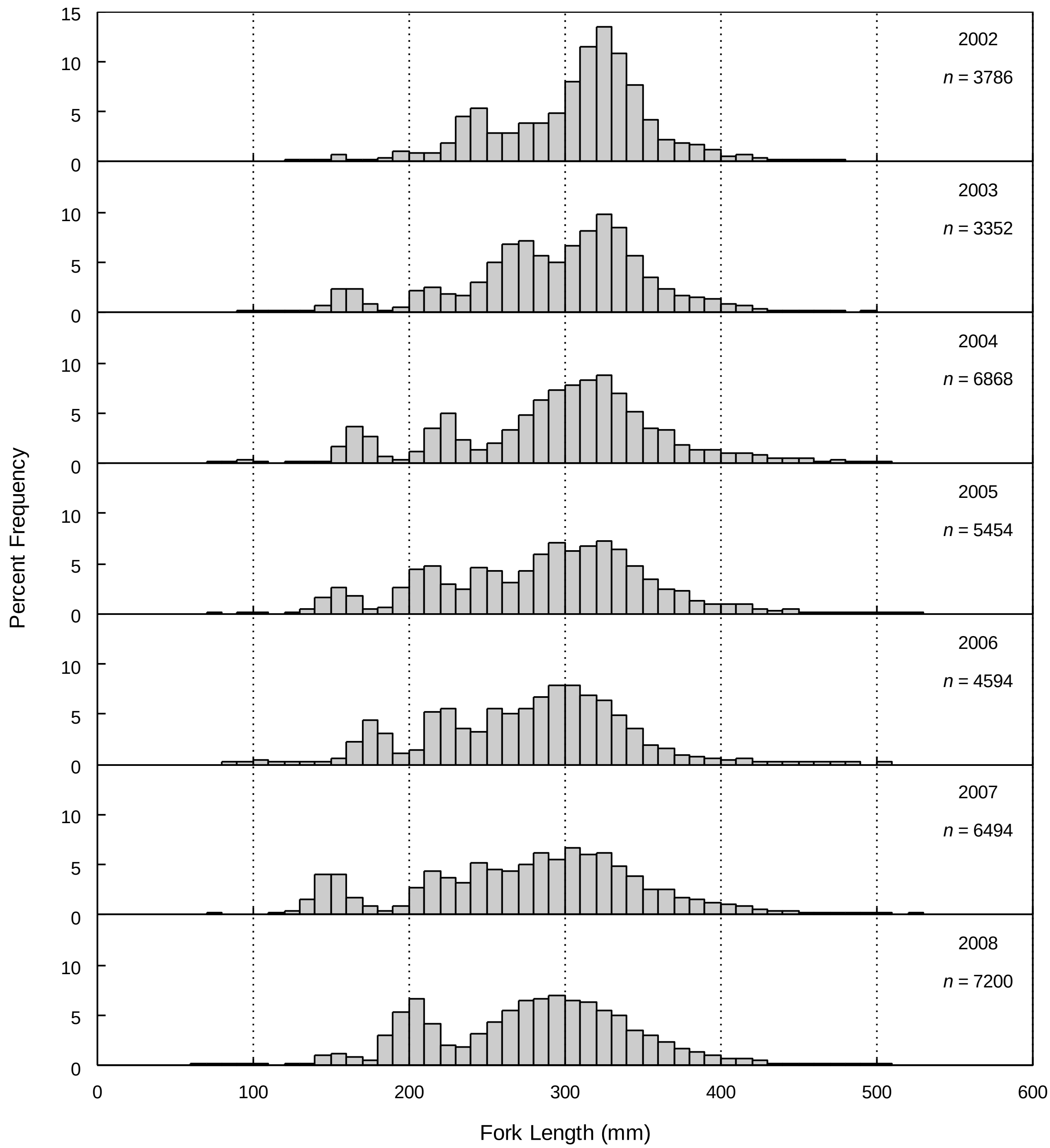


Figure E9 Length-frequency distributions by year for Mountain Whitefish captured by boat electroshocking in sampled sections of Peace River, 2002 to 2014.

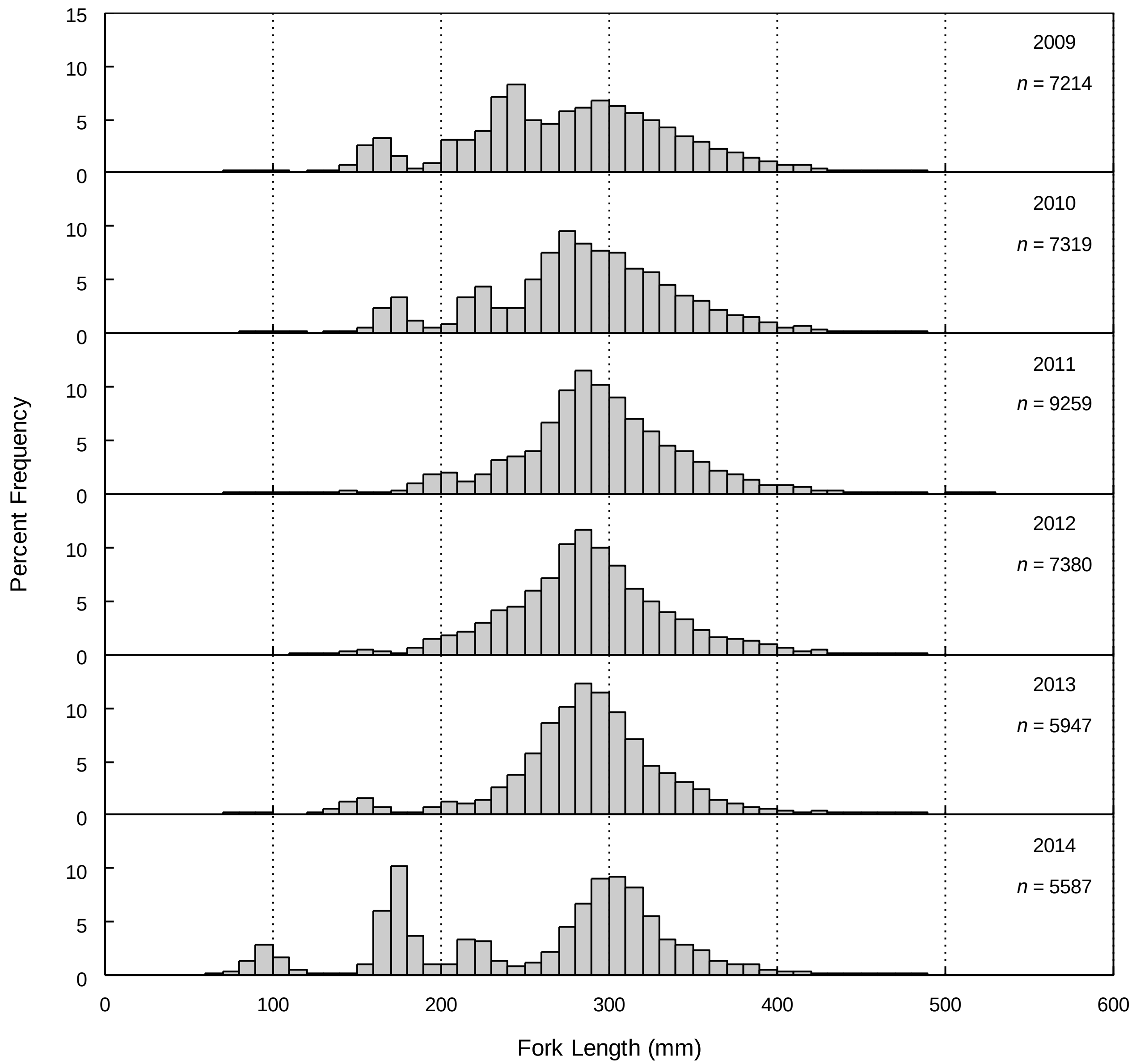


Figure E9 Concluded.

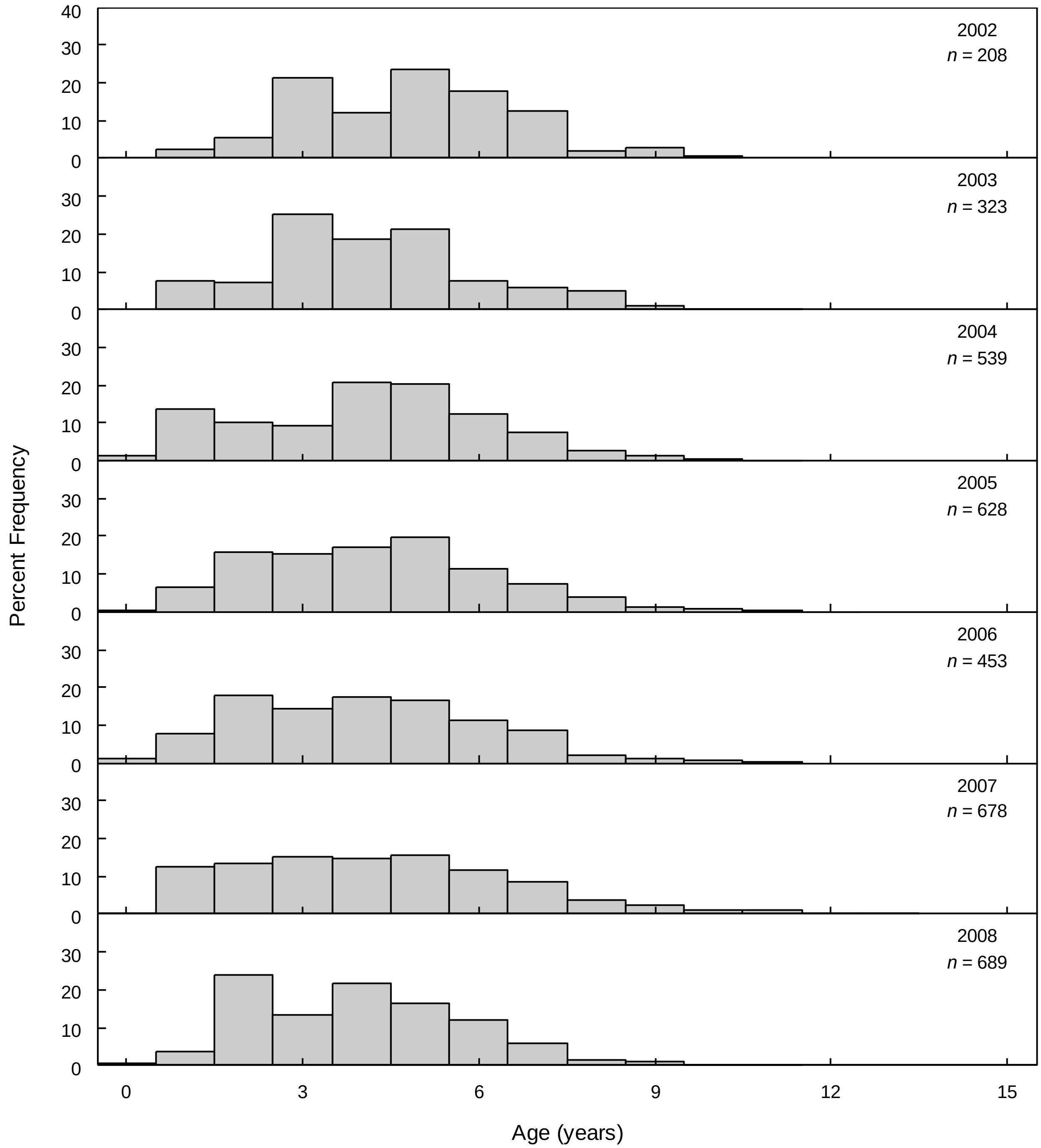


Figure E10 Age-frequency distributions by year for Mountain Whitefish captured by boat electroshocking in sampled sections of Peace River, 2002 to 2014.

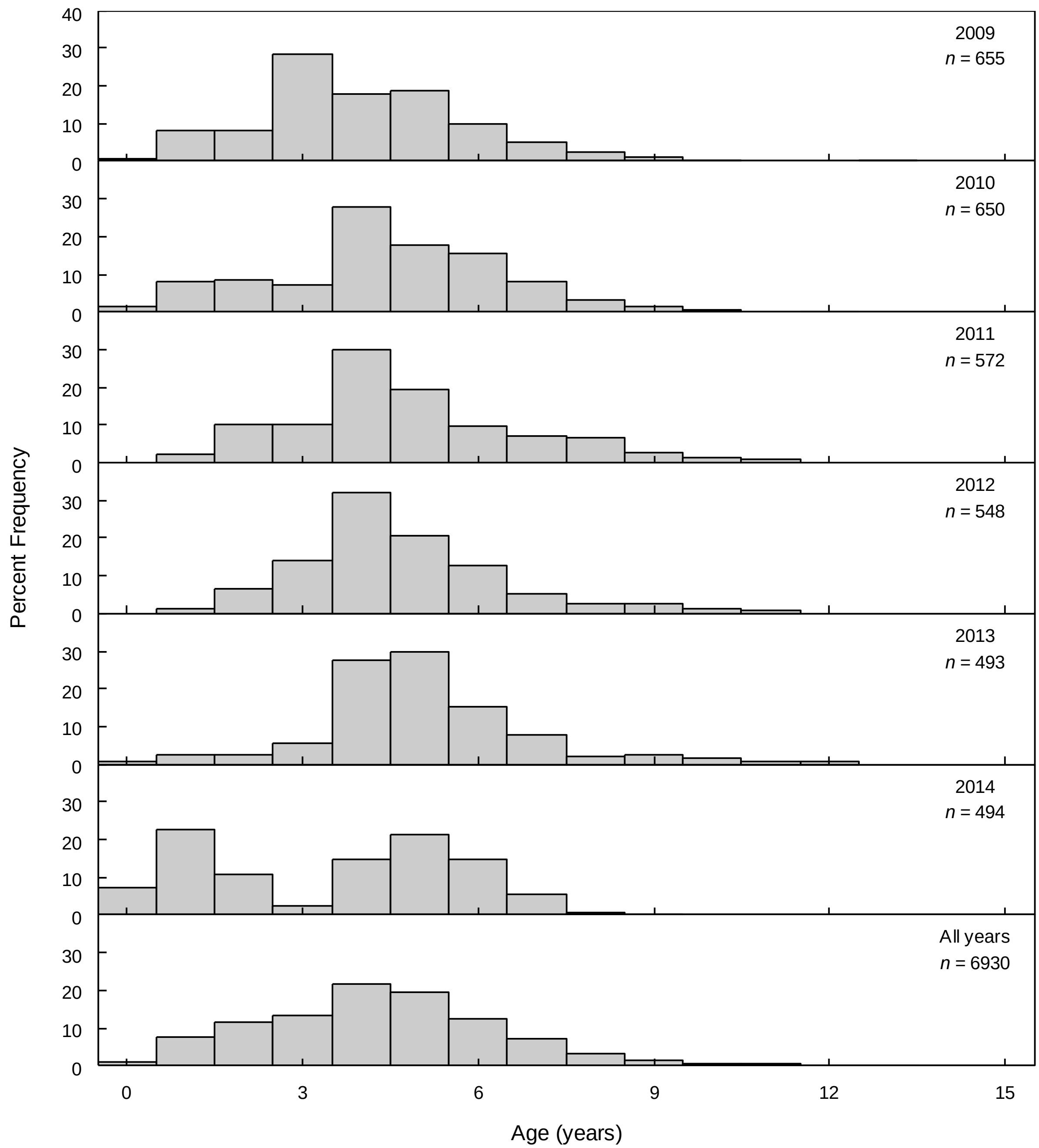
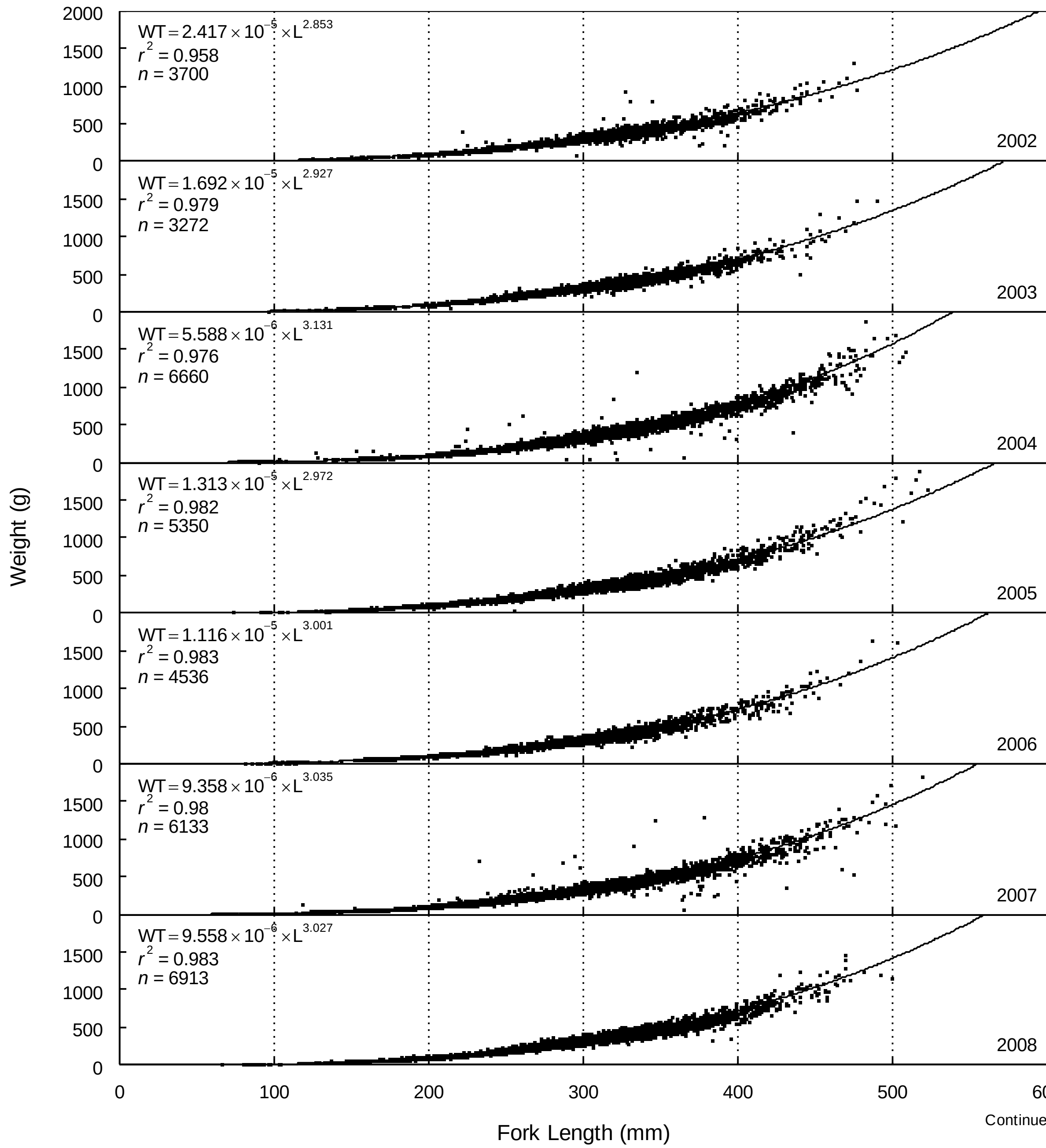


Figure E10 Concluded.



Continued…

Figure E11 Length-weight regressions for Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, 2002 to 2014.

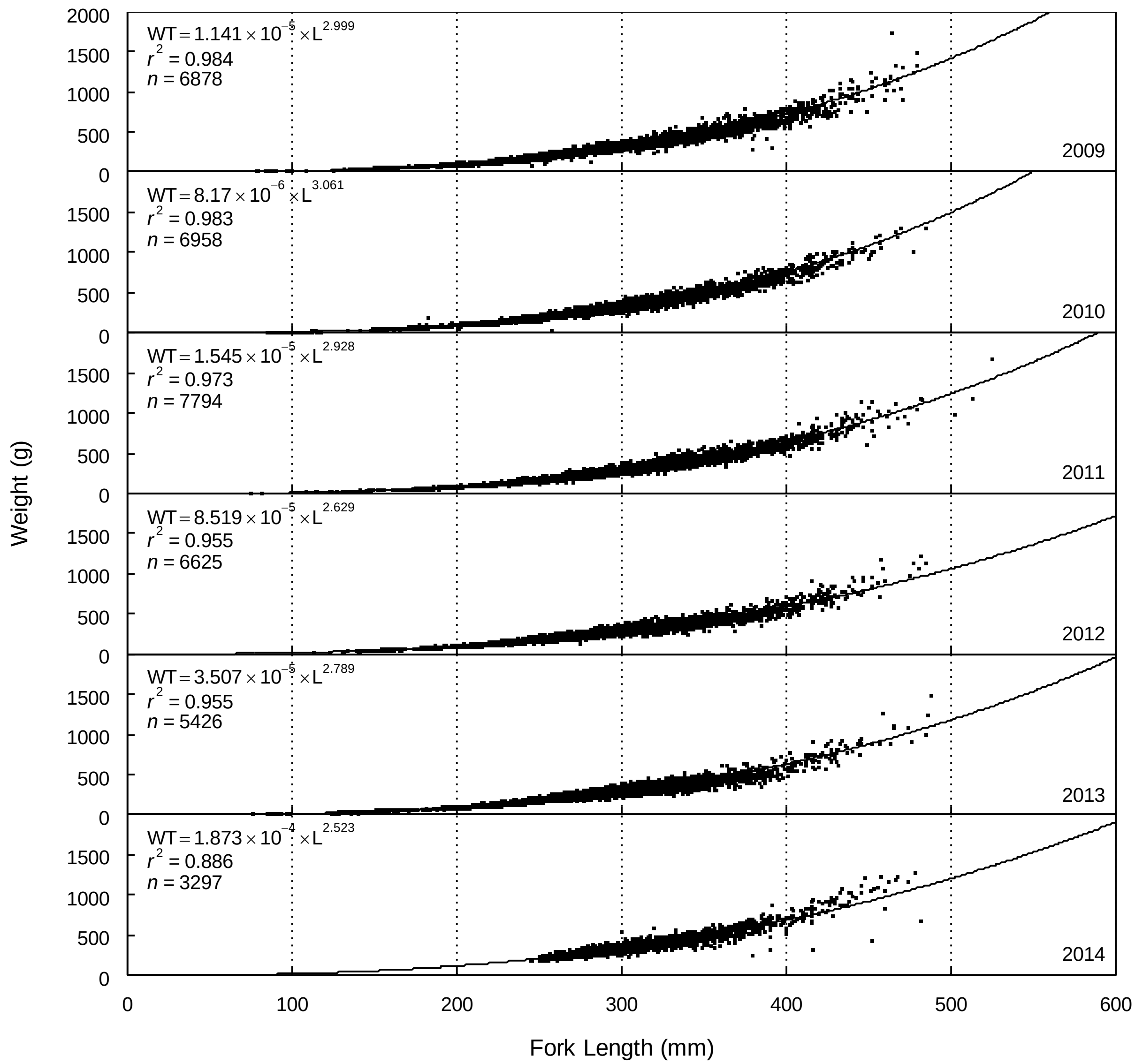


Figure E11 Concluded.

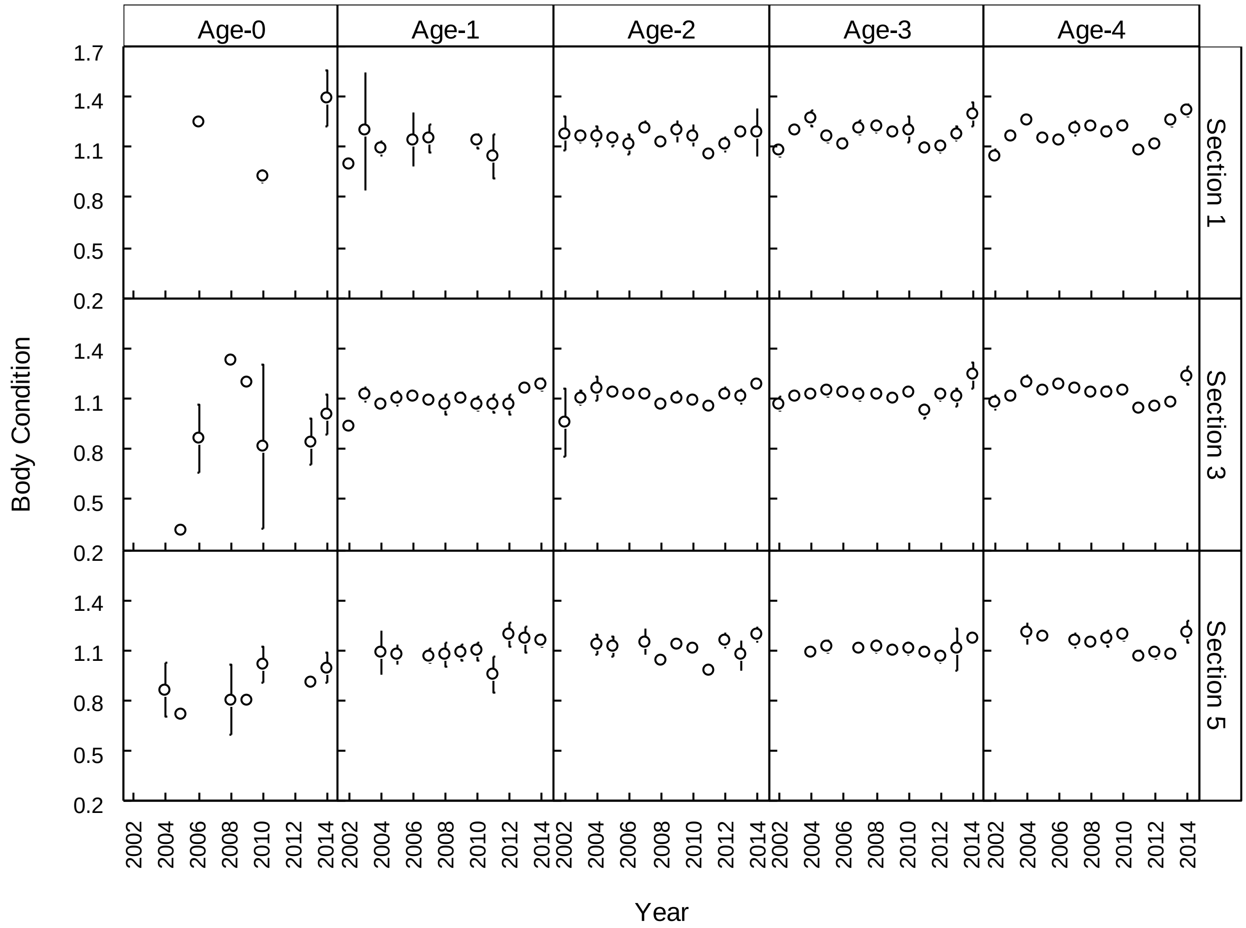


Figure E12 Body condition at age for age-0 to age-4 Mountain Whitefish captured by boat electroshocking in sampled sections of the Peace River, 2002 to 2014.

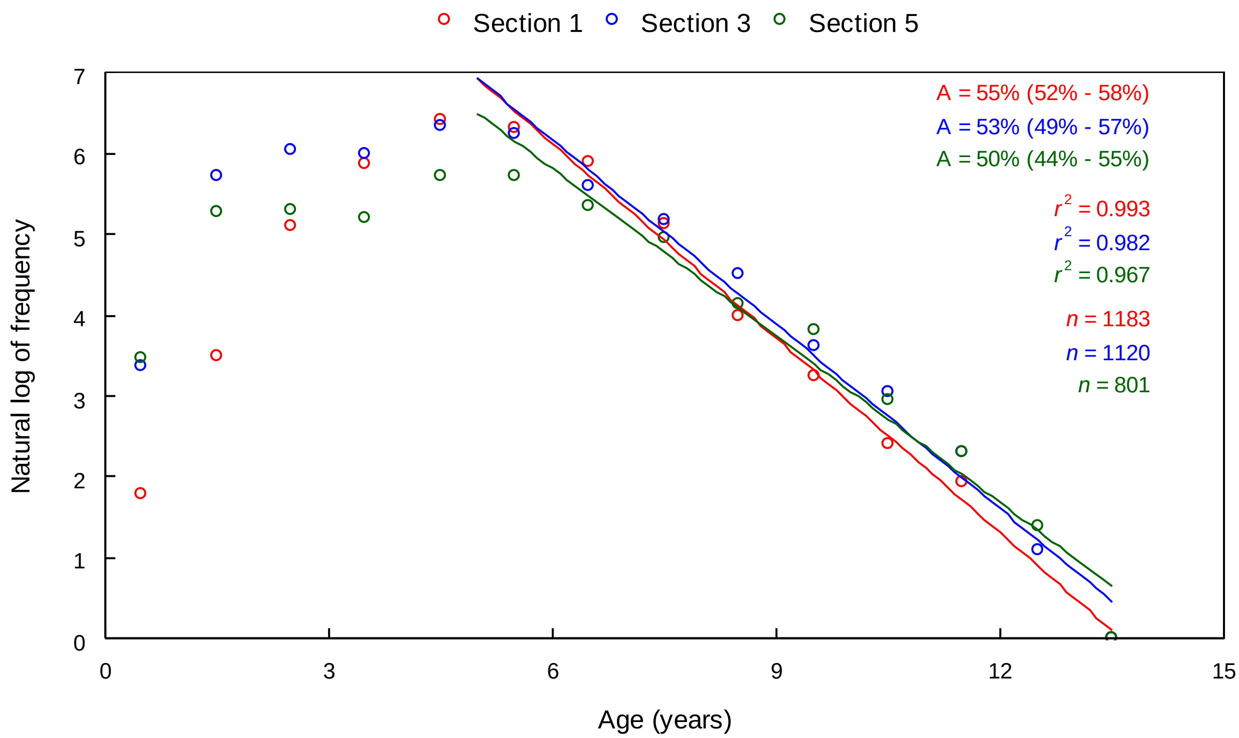


Figure E13 *Catch curve and annual mortality estimates (A; mean and 95% confidence intervals) for Mountain Whitefish, calculated for each sample section using data from 2003 to 2014 combined. Sample size, and r^2 of the catch curve regression are provided for each section.*

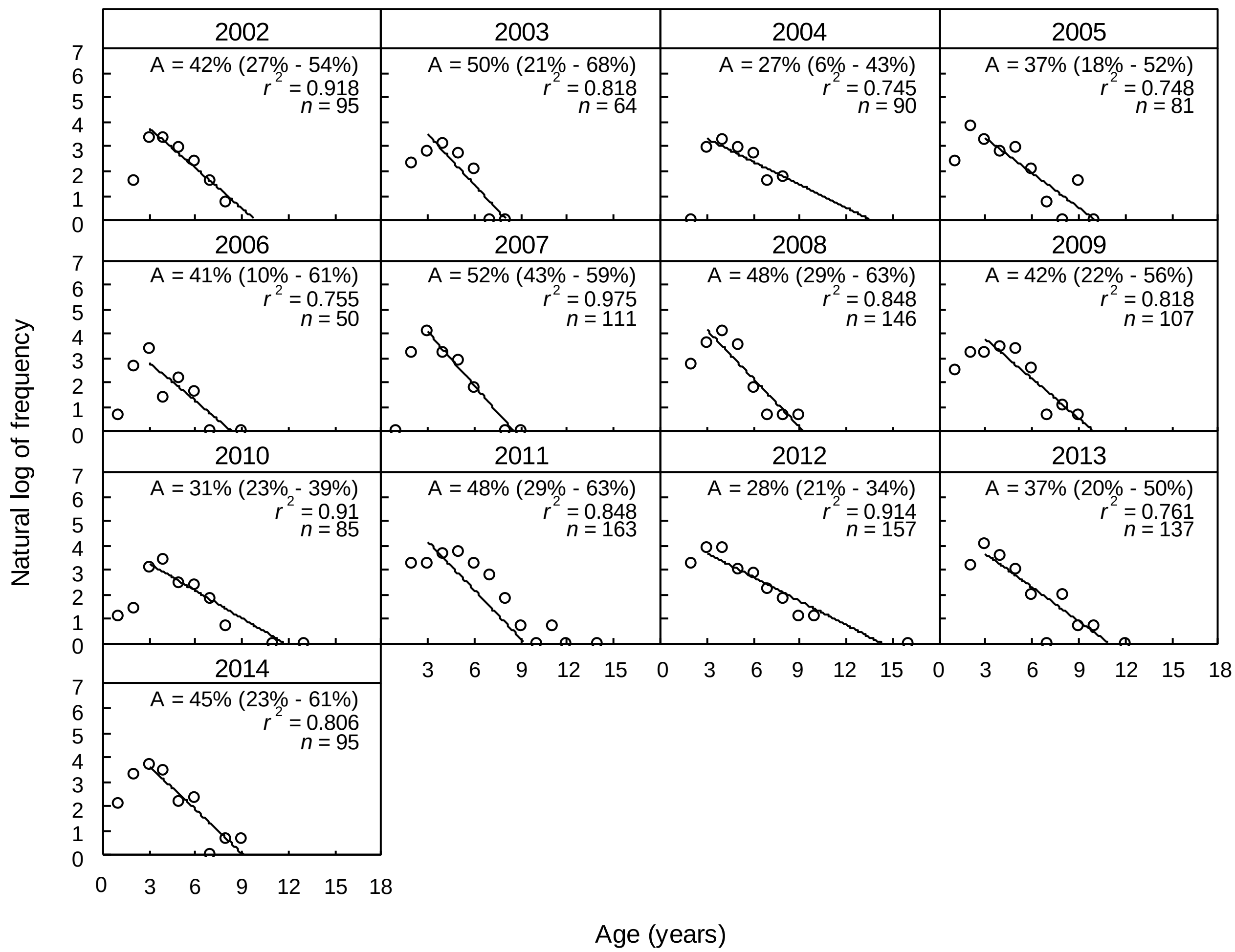


Figure E14 *Catch curve and annual mortality estimates (A; mean and 95% confidence intervals) for Mountain Whitefish, calculated for each sample year using data from Sections 1, 3, and 5. Sample size and r^2 of the catch curve regression are provided for each sample year.*

APPENDIX F

Population Abundance Analysis

MOUNTAIN WHITEFISH

Characteristics that Impact Population Estimates

The recovery of Floy tags in 2014 (marks applied 2002 through 2004) were few (12 fish were encountered a single time, none multiple times) and erratic; therefore, population estimates were restricted to pit tags applied post 2003. A comparison of the recovery rates by year of tag application and section is recorded in Table F1. The rates of recapture by year of release were not significantly different in river sections 1 and 5, but the rates were significantly different in Section 3 ($P < 0.05$) driven by the high recapture rate of marks released in 2006 through 2008.

Figure F2 plots the proportion of available marked fish recaptured two times by sampling session. If fish are not more or less prone to subsequent recapture, then the line in Figure F2 should be horizontal (Seber 1982). A possible explanation for the decrease in the proportion recaptured with sampling session is that the fish were subject to apparent mortality (either death or emigration from the study area); however, the decline was not statistically significant (the 95% confidence bounds on the recapture proportions, assuming a multinomial distribution, overlap).

Histograms of the Mountain Whitefish lengths at release and recapture are plotted in Figures F3 and F4, respectively. Inspection of the figures reveals that smaller fish (250-260 mm) were not recaptured with the same frequency. A comparison of the lengths (accumulated into 25 mm intervals) by section is tabulated in Table F2. Significant differences were not observed in any river section or overall ($P > 0.05$); however, Section 3 exhibited the greatest differences ($P = 0.11$). A slight under representation of smaller fish in the recapture record has been seen consistently in this study and in all previous studies.

Time at large of recaptured Mountain Whitefish regressed on the growth increment (length at release minus length at recapture) is plotted in Figure F5. The negative growth trend was not statistically significant ($P > 0.05$). The boarder histogram of the growth increment provides an indication of measurement error (residual standard deviation of 2.7 mm for each measurement), which was consistent to that observed in past years (historical range of 2.4 to 3.3 mm, approximately).

The movement of recaptured Mountain Whitefish between sections during 2014 is listed in Table F3 along with the estimates of the migration proportions adjusted for the number of fish examined (Equation 4). These proportions are plotted in Figure F6. Figure F7 provides a bar plot of the distance traveled within each section for marked fish released in 2014. Positive values indicate fish were recaptured upstream of the release site and vice-versa. Note that most fish were recaptured in the same site-of-release. The movement of recaptured Mountain Whitefish between sections with the marks applied in 2005 to 2013 are tabulated in Table F4 and plotted in Figures F8 to F16, respectively. For the 2005 to 2013 releases, a bar plot of the distance traveled within each section is displayed in Figure F17. Consistent with movement patterns in previous studies, Mountain Whitefish had remarkable fidelity to a site.

Empirical Model Selection

The number of captures by encounter history (six sessions) and section used for the CJS analysis are listed in Table F5. Capture probabilities pooled over sessions 1 to 4 and 4 to 6 within each section provided the best fit to the data based on Akaike information criteria (AIC). This structure for the capture probabilities was used to evaluate alternative survival unions over sessions and sections based on AIC (see Table F6). The best fitting model was constant survival over all sections and sessions. Survival by section fit the data almost as well; however, the confidence intervals for the survival estimates were large, particularly for Section 5 (see Table F7). Note that apparent mortality was statistically significant (the 95% confidence intervals for survival do not include 1.0). Estimates of instantaneous daily morality and project survival are also listed in Table F7.

The number of recaptures by encounter history and section used for the MARK closed population estimates with consistent sampling intensity (same distance travelled for the electroshocking sample) are listed in Table F8. Note that negative values (indicating fish removals from the population) also included fish that were examined for a mark but subsequently returned to the population unmarked (provides the least onerous approximation when the encounter history is unknown). The changes in the Akaike information content (ΔAIC) values for the fitted models are listed in Table F9. The time varying capture probability model provided the best fit to the data for all river sections. For river sections 1 and 3, the differences in ΔAIC were substantial. In all sections, the heterogeneous model provided the poorest fit to the data. Sensible estimates could not be obtained for the behaviour model (results not listed). As previously noted, the constant capture probability model assumes constant sample size and catchability for each sequence. Despite the constant sampling effort (in terms of distance traveled with the electroshocker), the sample size (marked and unmarked) collected in each sequence exhibited significant variation ($P < 0.05$, Chi-square test for multinomial distribution). A direct test of catchability is provided with population estimates using ADMB with Equations (1 to 8) in Table F10 (input data corrected for mortality and movement listed in Table F13 which was also used for the Bayesian model). The model with time varying catchability fit the data best in Sections 3; however, in sections 1 and 5 the constant catchability model fit the data best. The logarithmic population deviation estimates for the time varying catchability model (Equation 2) are plotted by section and date in Figure F18. Note that the deviations for Section 3 are the most variable and display an upward trend over time. Also, the population estimates were similar in sections 1 and 5 but substantially different in Section 3 (see Table 10).

Bayes Sequential Model for a Closed Population

The mark-recapture data were extracted by section from the database using PIT tags applied during 2014 and PIT tags that were observed during 2014 that were originally applied in 2004 through 2013 and a minimum length of 250 mm. Table F11 lists Mountain Whitefish examined for marks and recaptures by date and section. The releases, adjusted for movement between sections (Equation 4) by section and date, are given in Table F12. The compilations of marks available (Equation 6), fish examined (Equation 7), and recaptures (Equation 8) assuming the constant instantaneous mortality rate listed in Table F7 and 0% undetected mark rate are listed in Table F13. The subsequent population estimates using the Bayesian closed model are given in Table F14. The sequential posterior probability plots by section are provided in Figures F19, F20, and F21. The final posterior distributions for the three sections are drawn in Figure F22.

The sequence of posterior probability plots can be used as an indicator of closure or change in the population size over the study period (Gazey and Staley 1986). Trends in the posterior plots can also be caused by trends in catchability (changes in population size and catchability are confounded). Inspection of the posterior probability plot sequences in Section 1 (Figure F19) reveals that sections appear stable (no marked trend or sequence to larger or smaller population sizes) and were consistent with a convergence to a modal population size. Section 5 also appears stable (Figure F21) albeit the last sampling day (4 October, the latest sampling date in the study) indicated innovation in population size possibly caused by decreased catchability. Conversely, Section 3 (Figure F20) provides clear evidence that additional apparent mortality, trend in catchability and/or immigration of unmarked fish into the section were unaccounted in the population estimates.

ARCTIC GRAYLING

The mark-recapture data were extracted by section from the database using all available marks (smallest length 215 mm). There was no movement between sections. Table F15 lists Arctic Grayling examined for marks and recaptures by date and section. The releases are given in Table F16. The compilations of marks available (Equation 6), fish examined (Equation 7), and recaptures (Equation 8) assuming no mortality and 0% undetected mark rate are listed in Table F17. Only a single recapture was made in Sections 3 and 5; thus, diagnostic measures were not generated. The sequential posterior probability plots for the population estimates are provided in Figures F23 and F24 for Sections 3 and 5, respectively. Given the extremely sparse data, only minimal population estimates could be calculated (see Figure F25). There was a 0.95 probability of at least 11 and 13 fish in Sections 3 and 5, respectively.

BULL TROUT

The mark-recapture data were extracted by section from the database with a minimum length of 250 mm. Table F18 lists Bull Trout examined for marks and recaptures by date and section. There were no movements between sections. The releases by section and date are given in Table F19. The compilations of marks available (Equation 6), fish examined (Equation 7), and recaptures (Equation 8) assuming no mortality and 0% undetected mark rate are listed in Table F20. The data were too sparse to generate diagnostic measures. The population estimates using the Bayesian model are given in Table F21, and the associated sequential posterior probability plots are provided in Figures F26, F27, and F28 for Sections 1, 3 and 5, respectively. The final posterior distributions are drawn in Figure F29.

Table F1: A comparison of pit tagged Mountain Whitefish recaptured in 2014 by year tagged and section.

	One	Three	Five	Total		One	Three	Five	Total
Released in 2004					**Released in 2010**				
Recaptures					Recaptures	2	4	1	7
Marks		2		2	Marks	29	68	30	127
Percent					Percent	6.9	5.9	3.3	5.5
Time-at-large (days)					Time-at-large (days)	11.5	9.3	8.0	9.7
Released in 2005					**Released in 2011**				
Recaptures			2	2	Recaptures	2	11	3	16
Marks	3	14	7	24	Marks	38	80	42	162

	One	Three	Five	Total		One	Three	Five	Total
Percent			28.6	8.3	Percent	5.3	13.8	7.1	9.9
Time-at-large (days)			16.5	16.5	Time-at-large (days)	19.0	13.1	9.3	13.1
Released in 2006					**Released in 2012**				
Recaptures	1	4		5	Recaptures	9	9	3	21
Marks	13	12	2	27	Marks	85	91	49	227
Percent	7.7	33.3		18.5	Percent	10.6	9.9	6.1	9.3
Time-at-large (days)	16.0	17.3		17.0	Time-at-large (days)	20.8	12.1	18.0	16.7
Released in 2007					**Released in 2013**				
Recaptures	1	4	1	6	Recaptures	7	3	3	13
Marks	8	21	14	44	Marks	80	84	63	227
Percent	12.5	19.0	7.1	13.6	Percent	8.8	3.6	4.8	5.7
Time-at-large (days)	8.0	8.5	8.0	8.3	Time-at-large (days)	15.1	15.0	21.7	16.6
Released in 2008					**Released in 2014**				
Recaptures	1	7	4	12	Recaptures	50	42	42	134
Marks	16	35	22	74	Marks	824	677	820	2321
Percent	6.3	20.0	18.2	16.2	Percent	6.1	6.2	5.1	5.8
Time-at-large (days)	6.0	20.7	16.5	18.1	Time-at-large (days)	13.7	11.3	14.0	13.1
Released in 2009									
Recaptures	2	1		3					
Marks	18	21	23	62					
Percent	11.1	4.8		4.8					
Time-at-large (days)	13.0	7.0		11.0					
					Independence Test (3 or more recaptures in a year-section):				
					Probability	0.287	0.002	0.206	0.000

Table F2: Comparison of Mountain Whitefish lengths at release and recapture by section.

	Section						Total	
Length	**One**		**Three**		**Five**		**Total**	
Interval	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Recaptures								
250-275	3	4.0	6	7.1	9	15.5	18	8.3
275-300	27	36.0	15	17.9	16	27.6	58	26.9
300-325	30	40.0	28	33.3	16	27.6	74	34.3
325-350	12	16.0	19	22.6	8	13.8	39	18.1

	Section							
Length	**One**		**Three**		**Five**		**Total**	
Interval	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
350-375	1	1.3	14	16.7	2	3.4	17	7.9
375-400	2	2.7	2	2.4	3	5.2	7	3.2
400-425				0.0	1	1.7	1	0.5
425-450				0.0	2	3.4	2	0.9
450-475			1		1			
Total	75	100.0	84	100.0	58	98.3	216	100.0
Releases								
250-275	89	8.0	96	8.7	127	11.9	312	9.5
275-300	400	35.9	286	25.9	296	27.7	982	30.0
300-325	414	37.2	379	34.3	324	30.3	1117	34.1
325-350	133	11.9	172	15.6	161	15.0	466	14.2
350-375	38	3.4	103	9.3	91	8.5	232	7.1
375-400	25	2.2	42	3.8	39	3.6	106	3.2
400-425	10	0.9	12	1.1	18	1.7	40	1.2
425-450	4	0.4	10	0.9	9	0.8	23	0.7
450-475	1		5	0.5	5	0.5	11	
Total	1113	100.0	1105	100.0	1070	100.0	3278	100.0
Pearson Chi-Square	3.52		8.98		2.87		3.18	
Probability	0.619		0.110		0.721		0.673	

Table F3: Mountain Whitefish recaptures and migration proportions adjusted (inverse weight) for fish examined by section released and recaptured during 2014.

Release	**Recapture Section**			
Section	**One**	**Three**	**Five**	**Total**
Recaptures:				
One	75	1	1	77
Three	0	83	7	90
Five	0	1	51	52
Sample:	1677	1602	1534	4813
Recap. %	4.47	5.31	3.85	4.55
Proportions:				
One	0.972	0.014	0.014	1.000

Three	0.000	0.919	0.081	1.000
Five	0.000	0.018	0.982	1.000

Table F4: Mountain Whitefish recaptures and migration proportions adjusted (inverse weight) for fish examined by section released 2005 through 2013 and recaptured in 2014.

Release	Recapture Section			
Section	**One**	**Three**	**Five**	**Total**
2005 Releases				
One	2	1	0	3
Three	1	13	1	15
Five	0	0	8	8
Sample:	1677	1602	1534	4813
Recap. %	0.18	0.87	0.59	0.54
Proportions:				
One	0.656	0.344	0.000	1.000
Three	0.064	0.867	0.070	1.000
Five	0.000	0.000	1.000	1.000
2006 Releases				
One	14	0	0	14
Two	0	0	0	0
Three	0	16	2	18
Sample:	1677	1602	1534	4813
Recap. %	0.83	1.00	0.13	0.665
Proportions:				
One	1.000	0.000	0.000	1.000
Two	0	0	0	0
Three	0.000	0.885	0.115	1.000
2007 Releases				
One	9	0	0	9
Three	0	26	0	26
Five	0	0	15	15
Sample:	1677	1602	1534	4813
Recap. %	0.54	1.62	0.98	1.04
Proportions:				
One	1.000	0.000	0.000	1.000
Three	0.000	1.000	0.000	1.000
Five	0.000	0.000	1.000	1.000
2008 Releases				

Release	Recapture Section			
Section	**One**	**Three**	**Five**	**Total**
2010 Releases				
One	29	1	0	30
Three	1	68	2	71
Five	1	3	29	33
Sample:	1677	1602	1534	4813
Recap. %	1.85	4.49	2.02	2.78
Proportions:				
One	0.965	0.035	0.000	1.000
Three	0.013	0.957	0.029	1.000
Five	0.028	0.088	0.884	1.000
2011 Releases				
One	38	1	1	40
Three	2	89	2	93
Five	1	2	42	45
Sample:	1677	1602	1534	4813
Recap. %	2.44	5.74	2.93	3.70
Proportions:				
One	0.947	0.026	0.027	1.000
Three	0.021	0.957	0.022	1.000
Five	0.020	0.043	0.937	1.000
2012 Releases				
One	149	2	1	152
Three	4	301	9	314
Five	0	0	154	154
Sample:	1677	1602	1534	4813
Recap. %	9.12	18.91	10.69	12.88
Proportions:				
One	0.979	0.014	0.007	1.000
Three	0.012	0.958	0.030	1.000
Five	0.000	0.000	1.000	1.000
2013 Releases				

Release	Recapture Section			
Section	One	Three	Five	Total
One	17	2	0	19
Three	1	38	2	41
Five	0	2	24	26
Sample:	1677	1602	1534	4813
Recap. %	1.07	2.62	1.69	1.79
Proportions:				
One	0.890	0.110	0.000	1.000
Three	0.023	0.926	0.051	1.000
Five	0.000	0.074	0.926	1.000
2009 Releases				
One	19	0	0	19
Three	1	21	1	23
Five	0	1	22	23
Sample:	1677	1602	1534	4813
Recap. %	1.19	1.37	1.50	1.35
Proportions:				
One	1.000	0.000	0.000	1.000
Three	0.042	0.913	0.045	1.000
Five	0.000	0.042	0.958	1.000

Release	Recapture Section			
Section	One	Three	Five	Total
One	85	0	0	85
Three	1	86	3	90
Five	1	1	63	65
Sample:	1677	1602	1534	4813
Recap. %	5.19	5.43	4.30	4.99
Proportions:				
One	1.000	0.000	0.000	1.000
Three	0.011	0.955	0.035	1.000
Five	0.014	0.015	0.971	1.000

Table F5: Number of captures by encounter history and section used for the Cormack-Jolly-Seber analysis. A '1' indicates a capture and '0' no capture in the sequence.

	Section		
History	**One**	**Three**	**Five**
000010	58	64	51
000011	0	3	0
000100	181	226	284
000101	7	5	0
000110	8	8	4
001000	321	299	237
001001	8	3	3
001010	5	5	5
001100	5	10	5
010000	232	149	213
010001	0	1	1

	Section		
History	One	Three	Five
010010	6	4	4
010100	4	4	5
011000	5	6	3
011010	0	1	0
011100	0	1	0
100000	210	241	218
100001	3	1	1
100010	8	5	3
100011	0	1	0
100100	3	3	4
100101	1	0	0
101000	7	12	7
110000	6	6	7
110010	0	1	0
111000	0	1	0
111010	0	1	0

Table F6: Evaluation of various survival Cormack-Jolly-Seber models using MARK based on delta Akaike information criteria (ΔAIC).

Model	ΔAIC	AIC Weights	Model Like.	Num. Par
S(.)	0.0	0.429	1.000	16
S(section)	0.4	0.359	0.837	18
S(2 levels)	2.0	0.157	0.367	17
S(2 levels*section)	4.1	0.054	0.126	21
S(section*t)	13.0	0.001	0.002	27

Models:

S(.) - constant survival over all sessions and sections

S(section) - constant survival over all sessions within each section

S(2 levels) - constant survival for sessions 1 to 4 and sessions 4 to 6 over all sections

S(2 levels*section) - constant survival for sessions 1 to 4 and sessions 4 to 6 within each section

S(section*t) - survival by session and section

Table F7: Daily and project survival and instantaneous mortality estimates based on recaptures using the two best fitting Cormack-Jolly-Seber models.

	Daily		95% Confidence		Instan. Daily	Project
Model	**Survival**	**SD**	**Low**	**High**	**Mortality**	**Survival**
Constant	0.9846	0.0097	0.9482	0.9955	0.0155	0.5942
Section 1	0.9843	0.0148	0.9054	0.9976	0.0158	0.5755
Section 3	0.9574	0.0142	0.9191	0.9780	0.0435	0.2326
Section 5	0.9926	0.0190	0.4580	1.0000	0.0074	0.7740

Table F8: Number of captures by encounter history and section used for closed and '0' no capture in the sequence. Negative values indicate a dead and '0' no capture in the sequence. Negative values indicate a dead or removed Mountain Whitefish.

	Section		
History	**One**	**Three**	**Five**
0001	196	239	287
0010	334	303	244
0011	5	10	5
0100	237	152	217
0101	4	4	5
0110	5	7	3
0111	0	1	0
1000	221	245	221
1001	4	3	4
1010	7	12	7
1100	6	7	7
1101	0	2	0
1000	-8	-8	-2
0100	-24	-8	-8
0010	-11	-8	-7
0001	7	4	5

Table F9: Delta Akaike's information criteria computed with program MARK restricted to the first four sampling sessions for alternative closed population models.

		Compared with M_t			Compared with M_0		
Model	**Num. Par**	**ΔAIC**	**Weight**	**Model Like.**	**ΔAIC**	**Weight**	**Model Like.**
Section One:							
M_t	5	0	1.000	1.000	-	-	-
M_0	2	36.8	0.000	0.000	0.0	0.731	1.000
M_h	3	38.8	0.000	0.000	2.0	0.269	0.367
Section Three:							
M_t	5	0	1.000	1.000	-	-	-
M_0	2	47.4	0.000	0.000	0.0	0.731	1.000
M_h	3	49.4	0.000	0.000	2.0	0.269	0.367
Section Five:							
M_t	5	0.0	0.89921	1.000	-	-	-
M_0	2	5.0	0.07371	0.082	0.0	0.731	1.000
M_h	3	7.0	0.02708	0.030	2.0	0.269	0.367

Models:

Mt - time varying capture probability
M0 - constant capture probability
Mh - heterogeneous capture probability

Table F10: Population estimates using AD Model Builder assuming constant population size (M0t) and time varying catchability (Mtt).

Model	**N**	**SD**	**Function**	**Param.**	**AIC**	**ΔAIC**	**Weight**	**Model Like.**
Section One:								
M_{0t}	10,823	1,218	280.3	1	562.5	0.00	0.995	1.000
M_{tt}	11,139	1,557	279.6	7	573.2	10.64	0.005	0.005
Section Three:								
M_{tt}	10,838	3,577	303.5	11	629.0	0.00	0.858	1.000
M_{0t}	8,833	927	315.3	1	632.6	3.59	0.142	0.166
Section Five:								
M_{0t}	13,808	1,750	238.9	1	479.8	0.00	0.988	1.000
M_{tt}	13,709	2,272	236.3	8	488.6	8.81	0.012	0.012

Table F11: Sample size and recaptures of Mountain Whitefish by section and date.

	One		Three		Five		Total	
Date	Sample	Recap.	Sample	Recap.	Sample	Recap.	Sample	Recap.
8/25/2014	26	0	0	0	0	0	26	0
8/26/2014	219	0	0	0	0	0	219	0
8/27/2014	0	0	131	0	0	0	131	0
8/28/2014	0	0	150	0	0	0	150	0
8/29/2014	0	0	0	0	107	0	107	0
8/30/2014	0	0	0	0	134	0	134	0
8/31/2014	85	1	0	0	0	0	85	1
9/1/2014	192	5	0	0	0	0	192	5
9/2/2014	0	0	0	0	0	0	0	0
9/3/2014	0	0	55	1	0	0	55	1
9/4/2014	0	0	79	6	0	0	79	6
9/5/2014	0	0	50	3	0	0	50	3
9/6/2014	0	0	0	0	135	5	135	5
9/7/2014	0	0	0	0	106	2	106	2
9/8/2014	162	5	0	0	0	0	162	5
9/9/2014	200	7	0	0	0	0	200	7
9/10/2014	0	0	127	10	0	0	127	10
9/11/2014	0	0	115	4	0	0	115	4
9/12/2014	0	0	105	8	0	0	105	8
9/13/2014	0	0	0	0	149	7	149	7
9/14/2014	0	0	0	0	118	3	118	3
9/15/2014	0	0	0	0	0	0	0	0
9/16/2014	114	6	0	0	0	0	114	6
9/17/2014	102	7	40	4	0	0	142	11
9/18/2014	0	0	157	12	0	0	157	12
9/19/2014	0	0	63	1	0	0	63	1
9/20/2014	0	0	0	0	190	8	190	8
9/21/2014	0	0	0	0	117	7	117	7
9/22/2014	315	26	0	0	0	0	315	26
9/23/2014	0	0	262	23	0	0	262	23
9/24/2014	0	0	0	0	304	20	304	20
9/25/2014	254	18	0	0	0	0	254	18

	One		Three		Five		Total	
Date	Sample	Recap.	Sample	Recap.	Sample	Recap.	Sample	Recap.
9/26/2014	0	0	197	9	0	0	197	9
9/27/2014	0	0	0	0	0	0	0	0
9/28/2014	0	0	0	0	0	0	0	0
9/29/2014	0	0	0	0	0	0	0	0
9/30/2014	0	0	0	0	0	0	0	0
10/1/2014	0	0	0	0	0	0	0	0
10/2/2014	0	0	0	0	0	0	0	0
10/3/2014	0	0	0	0	174	7	174	7
10/4/2014	4	0	69	4	0	0	73	4
Total	1,673	75	1,600	85	1,534	59	4,807	219

Table F12: Mountain Whitefish marks applied by section and date adjusted for migration.

Date	One	Three	Five	Total
8/25/2014	23.3	0.3	0.3	24
8/26/2014	207.1	2.9	3.0	213
8/27/2014	0.0	116.7	10.3	127
8/28/2014	0.0	134.2	11.8	146
8/29/2014	0.0	2.0	105.0	107
8/30/2014	0.0	2.4	129.6	132
8/31/2014	75.8	1.1	1.1	78
9/1/2014	164.3	2.3	2.4	169
9/2/2014	0.0	0.0	0.0	0
9/3/2014	0.0	48.7	4.3	53
9/4/2014	0.0	63.4	5.6	69
9/5/2014	0.0	40.4	3.6	44
9/6/2014	0.0	2.3	124.7	127
9/7/2014	0.0	1.8	97.2	99
9/8/2014	149.7	2.1	2.2	154
9/9/2014	179.9	2.5	2.6	185
9/10/2014	0.0	107.5	9.5	117
9/11/2014	0.0	98.3	8.7	107
9/12/2014	0.0	85.5	7.5	93
9/13/2014	0.0	2.5	134.5	137

Date	One	Three	Five	Total
9/14/2014	0.0	2.1	110.9	113
9/15/2014	0.0	0.0	0.0	0
9/16/2014	99.2	1.4	1.4	102
9/17/2014	91.4	33.4	4.2	129
9/18/2014	0.0	131.4	11.6	143
9/19/2014	0.0	56.1	4.9	61
9/20/2014	0.0	3.3	174.7	178
9/21/2014	0.0	2.0	107.0	109
9/22/2014	56.4	0.8	0.8	58
9/23/2014	0.0	61.6	5.4	67
9/24/2014	0.0	0.9	50.1	51
9/25/2014	35.0	0.5	0.5	36
9/26/2014	0.0	31.3	2.7	34
9/27/2014	0.0	0.0	0.0	0
9/28/2014	0	0	0	0
9/29/2014	0	0	0	0
9/30/2014	0	0	0	0
10/1/2014	0	0	0	0
10/2/2014	0	0	0	0
10/3/2014	0.0	0.4	18.6	19
10/4/2014	1.0	8.3	0.7	10
Total	1,083	1,051	1,157	3,291

Table F13: Mountain Whitefish sample, cumulative marks available for recapture and recaptures by section and date.

Date	Sample	Marks	Recap.
Section One:			
8/31/2014	85	223	1
9/1/2014	192	220	5
9/8/2014	162	422	5
9/9/2014	200	415	7
9/16/2014	114	680	6
9/17/2014	102	669	7
9/22/2014	315	803	26

Date	Sample	Marks	Recap.
9/25/2014	254	822	18
10/4/2014	4	747	
Section Three:			
8/28/2014	150		
9/3/2014	55	246	1
9/4/2014	79	245	6
9/5/2014	50	241	3
9/10/2014	127	372	10
9/11/2014	115	369	4
9/12/2014	105	366	8
9/17/2014	40	621	4
9/18/2014	157	611	12
19-Sep-14	63	603	1
23-Sep-14	262	785	23
26-Sep-14	197	813	9
4-Oct-14	69	748	4
Section Five:			
8/29/2014	107	3	
8/30/2014	134	14	
9/6/2014	135	250	5
9/7/2014	106	251	2
9/13/2014	149	456	7
9/14/2014	118	458	3
9/20/2014	190	662	8
9/21/2014	117	663	7
9/24/2014	304	917	20
10/3/2014	174	851	7

Table F14: Population estimates by section for Mountain Whitefish.

			95% HPD		Standard	CV
Section	**Bayes Mean**	**MLE**	**Low**	**High**	**Deviation**	**(%)**
One	11,257	10,970	9,510	12,740	1,285	11.4
Three	9,092	8,890	7,270	11,030	967	10.6
Five	14,315	13,840	10,860	18,060	1,864	13.0
Total	34,664		29,839	39,489	2,462	7.1

Table F15: Sample size and recaptures of Arctic Grayling by section and date.

	One		Three		Five		Total	
Date	**Sample**	**Recap.**	**Sample**	**Recap.**	**Sample**	**Recap.**	**Sample**	**Recap.**
8/27/2014	0	0	1	0	0	0	1	0
8/28/2014	0	0	1	0	0	0	1	0
8/29/2014	0	0	0	0	1	0	1	0
8/30/2014	0	0	0	0	0	0	0	0
8/31/2014	0	0	0	0	0	0	0	0
9/1/2014	0	0	0	0	0	0	0	0
9/2/2014	0	0	0	0	0	0	0	0
9/3/2014	0	0	0	0	0	0	0	0
9/4/2014	0	0	0	0	0	0	0	0
9/5/2014	0	0	0	0	0	0	0	0
9/6/2014	0	0	0	0	1	0	1	0
9/7/2014	0	0	0	0	0	0	0	0
9/8/2014	0	0	0	0	0	0	0	0
9/9/2014	0	0	0	0	0	0	0	0
9/10/2014	0	0	0	0	0	0	0	0
9/11/2014	0	0	1	0	0	0	1	0
9/12/2014	0	0	1	0	0	0	1	0
9/13/2014	0	0	0	0	0	0	0	0
9/14/2014	0	0	0	0	1	0	1	0
9/15/2014	0	0	0	0	0	0	0	0
9/16/2014	0	0	0	0	0	0	0	0
9/17/2014	0	0	0	0	0	0	0	0
9/18/2014	0	0	1	0	0	0	1	0
9/19/2014	0	0	0	0	0	0	0	0

	One		Three		Five		Total	
Date	**Sample**	**Recap.**	**Sample**	**Recap.**	**Sample**	**Recap.**	**Sample**	**Recap.**
9/20/2014	0	0	0	0	0	0	0	0
9/21/2014	0	0	0	0	1	0	1	0
9/22/2014	0	0	0	0	0	0	0	0
9/23/2014	0	0	1	1	0	0	1	1
9/24/2014	0	0	0	0	2	1	2	1
Total	0	0	6	1	6	1	12	2

Table F16: Arctic Grayling marks applied by section and date.

Date	**One**	**Three**	**Five**	**Total**
8/27/2014	0.0	1.0	0.0	1
8/28/2014	0.0	1.0	0.0	1
8/29/2014	0.0	0.0	1.0	1
8/30/2014	0.0	0.0	0.0	0
8/31/2014	0.0	0.0	0.0	0
9/1/2014	0.0	0.0	0.0	0
9/2/2014	0.0	0.0	0.0	0
9/3/2014	0.0	0.0	0.0	0
9/4/2014	0.0	0.0	0.0	0
9/5/2014	0.0	0.0	0.0	0
9/6/2014	0.0	0.0	1.0	1
9/7/2014	0.0	0.0	0.0	0
9/8/2014	0.0	0.0	0.0	0
9/9/2014	0.0	0.0	0.0	0
9/10/2014	0.0	0.0	0.0	0
9/11/2014	0.0	1.0	0.0	1
9/12/2014	0.0	1.0	0.0	1
9/13/2014	0.0	0.0	0.0	0
9/14/2014	0.0	0.0	1.0	1
9/15/2014	0.0	0.0	0.0	0
9/16/2014	0.0	0.0	0.0	0
9/17/2014	0.0	0.0	0.0	0
9/18/2014	0.0	1.0	0.0	1
9/19/2014	0.0	0.0	0.0	0

Date	One	Three	Five	Total
9/20/2014	0.0	0.0	0.0	0
9/21/2014	0.0	0.0	1.0	1
9/22/2014	0.0	0.0	0.0	0
9/23/2014	0.0	0.0	0.0	0
9/24/2014	0.0	0.0	1.0	1
Total	0	5	5	10

Table F17: Arctic Grayling sample, cumulative marks available for recapture and recaptures by section and date.

Date	Sample	Marks	Recap.
Section Three:			
9/11/2014	1	2	
9/12/2014	1	2	
9/18/2014	1	4	
9/23/2014	1	5	1
Section Five:			
9/6/2014	1	1	
9/14/2014	1	2	
9/21/2014	1	3	
9/24/2014	2	4	1

Table F18: Sample size and recaptures of Bull Trout by section and date.

	One		Three		Five		Total	
Date	Sample	Recap.	Sample	Recap.	Sample	Recap.	Sample	Recap.
8/26/2014	6	0	0	0	0	0	6	0
8/27/2014	0	0	9	0	0	0	9	0
8/28/2014	0	0	9	0	0	0	9	0
8/29/2014	0	0	0	0	4	0	4	0
8/30/2014	0	0	0	0	1	0	1	0
8/31/2014	2	0	0	0	0	0	2	0
9/1/2014	6	1	0	0	0	0	6	1
9/2/2014	0	0	0	0	0	0	0	0
9/3/2014	0	0	1	0	0	0	1	0
9/4/2014	0	0	10	1	0	0	10	1

	One		Three		Five		Total	
Date	**Sample**	**Recap.**	**Sample**	**Recap.**	**Sample**	**Recap.**	**Sample**	**Recap.**
9/5/2014	0	0	4	1	0	0	4	1
9/6/2014	0	0	0	0	2	1	2	1
9/7/2014	0	0	0	0	2	1	2	1
9/8/2014	5	0	0	0	0	0	5	0
9/9/2014	8	1	0	0	0	0	8	1
9/10/2014	0	0	13	3	0	0	13	3
9/11/2014	0	0	1	0	0	0	1	0
9/12/2014	0	0	4	0	0	0	4	0
9/13/2014	0	0	0	0	3	1	3	1
9/14/2014	0	0	0	0	1	0	1	0
9/15/2014	0	0	0	0	0	0	0	0
9/16/2014	3	0	0	0	0	0	3	0
9/17/2014	5	0	3	0	0	0	8	0
9/18/2014	0	0	11	3	0	0	11	3
9/19/2014	0	0	2	1	0	0	2	1
9/20/2014	0	0	0	0	2	1	2	1
9/21/2014	0	0	0	0	2	1	2	1
9/22/2014	9	4	0	0	0	0	9	4
9/23/2014	0	0	9	1	0	0	9	1
9/24/2014	0	0	0	0	4	0	4	0
9/25/2014	7	0	0	0	0	0	7	0
9/26/2014	0	0	4	2	0	0	4	2
9/27/2014	0	0	0	0	0	0	0	0
9/28/2014	0	0	0	0	0	0	0	0
9/29/2014	0	0	0	0	0	0	0	0
9/30/2014	0	0	0	0	0	0	0	0
10/1/2014	0	0	0	0	0	0	0	0
10/2/2014	0	0	0	0	0	0	0	0
10/3/2014	0	0	0	0	2	0	2	0
Total	51	6	80	12	23	5	154	23

Table F19: Bull Trout marks applied by section and date adjusted for migration.

Date	One	Three	Five	Total
8/26/2014	6.0	0.0	0.0	6
8/27/2014	0.0	9.0	0.0	9
8/28/2014	0.0	9.0	0.0	9
8/29/2014	0.0	0.0	4.0	4
8/30/2014	0.0	0.0	1.0	1
8/31/2014	2.0	0.0	0.0	2
9/1/2014	5.0	0.0	0.0	5
9/2/2014	0.0	0.0	0.0	0
9/3/2014	0.0	1.0	0.0	1
9/4/2014	0.0	9.0	0.0	9
9/5/2014	0.0	3.0	0.0	3
9/6/2014	0.0	0.0	1.0	1
9/7/2014	0.0	0.0	1.0	1
9/8/2014	5.0	0.0	0.0	5
9/9/2014	7.0	0.0	0.0	7
9/10/2014	0.0	10.0	0.0	10
9/11/2014	0.0	1.0	0.0	1
9/12/2014	0.0	4.0	0.0	4
9/13/2014	0.0	0.0	2.0	2
9/14/2014	0.0	0.0	1.0	1
9/15/2014	0.0	0.0	0.0	0
9/16/2014	3.0	0.0	0.0	3
9/17/2014	5.0	2.0	0.0	7
9/18/2014	0.0	7.0	0.0	7
9/19/2014	0.0	1.0	0.0	1
9/20/2014	0.0	0.0	1.0	1
9/21/2014	0.0	0.0	1.0	1
9/22/2014	5.0	0.0	0.0	5
9/23/2014	0.0	8.0	0.0	8
9/24/2014	0.0	0.0	4.0	4
9/25/2014	7.0	0.0	0.0	7
9/26/2014	0.0	2.0	0.0	2
9/27/2014	0.0	0.0	0.0	0

Date	One	Three	Five	Total
9/28/2014	0	0	0	0
9/29/2014	0	0	0	0
9/30/2014	0	0	0	0
10/1/2014	0	0	0	0
10/2/2014	0	0	0	0
10/3/2014	0.0	0.0	2.0	2
Total	45	66	18	129

Table F.20: Bull Trout sample, cumulative marks available for recapture and recaptures by section and date.

Date	Sample	Marks	Recap.
Section One:			
8/31/2014	2	6	
9/1/2014	6	6	1
9/8/2014	5	13	
9/9/2014	8	13	1
9/16/2014	3	25	
9/17/2014	5	25	
9/22/2014	9	33	4
9/25/2014	7	38	
Section Three:			
9/3/2014	1	18	
9/4/2014	10	18	1
9/5/2014	4	18	1
9/10/2014	13	31	3
9/11/2014	1	31	
9/12/2014	4	31	
9/17/2014	3	46	
9/18/2014	11	46	3
9/19/2014	2	46	1
9/23/2014	9	56	1
9/26/2014	4	64	2
Section Five:			
9/6/2014	2	5	1

Date	Sample	Marks	Recap.
9/7/2014	2	5	1
9/13/2014	3	7	1
9/14/2014	1	7	
9/20/2014	2	10	1
9/21/2014	2	10	1
9/24/2014	4	12	
10/3/2014	2	16	

Table F.21: Population estimates by section for Bull Trout.

			95% HPD		Standard	CV
Section	**Bayes Mean**	**MLE**	**Low**	**High**	**Deviation**	**(%)**
One	240	166	82	479	120	50.0
Three	231	196	122	368	69	29.9
Five	59	38	19	123	33	56.0
Total	530		251	809	142	26.8

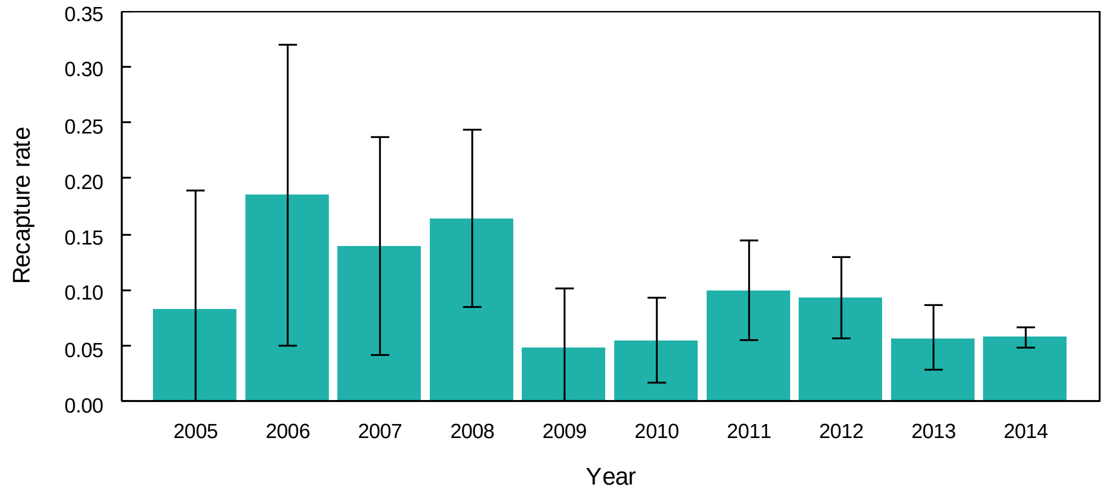


Figure F1: Proportion of pit tags recaptured (recapture rate) by year of release for Mountain Whitefish.

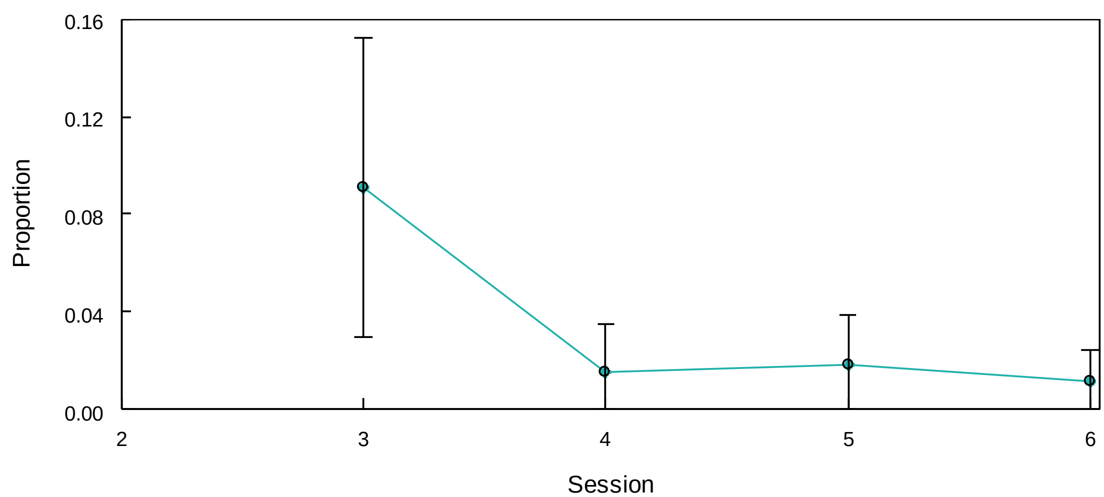


Figure F2 Proportion of Mountain Whitefish recaptured two times by sampling session. Error bars represent plus/minus a standard deviation assuming a multinomial distribution.

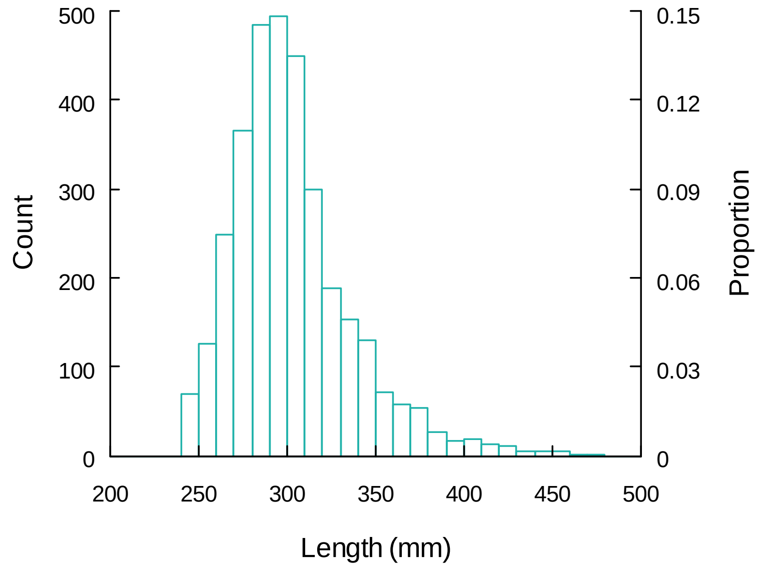


Figure F3 Histogram of Mountain Whitefish lengths at release.

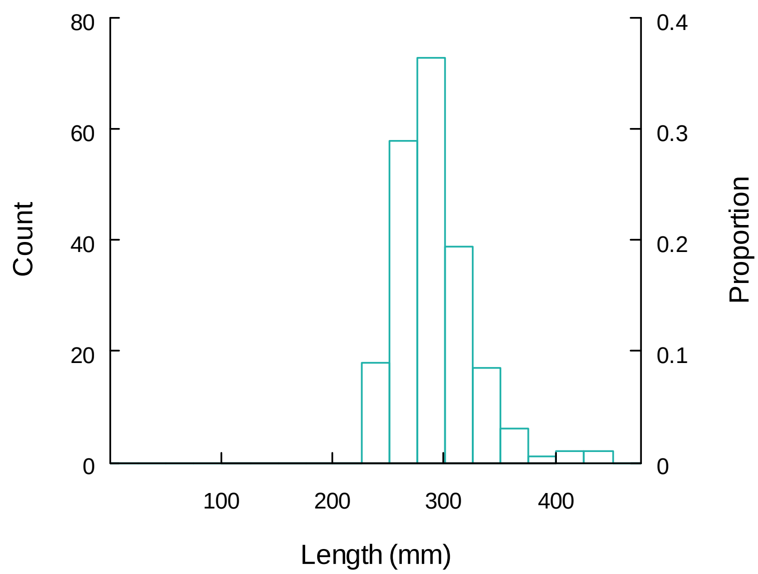


Figure F4 Histogram of Mountain Whitefish lengths at recapture.

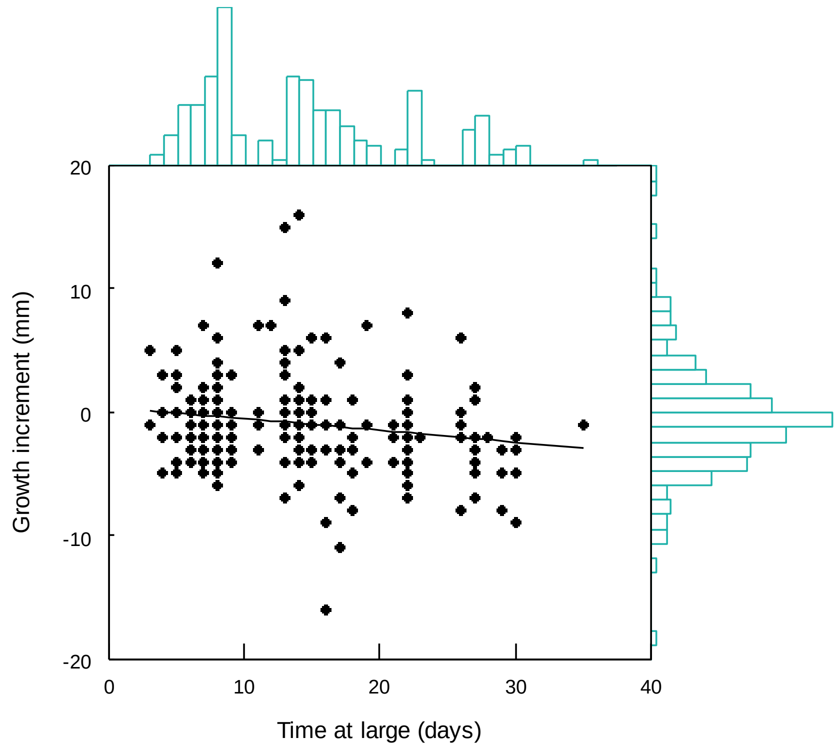


Figure F5 Growth over the study period of Mountain Whitefish with border histograms of time at large and growth increment.

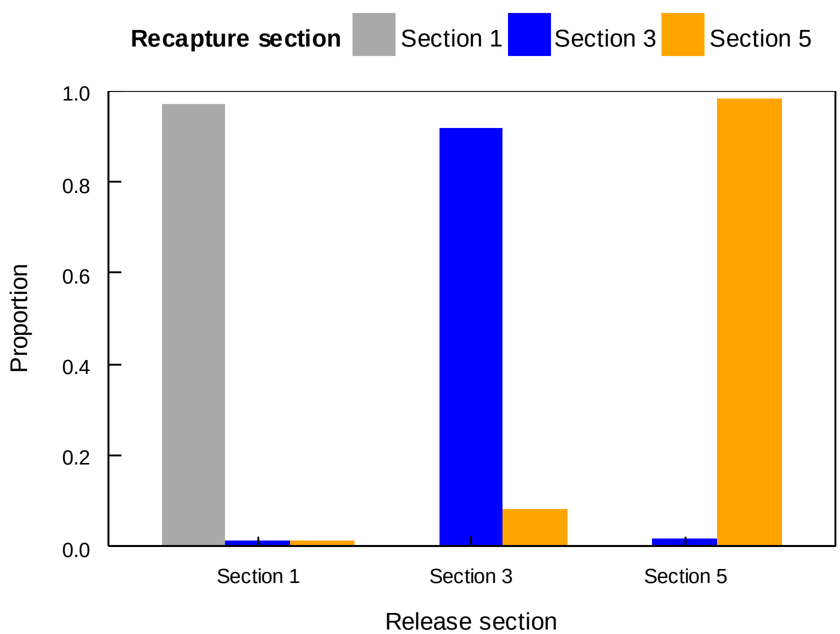


Figure F6 Distribution of recaptured marks in 2014 standardized for sampling effort by section of Mountain Whitefish released in 2014.

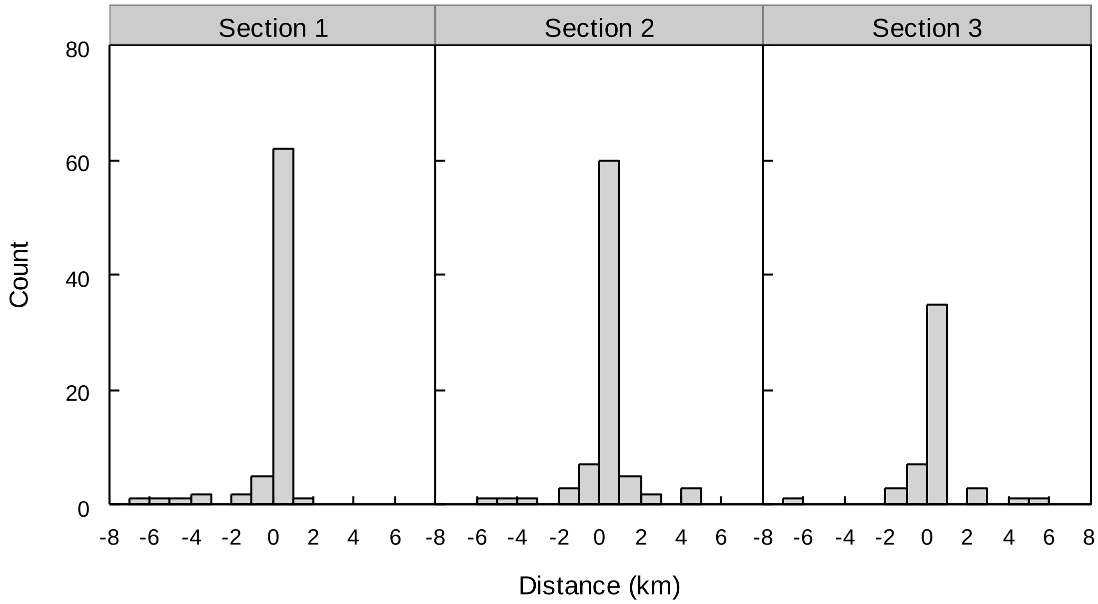


Figure F7 Bar plot of the travel distance of recaptured Mountain Whitefish released in 2014 within each of the sections sampled (positive values indicate upstream movement and negative values downstream movement).

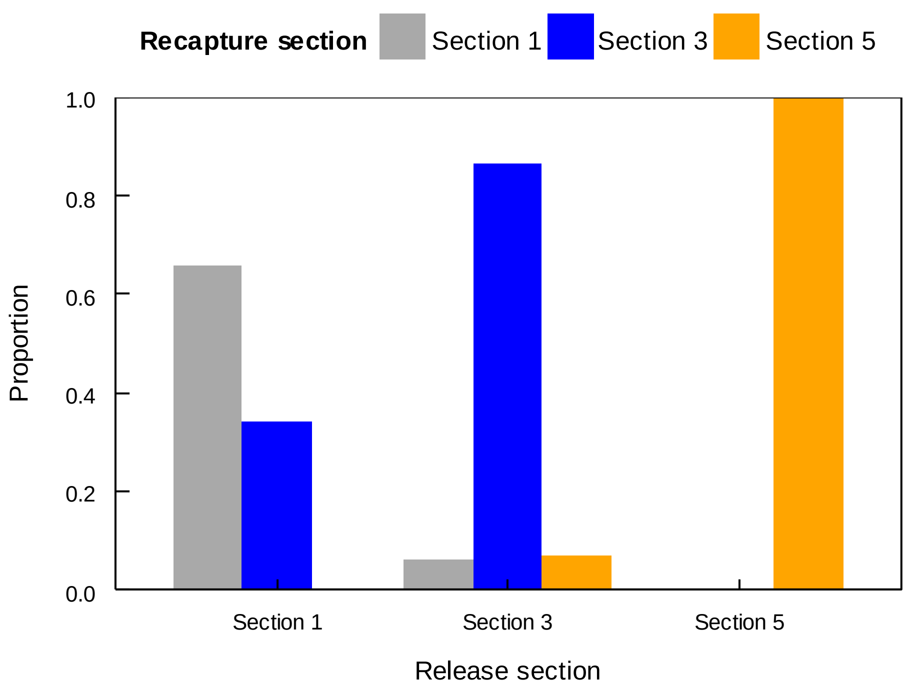


Figure F8 Distribution of recaptured marks in 2014 standardized for sampling effort by section of Mountain Whitefish released in 2005.

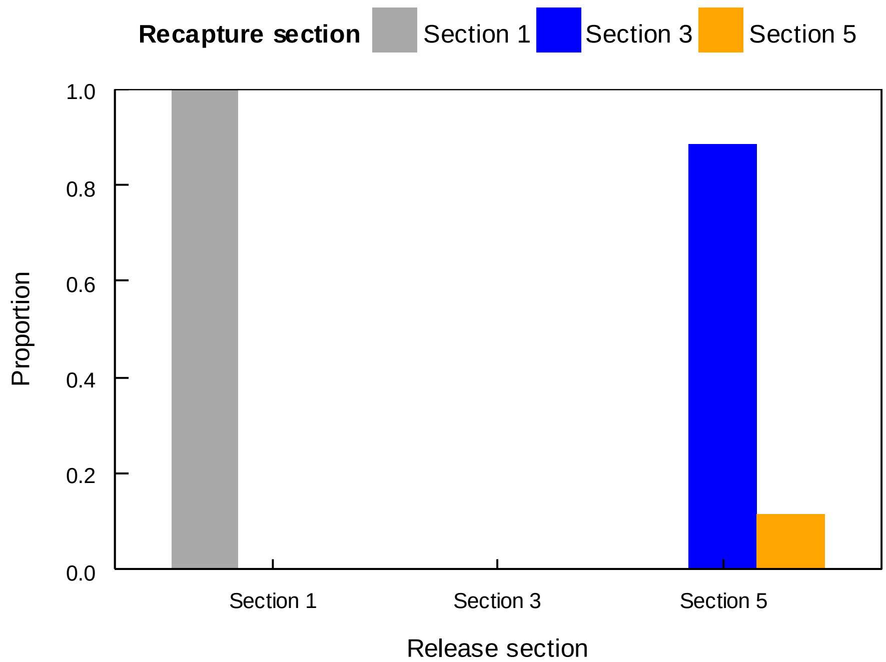


Figure F9 Distribution of recaptured marks in 2014 standardized for sampling effort by section of Mountain Whitefish released in 2006.

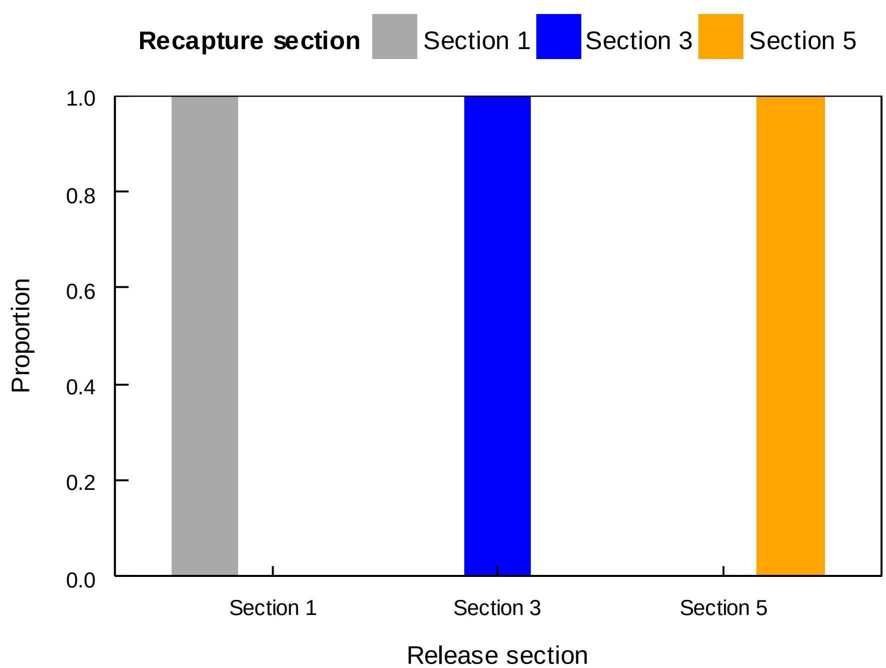


Figure F10 Distribution of recaptured marks in 2014 standardized for sampling effort by section of Mountain Whitefish released in 2007.

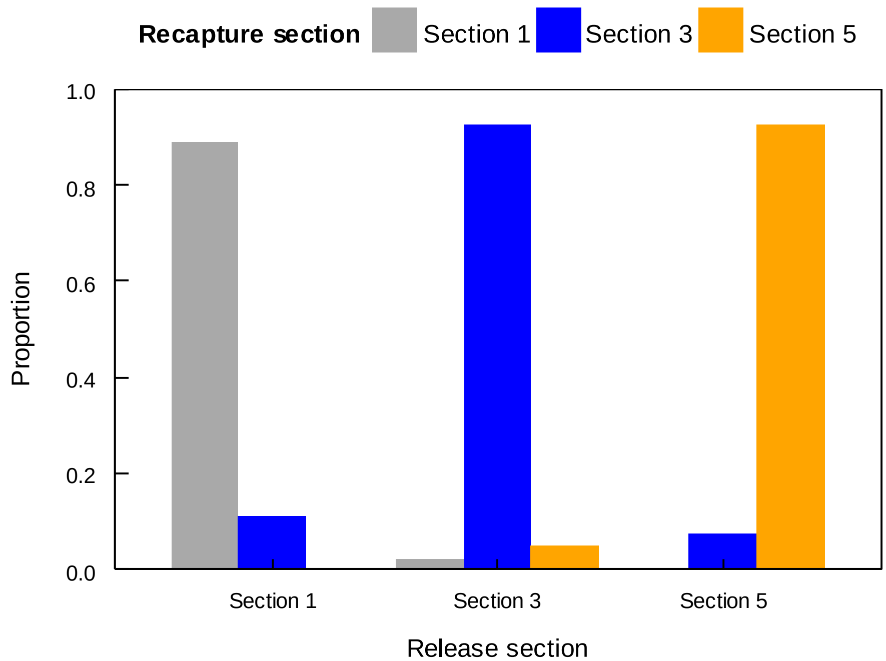


Figure F11 Distribution of recaptured marks in 2014 standardized for sampling effort by section of Mountain Whitefish released in 2008.

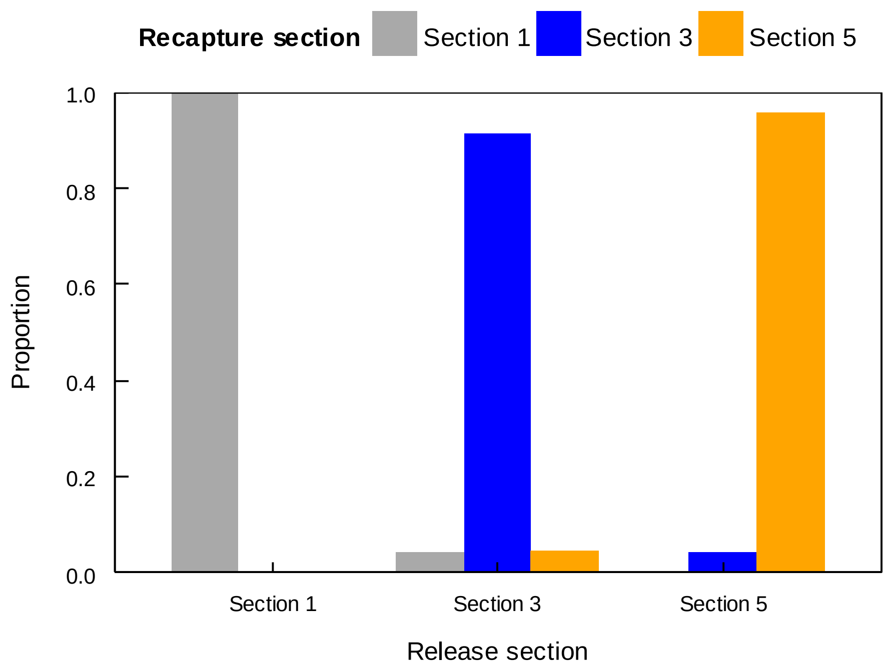


Figure F12 Distribution of recaptured marks in 2014 standardized for sampling effort by section of Mountain Whitefish released in 2009.

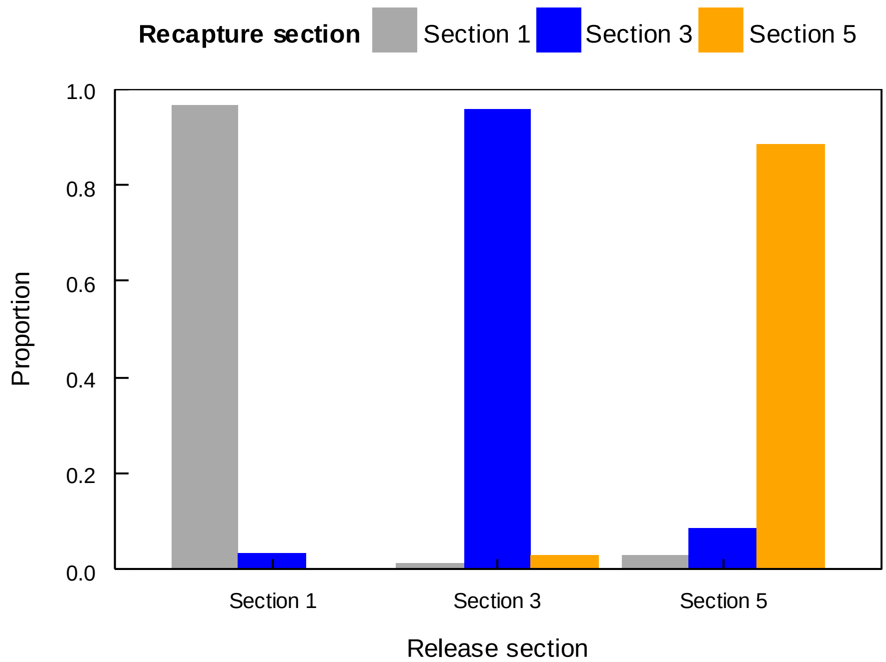


Figure F13 Distribution of recaptured marks in 2014 standardized for sampling effort by section of Mountain Whitefish released in 2010.

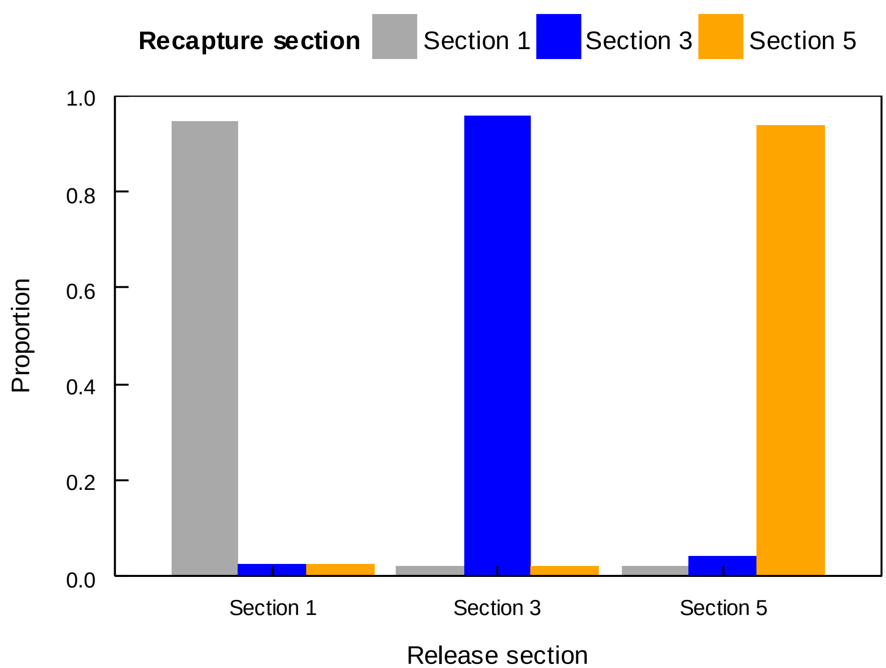


Figure F14 Distribution of recaptured marks in 2014 standardized for sampling effort by section of Mountain Whitefish released in 2011.

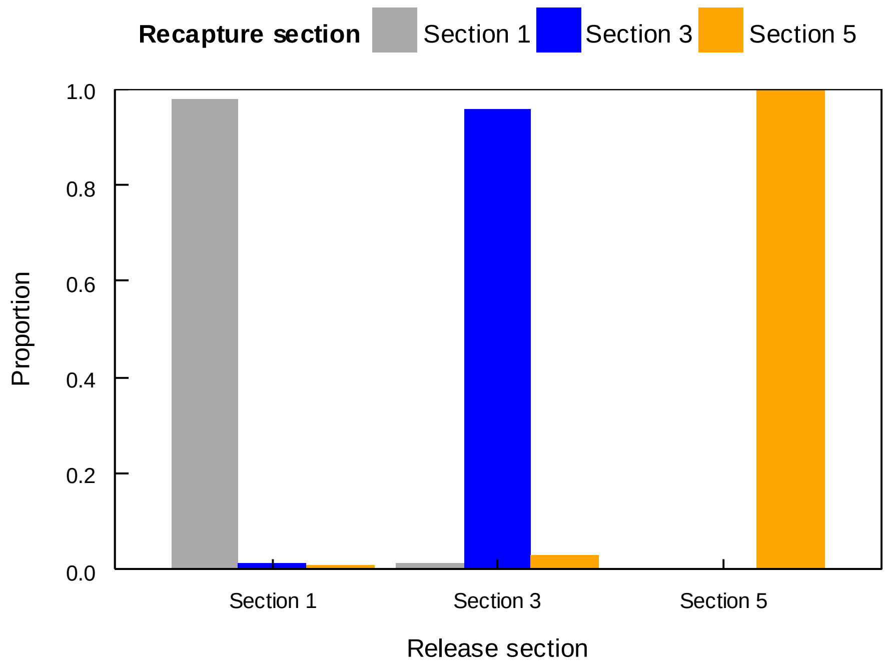


Figure F15 Distribution of recaptured marks in 2014 standardized for sampling effort by section of Mountain Whitefish released in 2012.

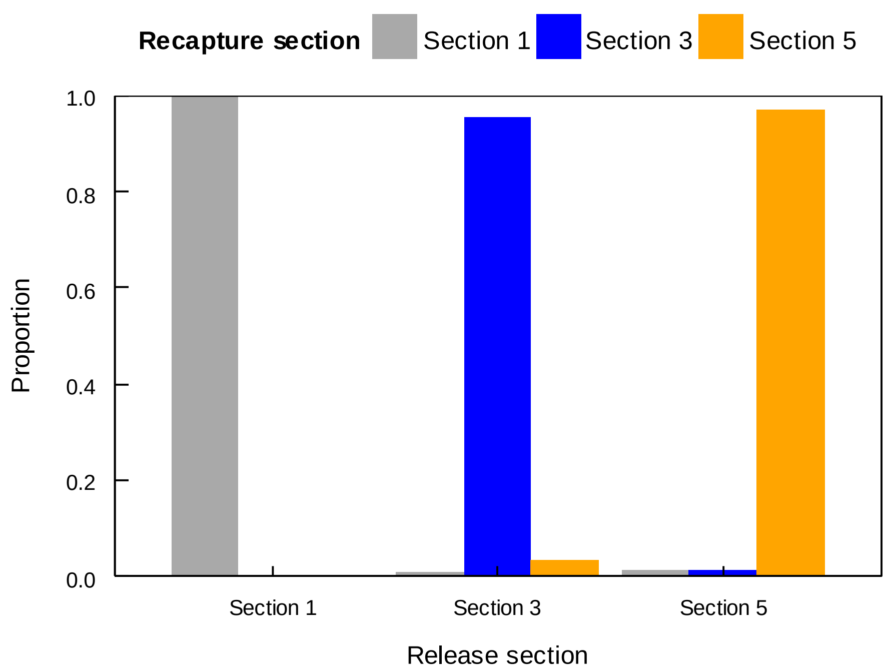


Figure F16 Distribution of recaptured marks in 2014 standardized for sampling effort by section of Mountain Whitefish released in 2013.

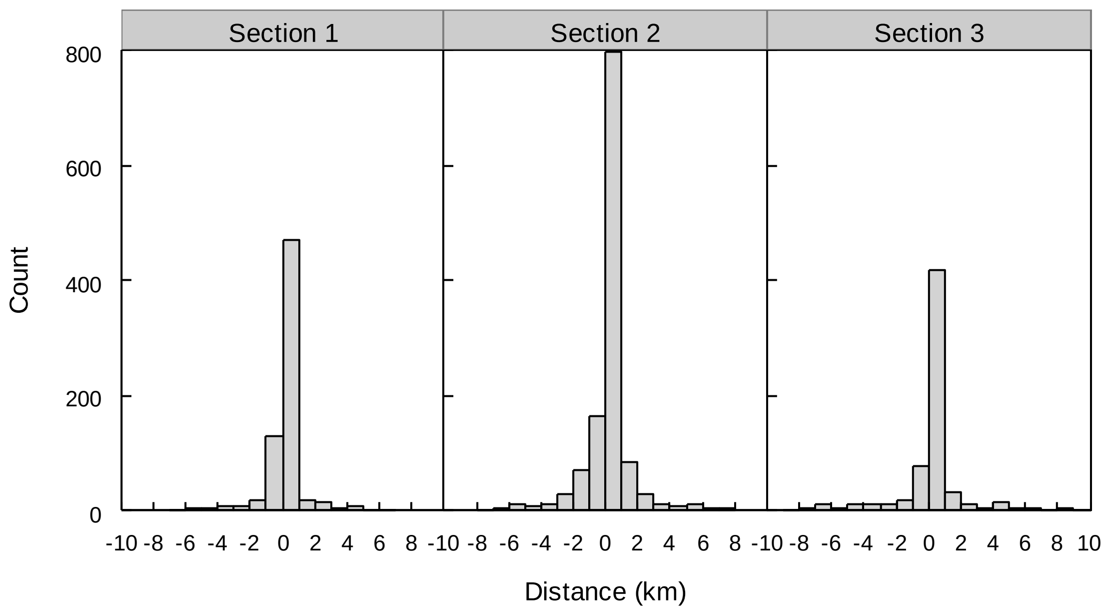


Figure F17 Bar plot of the travel distance of recaptured Mountain Whitefish released 2005 through 2013 within each of the sections sampled (positive values indicate upstream movement and negative values downstream movement) and captured in 2014.

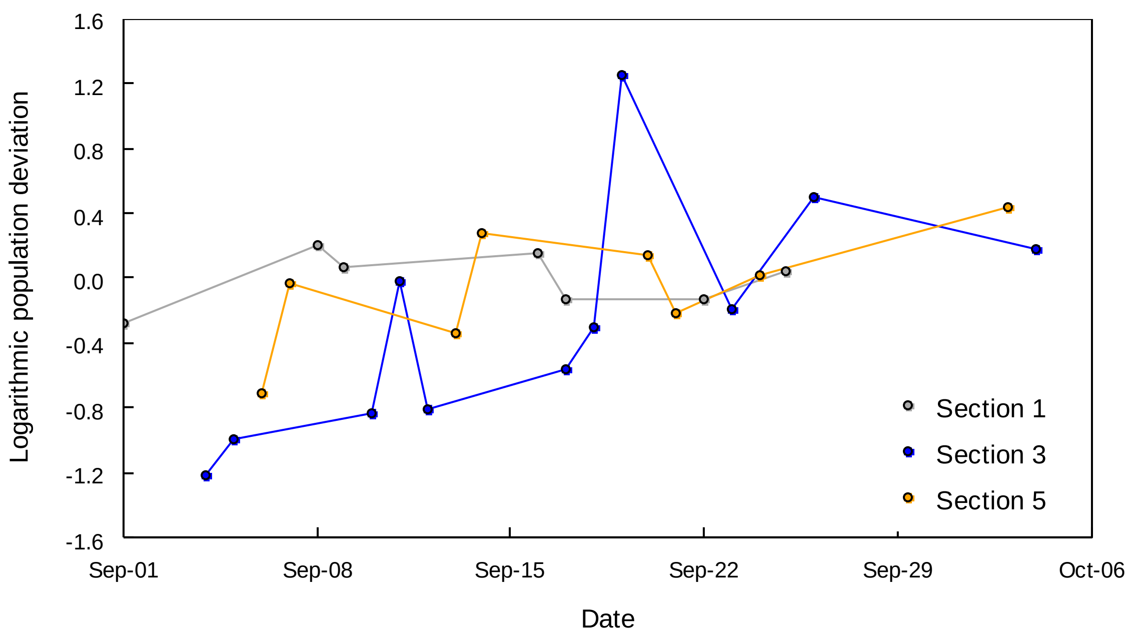


Figure F18 Logarithmic population deviation from the mean by section and date for Mountain Whitefish.

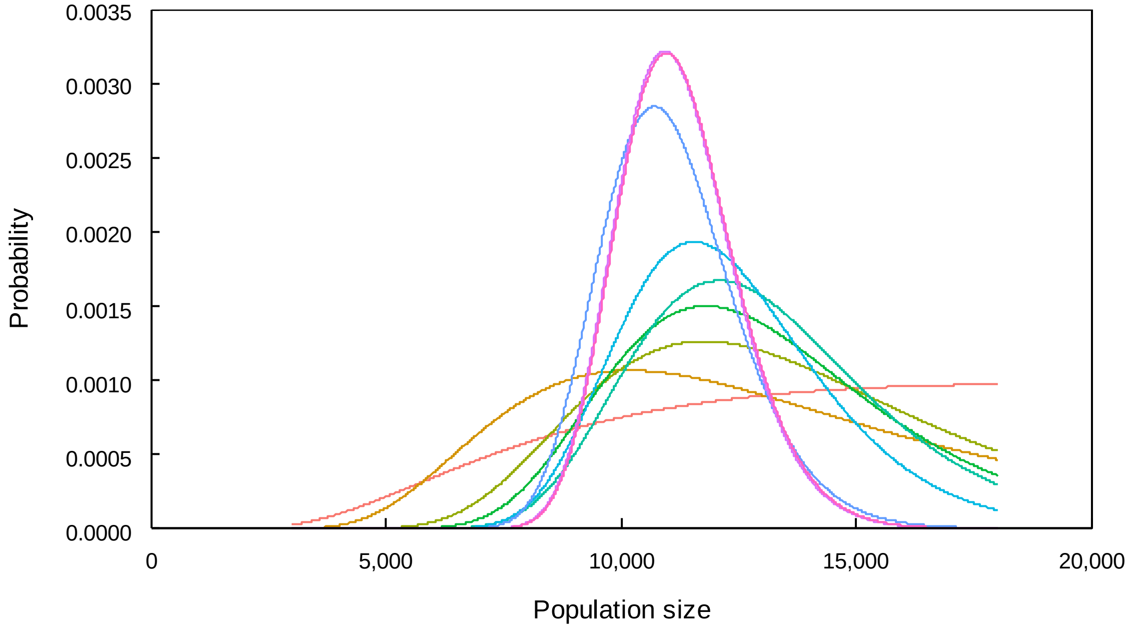


Figure F19 Sequential posterior probability plots of population size for Section 1 Mountain Whitefish in 2014. Each line is the posterior probability updated by a sample day.

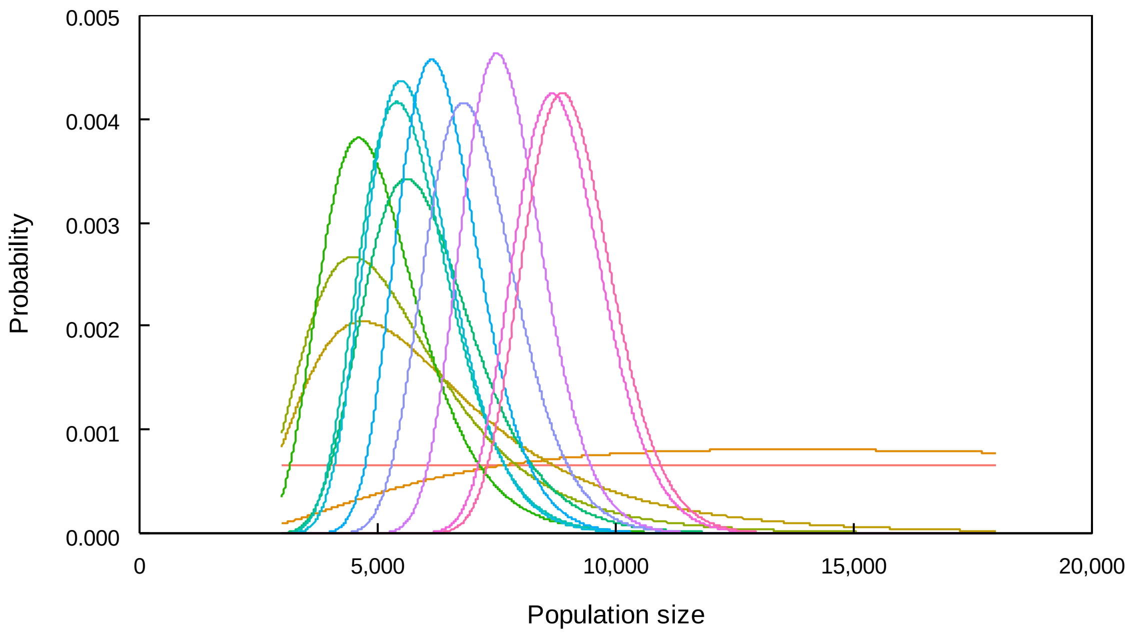


Figure F20 Sequential posterior probability plots of population size for Section 3 Mountain Whitefish in 2014. Each line is the posterior probability updated by a sample day.

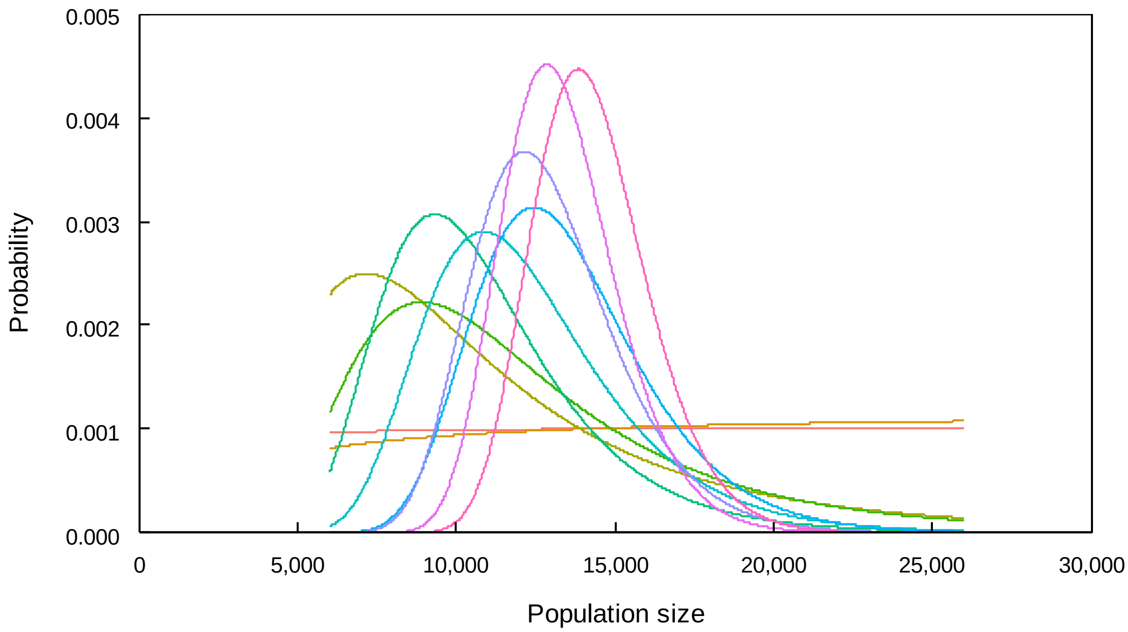


Figure F21 Sequential posterior probability plots of population size for Section 5 Mountain Whitefish in 2014. Each line is the posterior probability updated by a sample day.

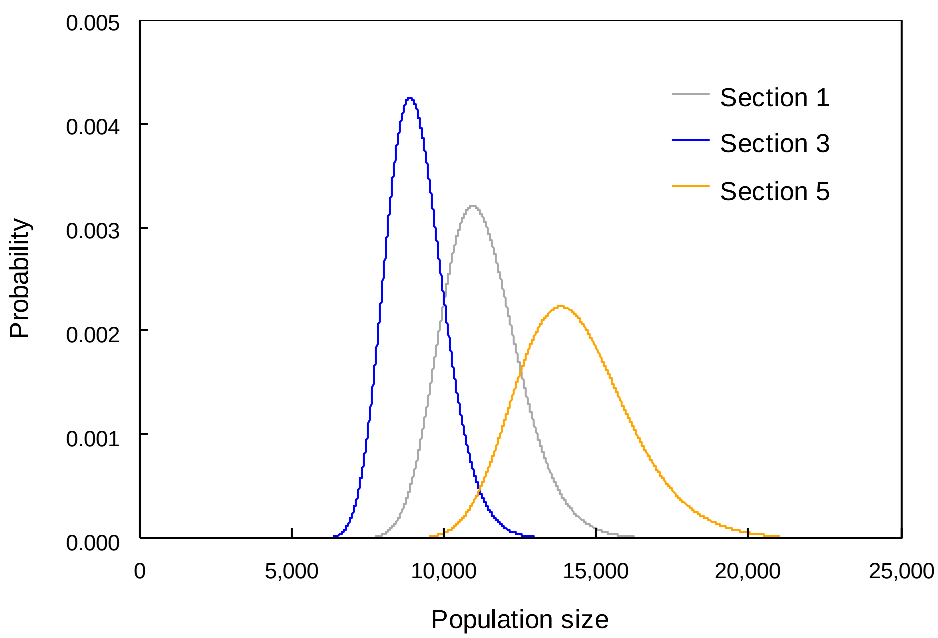


Figure F22 Final posterior distributions by section for Mountain Whitefish.

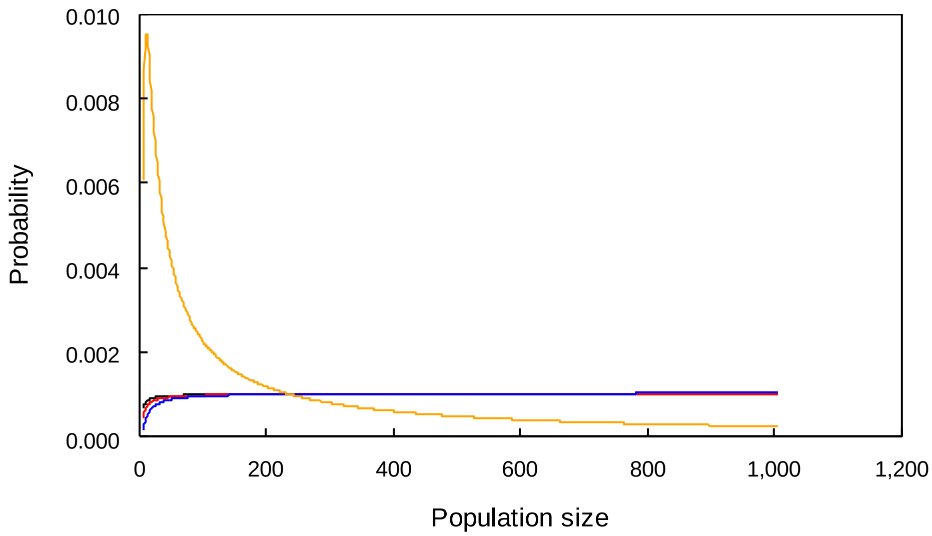


Figure F23 Sequential posterior probability plots of population size for Section 3 Arctic Grayling in 2014. Each line is the posterior probability updated by a sample day.

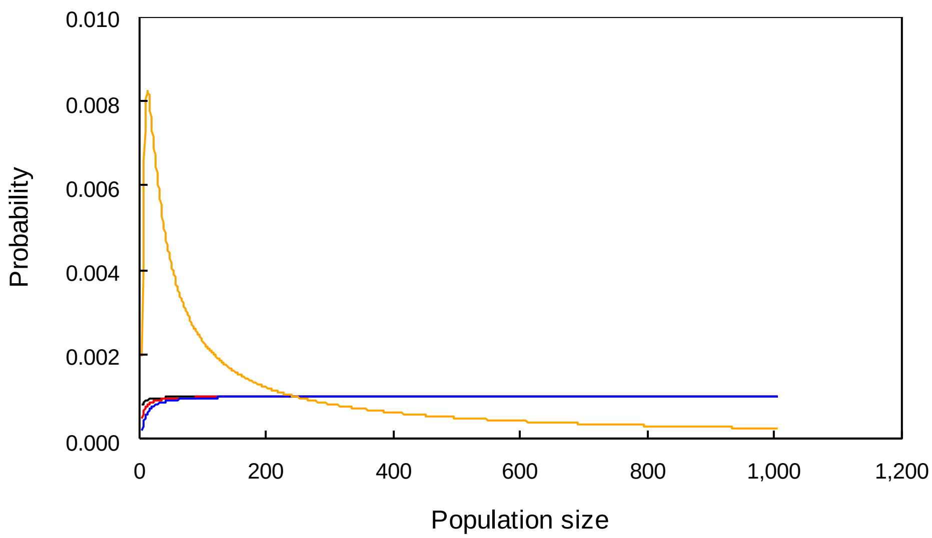


Figure F24 Sequential posterior probability plots of population size for Section 5 Arctic Grayling in 2014. Each line is the posterior probability updated by a sample day.

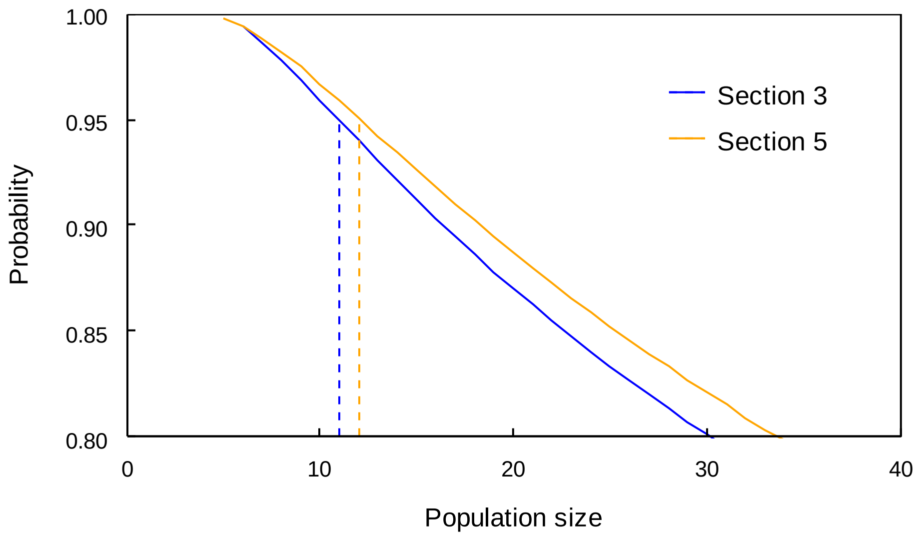


Figure F25 Minimal population estimates for sections 3 and 5 Arctic Grayling in 2014. The dashed vertical lines indicate the 0.95 probability that the population size was at least 11 in Section 3 and 13 in Section 5.

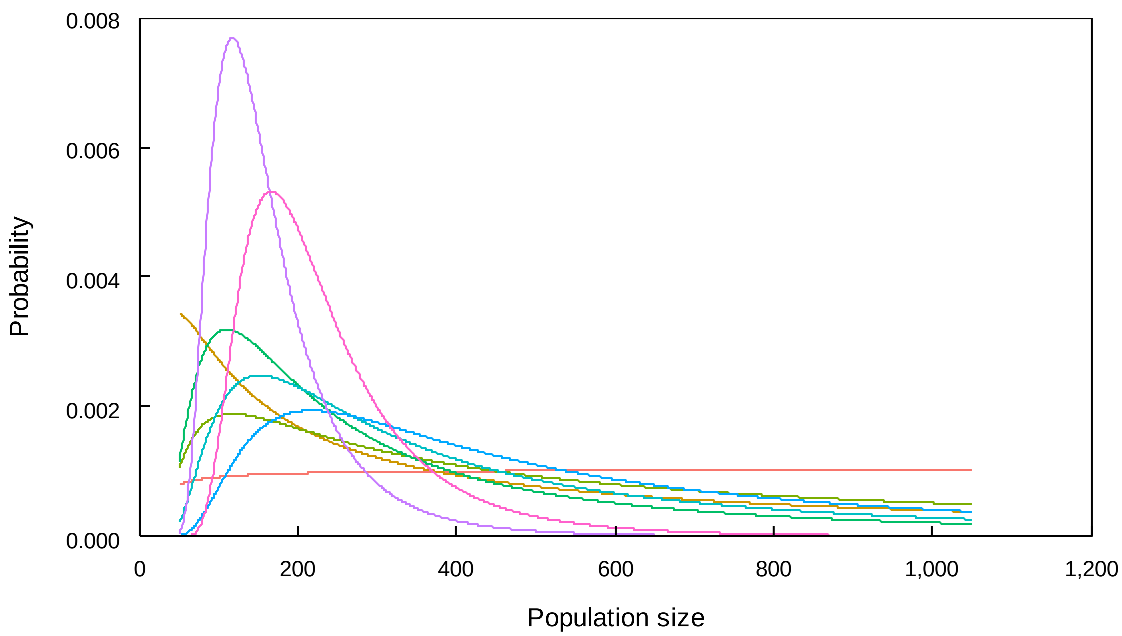


Figure F26 Sequential posterior probability plots of population size for Section 1 Bull Trout in 2014. Each line is the posterior probability updated by a sample day.

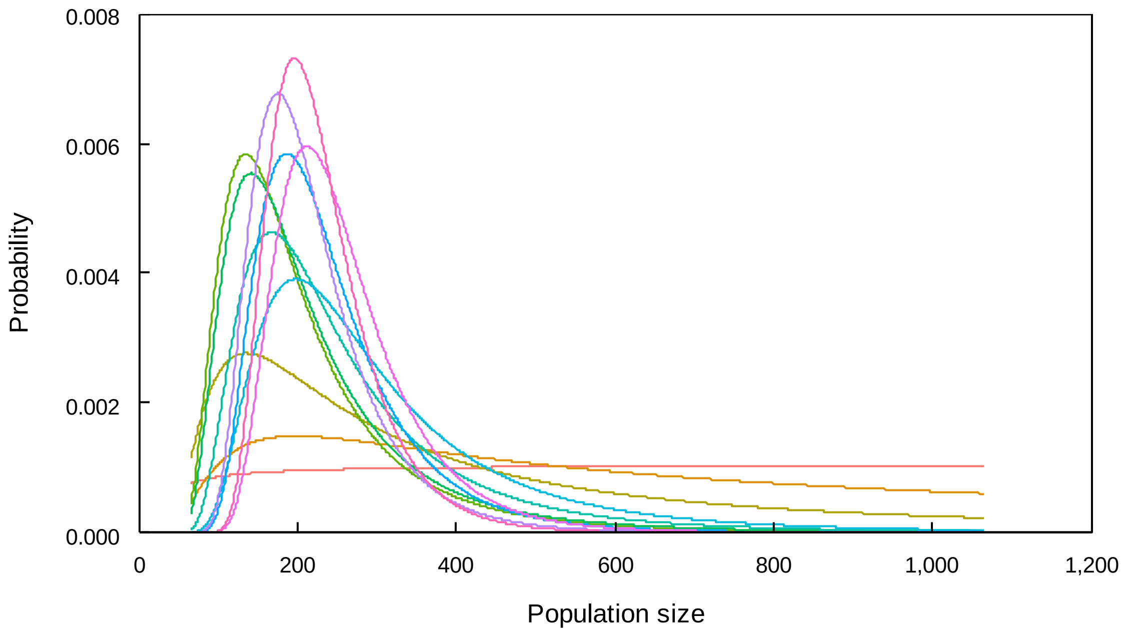


Figure F27 Sequential posterior probability plots of population size for Section 3 Bull Trout in 2014. Each line is the posterior probability updated by a sample day.

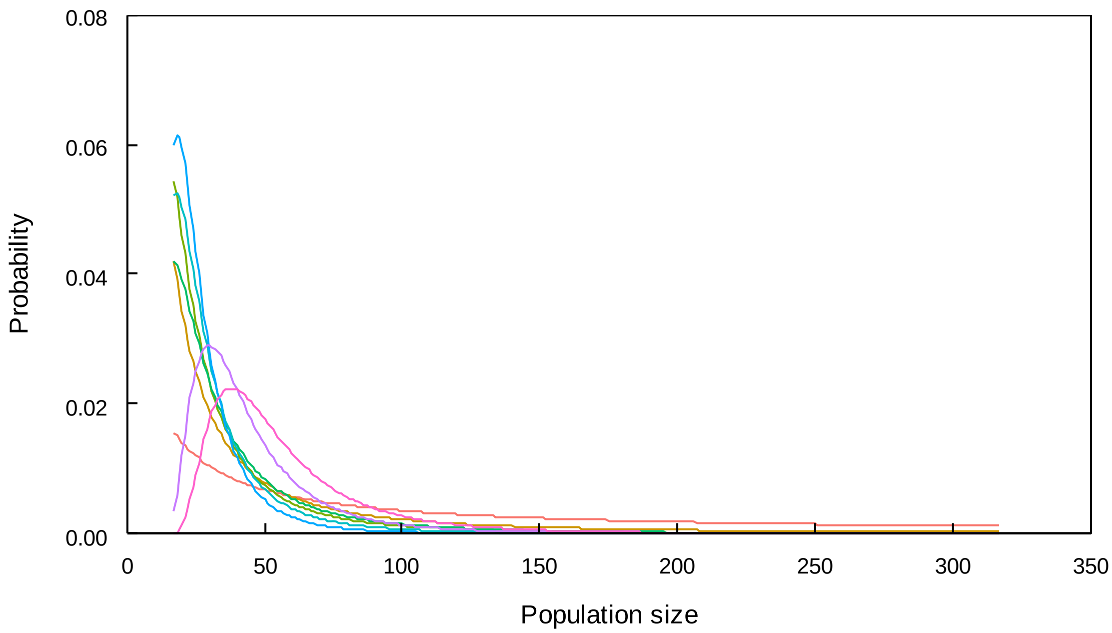


Figure F28 Sequential posterior probability plots of population size for Section 5 Bull Trout in 2014. Each line is the posterior probability updated by a sample day.

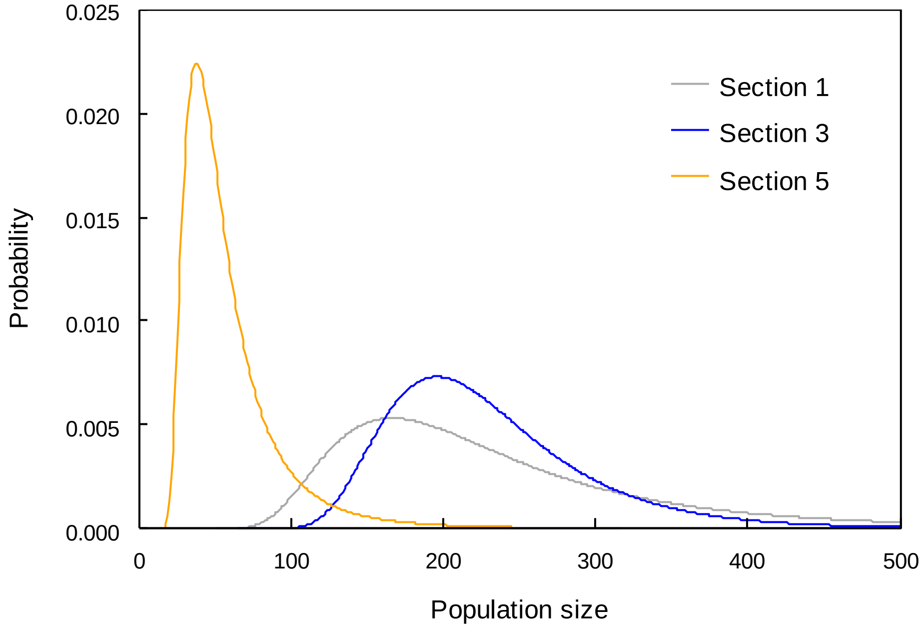


Figure F29 Final posterior distribution by section for Bull Trout.

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