Site C Clean Energy Project

Fisheries and Aquatic Habitat Monitoring and Follow-up Program

Fish Otolith and Fin Ray Microchemistry Study

Construction Years 1 to 4 (2015 to 2018)

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Prepared for

BC Hydro

Site C Clean Energy Project

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EXECUTIVE SUMMARY

BC Hydro is currently constructing the Site C Clean Energy Project (the Project), which will be the third hydroelectric dam on the Peace River near the town of Fort St. John in northeastern British Columbia. BC Hydro developed the Site C Fisheries and Aquatic Habitat Monitoring and Follow-up Program (FAHMFP) in accordance with Provincial Environmental Assessment Certificate Condition No. 7 and Federal Decision Statement Condition Nos. 8.4.3 and 8.4.4 for the Project. To date, Mon-1b, Task 2c (Site C Reservoir Tributaries Fish Population Indexing Survey) and Mon-2, Task 2a (Peace River Large Fish Indexing Survey) of the FAHMFP have collected otoliths and fin rays from select fish species when sampling in the Peace River and its tributaries. Otoliths and fin rays were collected to determine the streams where fish were born and the movement of fish between waterbodies.

Fish structures and water chemistry data were collected opportunistically as part of other monitoring programs (e.g., Mon-1b, Task 2c and Mon-2, Task 2a), and not solely for the purpose of the Fish Otolith and Fin Ray Microchemistry Study. The main objectives of the study were to determine the recruitment sources of six fish species and differentiate recruitment sources between upstream and downstream of the Project. Recruitment, in this particular study, is defined as either natal or first summer habitat or both. The key indicator species included: Arctic Grayling, Bull Trout, Goldeye, Mountain Whitefish, Rainbow Trout, and Walleye. All fish were captured in the Peace River between Peace Canyon Dam and Many Islands, Alberta, as well as from tributaries of the Peace River between Peace Canyon Dam and the Project. Otoliths and fin rays were collected from 2014 to 2018, where 2014 samples are from baseline work (GMSMON-2; Golder and Gazey 2015) and 2015 to 2018 samples are from the first four years of the FAHMFP (BC Hydro 2015). Otoliths and fin rays were analyzed for barium, strontium, and calcium using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) along the temporal growth axis from the structure edge (capture location) to the core (maternal signal). Line scans, using LA-ICP-MS, along the growth axis provides a method to examine and quantify temporal changes in chemistry throughout the fish's life history. Barium and strontium chemistry (corrected to calcium) can provide information about the changes in habitat use over time because these elements are accumulated in the fish directly from the water in which they reside. By modeling the water chemistry at various locations and comparing that with natal and first summer (otolith or fin ray) chemistry using discriminant function analysis, the location of these habitats was predicted. In some cases, it was necessary to combine the water chemistry data among one or more rivers/creeks as they could not be differentiated and/or there was not enough data for the model as an individual waterbody (e.g., Pouce Coupe and Clear rivers combined to Pouce Coupe/Clear for the model).

Results suggested that otolith and fin ray microchemistry, in combination with water chemistry from the Peace River and its tributaries, provided recruitment information within the Peace River watershed. The main findings from the otolith and fin ray microchemistry of the fish captured in the study area are presented below:

- All Arctic Grayling, as determined through otolith microchemistry, were predicted to have recruited from (i.e., born and spent their first summer in) the Moberly River.
- Major recruitment for Bull Trout in the Peace River, as determined through both otolith and fin ray microchemistry, was from the Halfway River watershed (mainly Chowade River, Cypress and Fiddes creeks, and/or Halfway River mainstem). Other recruitment sources to the Peace River may include the Moberly and Pine rivers. All recruitment appeared to have occurred within the Site C Local Assessment Area (LAA), with most upstream of the Project.
- All recruitment of Goldeye, determined through otolith microchemistry, occurred from the Smoky River in Alberta, downstream of the Project and outside the LAA.
- Mountain Whitefish, as determined through otolith microchemistry, mostly recruited from the Beatton and Peace rivers, with smaller recruitment from Moberly and Pine rivers. A large proportion of Mountain Whitefish migrated to the Peace River by their first summer. Most recruitment of Mountain Whitefish occurred downstream of the Project, while there was minimal recruitment upstream of the Project.
- Rainbow Trout, as determined through otolith microchemistry, all recruited from the Halfway River watershed, primarily from Colt, Kobes and Cypress creeks, and remained there until capture, except two fish that ultimately migrated to the Peace River. Therefore, all recruitment occurred within the LAA upstream of the Project.
- Walleye, as determined through fin ray microchemistry, had four major sources of recruitment, including the Peace, Pouce Coupe/Clear, Smoky, and Beatton rivers. In the Beatton River, all Walleye migrated to the Peace River for the first summer, whereas Walleye from other natal areas seemed to remain close to their natal area during their first summer, and then migrated to the Peace River during their adult life. All Walleye appear to have recruited downstream of the Project, with approximately 25% recruiting outside of the LAA in the Smoky River.
- Fin rays and otoliths provided the same habitat predictions for natal and first summer habitat for Bull Trout, suggesting that non-lethally collected fin rays will provide similar recruitment habitat predictions for the fish.
- While there was variability among edge (capture) elemental signatures from fish captured in the same location, overall capture chemistry was highly correlated with the associated capture location water chemistry. In most cases, water chemistry from the various locations was

sufficiently variable to be distinct from other locations. However, in some instances two or more locations were combined due to lack of differentiation in chemistry and/or lack of samples. This improved the models' predictive power (i.e., classification accuracy), as determined through a confusion matrix. The predictive power of all species/structure models was high, ranging from 84.8% to 93.7%, between 4.4 to 6.8 times higher than if predicted by random chance (i.e., expected classification rate; 12.5% to 20% accuracy, depending on species).

ACKNOWLEDGEMENTS

This report was prepared for Nich Burnett, M.Sc., R.P.Bio., Senior Environmental Coordinator of the BC Hydro Site C Clean Energy Project.

TrichAnalytics Inc. would like to acknowledge Golder Associates Ltd. and BC Hydro for providing the historic water chemistry data from 2008-2018, and fish otolith and fin ray samples for the 2014-2018 study period. Golder also provided text for fish capture and tissue sampling methods.

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1.0 INTRODUCTION

BC Hydro is currently constructing the Site C Clean Energy Project (the Project), which will be the third hydroelectric dam on the Peace River near the town of Fort St. John in northeastern British Columbia. BC Hydro developed the Site C Fisheries and Aquatic Habitat Monitoring and Follow-up Program (FAHMFP; BC Hydro 2015) in accordance with Provincial Environmental Assessment Certificate Condition No. 7 and Federal Decision Statement Condition Nos. 8.4.3 and 8.4.4 for the Project. To date, Mon-1b, Task 2c (Site C Reservoir Tributaries Fish Population Indexing Survey) and Mon-2, Task 2a (Peace River Large Fish Indexing Survey) of the FAHMFP have collected otoliths and fin rays from select fish species when sampling in the Peace River and its tributaries. Otoliths and fin rays were collected to determine possible recruitment sources of key indicator fish species in the Peace River.

The Fish Otolith and Fin Ray Microchemistry Study is the largest and most comprehensive examination of fish natal and summer rearing habitat using otolith and fin ray microchemistry ever conducted in British Columbia. This report builds off previous baseline studies focused on identifying potential spawning and early rearing habitats of fish in the Peace River watershed.

Otoliths are calcified bony structures of the inner ear that grow like tree rings throughout a fish's life. Elements in surface water, such as barium, strontium, and zinc can accumulate in the otoliths in such a way as to record the temporal changes in water quality, and/or habitat use during a fish's entire life history up until capture. Otolith microchemistry using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) has been used as a standard tool to characterize natal sources and migration of freshwater and anadromous fish for many years (Wells et al. 2003; Clarke et al. 2007a,b; Gibson-Reinemer et al. 2009). While there are significant and stark differences in barium and strontium signatures between freshwater and marine environments, the differences among freshwater tributaries can be more subtle. As such, the usefulness of the technique to predict fish habitat is dependent upon differentiation of water chemistry signatures (particularly barium and strontium) among the waterbodies that the fish use throughout their life. Therefore, the first study conducted in 2010 focused on whether there was enough differentiation in barium and strontium signatures among various Peace River tributaries, and if that correlated with differentiation in the barium and strontium signatures in fish otoliths collected from those tributaries (Clarke et al. 2011). Clarke et al. (2011) concluded that a combination of water chemistry data from various locations in the Peace River watershed and otoliths from the captured fish provided an effective means to assess natal habitat sources. Earthtone and Mainstream (2012) verified the usefulness of otoliths as a predictive tool for habitat use, but many

"unknown" predictions still resulted (unknown meaning that the natal or first summer chemistry in the otolith did not match the water chemistry of the locations used in the model).

Earthtone and Mainstream (2013) conducted a follow-up study to build on the initial results of Clarke et al. (2011) and Earthtone and Mainstream (2012). The main findings of Earthtone and Mainstream (2013) included the following:

- Arctic Grayling spent their first summer in habitats similar to their natal streams; and that the Moberly River was the most important recruitment source of Arctic Grayling to the Peace River, with minor recruitment sources from the Halfway, Pine, and Beatton rivers.
- Most of the recruitment for Bull Trout was from the Halfway River watershed, mainly from the Chowade River, and Cypress and Fiddes creeks. The Pine River was another important recruitment source, and possibly Gething Creek, although Gething Creek may not be accurate due to its similarity in water chemistry to the Pine River.
- While up to 20% of the Goldeye recruited from the Smoky River in Alberta, all other Goldeye came from unknown locations.
- Mountain Whitefish recruited from a number of locations, including the Halfway, Moberly, Peace, Pine, and Beatton rivers. Many of the fish spent their first summer in the Peace River, irrespective of their natal habitat.
- Rainbow Trout captured in the Peace River appeared to originate from the Halfway River, and Maurice and Farrell creeks.
- The largest sources of Walleye recruitment were predicted to be Beatton River and/or Charlie Lake, although some were predicted to recruit from the Pine, Pouce Coupe, and Smoky rivers.

Fish structures and water chemistry data were collected opportunistically as part of other monitoring programs (e.g., Mon-1b, Task 2c and Mon-2, Task 2a), and not solely for the purpose of the Fish Otolith and Fin Ray Microchemistry Study. Different from previous reports using fish otolith microchemistry, the current study incorporated a non-lethal structure (fin rays) into the analysis to evaluate its effectiveness as an alternative or supplementary structure to otoliths to help expand on existing knowledge of fish recruitment in the Peace River watershed. A fin ray is also a calcified structure, but contains slightly less calcium (27%) than an otolith (40%). Fin rays grow like otoliths with a core (representing natal habitat) growing outwards to the edge (capture location). Fin ray collection is considered not only non-lethal, but also does not appear to have physiological or behavioural impacts to sampled fish (Collins and Smith 1996; Nguyen et al. 2016). Collection of fin rays is preferred by BC Hydro (BC Hydro 2015) for monitoring programs that require microchemistry analysis due to the non-lethal sampling nature.

Otoliths are opportunistically collected from fish that inadvertently succumb from sampling under the FAHMFP (BC Hydro 2015).

Otoliths are the preferred structure for microchemistry as they are primarily comprised of aragonite and there is high precision with identifying annuli, which is important for determining natal and first summer regions on the structure in addition to ageing the fish (Clarke et al. 2007a). Alternatively, fin rays are comprised of apatite, which can potentially interfere with signals when ablated using LA-ICP-MS analysis (Tzadik et al. 2017). Additionally, fin rays may have reduced precision in ageing, depending on the fish species (Maraldo and MacCrimmon 1979; Zymonas and McMahon 2009), and thus there may be increased difficulty in identifying specific time periods of the fish's life history. Despite some potential limitations, fin rays have been successfully used, particularly to determine migration of fish between freshwater and marine water (Veinott et al. 1999; Arai et al. 2002; Allen et al. 2009; Nelson et al. 2013; Sellheim et al. 2017). Due to more subtle differentiation in freshwater environments in barium and strontium (as opposed to freshwater versus marine), the potential use of fin rays is largely dependent on variability in water chemistry among the freshwater environments that are sampled. For instance, fin rays were successfully used for Sturgeon (*Acipenser fulvescens* and *Scaphirhynchus platorynchus*) in a number of studies to discern changing habitat use within the freshwater environment (Phelps et al. 2012; Phelps et al. 2016; Phelps et al. 2017). The main purpose of integrating fin rays into the current study was to determine if this non-lethally collected structure could be a powerful predictive tool to characterize natal and first summer habitat of fish in the Peace River watershed.

The previous findings using otolith microchemistry, in addition to the Fish Otolith and Fin Ray Microchemistry Study (this report), will help support other monitoring programs in the FAHMFP. Specifically, the microchemistry results will be combined with other fish habitat data sources (e.g., genetics, radio telemetry, fish capture locations) in a weight of evidence approach to provide insight on life history and recruitment sources of key indicator fish species in the Peace River. Ultimately, information from all monitoring approaches will be used to answer management questions and test management hypotheses for these key fish species (BC Hydro 2015).

1.1 Purpose and Objectives

The purpose of the Fish Otolith and Fin Ray Microchemistry Study is to investigate the recruitment sources (defined herein as natal and first summer habitats) of key indicator species in the Peace River, namely Arctic Grayling, Bull Trout, Goldeye, Mountain Whitefish, Rainbow Trout, and Walleye. A summary of fish data and capture locations is provided in Appendix A. Specifically, this report aims to characterize the proportion of fish that recruit (i.e., natal and first summer) from upstream *versus*

downstream of the Project, as well as those that recruit within and outside the Site C Local Assessment Area (LAA). Objectives, taken directly from the FAHMFP (BC Hydro 2015), are:

(1) "Microchemistry will be used to estimate the proportion of each species that were spawned and reared upstream *versus* downstream of the Project" (BC Hydro 2015); most specifically for Bull Trout, Rainbow Trout, and Arctic Grayling.

(2) Estimate the proportion of all fish species reported here, most specifically Goldeye and Walleye, that were spawned and reared in the LAA relative to downstream areas (i.e., downstream of Many Islands, Alberta).

The activities conducted to meet objectives and the overall purpose included:

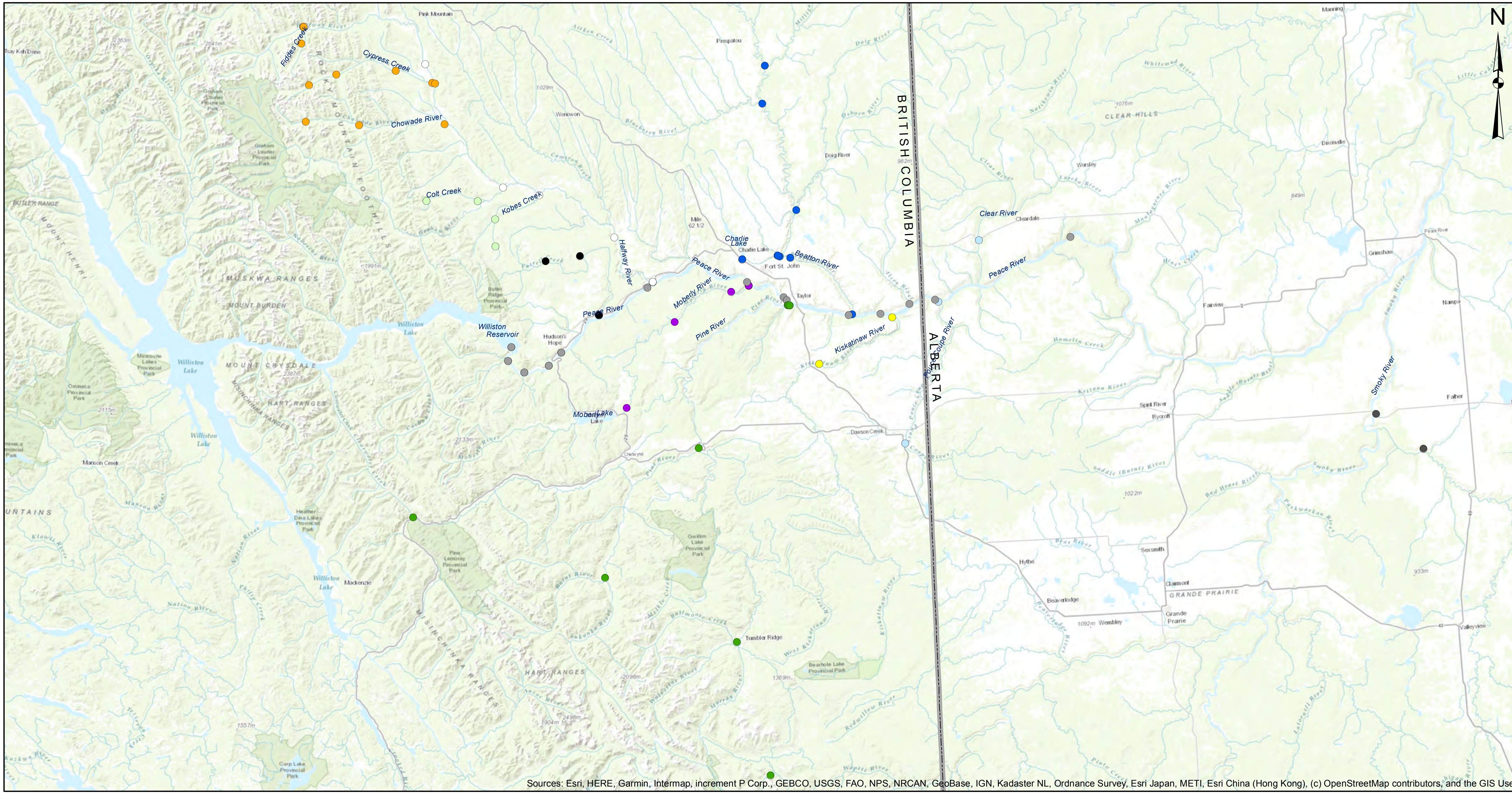
- Compilation of available water chemistry data (specifically, barium, strontium, and calcium) from the Peace River and its tributaries to develop location-specific elemental signatures.
- Analysis of fin rays and/or otoliths, from six species of fish, for barium, strontium, and calcium.
- Development of water to otolith and/or water to fin ray chemistry models for each species using capture habitat elemental signatures.
- Statistical analysis and modeling to determine the most probable natal and first summer habitat for each individual fish.
- Comparison of fin rays to otoliths for use in habitat prediction in Bull Trout (n = 10), when both structures are available from the same individual fish.

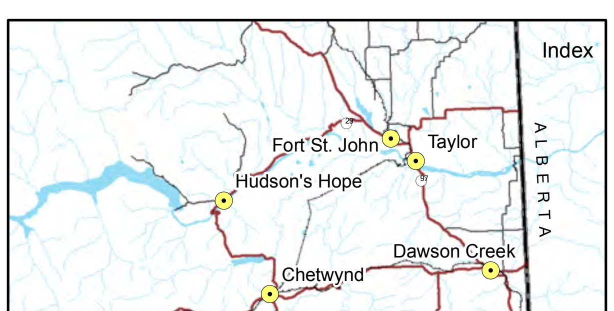
2.0 METHODS

2.1 Surface Water Chemistry Data

Surface water chemistry data collected from several rivers and creeks in the Peace River watershed was provided by BC Hydro and included data collected from 2008 to 2018 (Golder 2009; Clarke et al. 2011; Earthtone and Mainstream 2012) (Figure 1). For the current study, 80 sampling locations within 33 waterbodies were selected from the available water chemistry data (Table 1) to determine probable natal and first summer habitats. While some locations were monitored multiple times over multiple years, some locations have only been sampled once from 2008 to 2018 (Table 1). While the multi-year collection of water samples from this large-scale area is extensive, some waterbodies had only one or two water samples collected over the 10-year period. Additionally, water chemistry among some locations could not be differentiated based on strontium and barium signatures alone (see Results, Section 3.1). As a result, some waterbodies and/or locations were grouped and this

increased the water chemistry data set for a particular area required for modeling (Figure 1). However, groupings were structured to differentiate locations upstream and downstream of the Project so the objectives of the study could still be met. For example, Smoky River watershed had a total of three (3) water chemistry results (Table 1); two from the mainstem and one from Little Smoky River. The statistical model used to predict fish habitat requires a minimum of three samples. Combining these data was deemed appropriate, as water chemistry was fairly similar and they are all located downstream of the Project outside of the LAA.





Water Sample Locations

- Farrell Creek
- Beatton River
- Pine River
- Smoky River
- Peace River
- Chowade River, Cypress Creek, Fiddes Creek
- Pouce Coupe River, Clear River
- Colt Creek, Kobes Creek
- Moberly River
- Halfway River
- Kiskatinaw River

1:1,250,000   0 — 50 km

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI World Topographic

BC Hydro

Water sample collection sites used for fish microchemistry study

Figure 1

Date	Jun 8, 2020	DWG NO	1016-N11-00749-13	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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Table 1. Summary of Surface Water Sample Collection Locations from 2008 to 2018 Selected for Modeling

Label for Model	Waterbody/Tributary		2008	2011	2012	2016	2017	2018
Peace	Dinosaur L.			48		3	2	
	Williston L.			14		3	2	2
	Peace R.	Section 1	9	8		4	2	4
		Section 2	6	8		2	1	2
		Section 3	6	8		2	1	2
		Section 4	6	7				
		Section 5	7					
		Section 6						
		Section 7				2	1	2
		Section 8				2	1	2
		Section 9				2	1	2
Farrell	Farrell Cr.			1	1			3
Halfway Main	Halfway R.	Mainstem	11	24	1	3	1	6
Chowade/ Cypress/Fiddes		Chowade R.			1			2
		Cypress Cr.			1			4
		Fiddes Cr.			1			1
Colt/Kobes		Colt Cr.						2
		Kobes Cr.						2
Moberly	Moberly R.		12	15		3	1	3
Beatton	Beatton R.	Reach 17		9		2	1	
		Blueberry R.			1			
		Charlie L.		1	1			
		Doig R.			1			
		Milligan R.			1			
		Montney Cr.			1			
		Stoddard Cr.		1	1			
Pine	Pine R.	Mainstem		9	1	2	1	2
		Burnt R.			1			
		Callazon Cr.			1			
		Fellers Cr.			1			
		Murray R.			1			
		Wolverine R.			1			
Kiskatinaw	Kiskatinow R.				1	2	1	1
Pouce/Clear	Pouce R.			1	2	2	1	1
	Clear R.			1	1			
Smoky	Smoky R.	Mainstem		1	1			
		Little Smoky R.			1			

2.2 Fish Otolith and Fin Ray Samples

Fish were sampled by Golder Associates Ltd. (Golder) at various locations that differed among years from 2014 to 2018 (Tables 2 and 3) through other fish monitoring programs. Specifically, fish sampled in 2014 were collected under GMSMON-2 (Golder and Gazey 2015). Fish sampled from 2015 to 2018 were collected through Mon-1b, Task 2c (Site C Reservoir Tributaries Fish Population Indexing Survey) and Mon-2, Task 2a (Peace River Large Fish Indexing Survey) of the FAHMFP (BC Hydro 2015). Fin ray samples were collected from all initially captured Bull Trout, Goldeye, Lake Trout, Northern Pike, and Walleye.

Otoliths were collected opportunistically from fish that succumbed to sampling. Samples were collected in accordance with the methods outlined in Mackay et al. (1990). For otoliths, scissors or side-cutter pliers were used to cut through the fish's isthmus to expose the roof the mouth. A portion of the parasphenoid bone was cut where the first gill arch joined the roof of the mouth. The depth of the cut was such that when the fish was held exclusively by its head, the weight of the fish's body "broke" the fish's backbone where the parasphenoid bone was cut, exposing the otoliths. Otoliths were removed from the fish using a pair of forceps and the otolithic membrane sac was removed from each otolith before being stored in an appropriately labelled coin envelop.

For fin rays, side-cutter pliers were used to cut through the leading ray of the fish's right pectoral fin. The fin ray was removed as close to the body of the fish as possible and was cut perpendicular to the fin ray. After collection, excess tissue was removed when necessary, and the fin ray was stored in an appropriately labelled coin envelop. Prior to the extraction process, all instruments were immersed in an antiseptic (Super Germiphene™; Brantford, ON, Canada) and rinsed with distilled water.

Otoliths and fin rays were provided to TrichAnalytics for microchemistry analysis. Samples provided included: Arctic Grayling (AG), Bull Trout (BT), Goldeye (GE), Mountain Whitefish (MW), Rainbow Trout (RB), and Walleye (WP). Golder collected samples of Kokanee (2014, n=1) and Slimy Sculpin (2018, n=1), but these samples were not included in this report. In total, Golder shipped 414 otoliths and fin rays to TrichAnalytics Inc. (Saanichton, BC) in May 2019 (Table 4).

Table 2. Fish Otolith Sample Collection Locations from 2014 to 2018

Label for Model	Waterbody/Tributary		2014[1]	2015[2]	2016[2]	2017[2]	2018[2]
Peace	Dinosaur L.						
	Williston L.						
	Peace R.	Section 1	MW	MW	MW	MW	MW, AG
		Section 2					
		Section 3	MW		MW, RB, AG	MW	
		Section 4					
		Section 5	MW, RB		MW		MW, AG
		Section 6		MW	MW	MW	MW
		Section 7		MW			MW
		Section 8					
		Section 9				MW	MW
Farrell	Farrell C.						RB
Halfway Main	Halfway R.	Mainstem					
Chowade/ Cypress/Fiddes		Chowade R.					BT
		Cypress Cr.				RB, BT	BT
		Fiddes Cr.				BT	
Colt/Kobes		Colt Cr.				RB	MW
		Kobes Cr.				RB	
Moberly	Moberly R.						AG
Beatton	Beatton R.	Reach 17					
		Blueberry R.					
		Charlie L.					
		Doig R.					
		Milligan R.					
		Montney Cr.					
		Stoddard Cr.					
Pine	Pine R.	Mainstem		MW			
		Burnt R.					
		Callazon Cr.					
		Fellers Cr.					
		Murray R.					
		Wolverine R.					
Kiskatinaw	Kiskatinaw R.						
Pouce/Clear	Pouce R.						
	Clear R.						
Smoky	Smoky R.	Mainstem					
		Little Smoky R.					

Note: (1) Golder and Gazey 2015; (2) BC Hydro 2015.

Table 3. Fish Fin Ray Sample Collection Locations from 2016 to 2018

Label for Model	Waterbody/Tributary		2016[1]	2017[1]	2018[1]
Peace	Dinosaur L.				
	Williston L.				
	Peace R.	Section 1	BT	WP, BT	MW, BT
		Section 2			
		Section 3	BT, WP	BT, WP	BT, WP, MW
		Section 4			
		Section 5	BT, WP	BT, WP	BT, WP
		Section 6	BT, WP, GE	BT, WP	BT, WP
		Section 7	BT, WP, GE	BT, WP	BT, WP, MW, GE
		Section 8			GE
		Section 9	BT, WP, GE	BT, WP, GE	BT, WP
Farrell	Farrell Cr.				
Halfway Main	Halfway R.	Mainstem			
Chowade/ Cypress/Fiddes		Chowade R.			BT
		Cypress Cr.		BT	
		Fiddes Cr.		BT	
Colt/Kobes		Colt Cr.			
		Kobes Cr.			
Moberly	Moberly R.				
Beatton	Beatton R.	Reach 17			
		Blueberry R.			
		Charlie L.			
		Doig R.			
		Milligan R.			
		Montney Cr.			
		Stoddard Cr.			
Pine	Pine R.	Mainstem			
		Burnt River			
		Callazon Cr.			
		Fellers Cr.			
		Murray R.			
		Wolverine R.			
Kiskatinaw	Kiskatinaw R.				
Pouce/Clear	Pouce R.				
	Clear R.				
Smoky	Smoky R.	Mainstem			
		Little Smoky R.			

Note: (1) BC Hydro 2015.

Table 4. Fish Species and Structure Sample Type

Fish Species	Latin Name	Number of Otolith Samples[1]	Number of Fin Ray Samples
Arctic Grayling (AG)	*Thymallus arcticus*	3	-
Bull Trout (BT)	*Salvelinus confluentus*	14	140
Goldeye (GE)	*Hiodon alosoides*	-	13
Mountain Whitefish (MW)	*Prosopium williamsoni*	95	3
Rainbow Trout (RB)	*Oncorhynchus mykiss*	15	-
Walleye (WP)	*Sander vitreus*	-	131
	Total	127	287

Note: (1) Sample envelope for otolith #190 (Bull Trout) was provided. However, no otolith sample was located in the envelope; therefore, the sample could not be analyzed or included in the data set.

A summary of fish otolith and fin ray sample collection locations from 2014 to 2018, including field measured fish length, is provided in Tables 5 and 6, respectively. Maps of capture locations for individual fish species can be viewed in the respective results section for each species (see Section 3.0).

Table 5. Fish Otolith Sample Collection Locations 2014 to 2018.

Water Body	Location	Fish Species					Fish Length (mm)	
		AG	BT	MW	RB	Total	Mean	Range
Peace River	Section 1	1	-	23	-	24	238 (AG) 275.2 (MW)	238 (AG) 178-334 (MW)
	Section 3	1	-	21	1	23	229 (AG) 301.2 (MW) 147 (RB)	229 (AG) 129-430 (MW) 147 (RB)
	Section 5	-	-	6	1	7	236.7 (MW) 193 (RB)	135-296 (MW) 193 (RB)
	Section 6	-	-	10	-	10	220.5 (MW)	73-435 (MW)
	Section 7	-	-	2	-	2	182.5 (MW)	91-274 (MW)
	Section 9	-	-	25	-	25	197.2 (MW)	145-298 (MW)
Pine River	-	-	-	6	-	6	317.1 (MW)	286-354 (MW)
Colt Creek	-	-	-	2	4	6	112 (MW) 109 (RB)	59-165 (MW) 74-159 (RB)
Cypress Creek	-	-	10	-	2	12	109.9 (BT) 271.5 (RB)	38-205 (BT) 223-320 (RB)
Moberly River	-	1	-	-	-	1	66 (AG)	66 (AG)
Kobes Creek	-	-	-	-	6	6	106 (RB)	77-125 (RB)
Fiddes Creek	-	-	1	-	-	1	127 (BT)	127 (BT)
Chowade River	-	-	3	-	-	3	87 (BT)	50-157 (BT)
Farrell Creek	-	-	-	-	1	1	85 (RB)	85 (RB)
	Total	3	14	95	15	127		

Table 6. Fish Fin Ray Sample Collection Location 2014 to 2018.

Water Body	Location	Fish Species					Fish Length (mm)	
		BT	GE	MW	WP	Total	Mean	Range
Peace River	Section 1	24	-	1	1	26	413.5 (BT) 266 (MW) 530 (WP)	200-642 (BT) 266 (MW) 530 (WP)
	Section 3	25	-	1	30	56	333.3 (BT) 319 (MW) 449.9 (WP)	184-588 (BT) 319 (MW) 332-584 (WP)
	Section 5	20	-	-	20	40	354.4 (BT) 436.1 (WP)	249-531 (BT) 280-640 (WP)
	Section 6	26	1	-	23	50	351.4 (BT) 398 (GE) 385.3 (WP)	171-790 (BT) 398 (GE) 298-485 (WP)
	Section 7	17	4	1	22	44	343.5 (BT) 382.3 (GE) 91 (MW) 350.0 (WP)	189-505 (BT) 374-401 (GE) 91 (MW) 192-661 (WP)
	Section 8	-	1	-	-	1	385 (GE)	385 (GE)
	Section 9	17	7	-	35	59	358.0 (BT) 402.7 (GE) 366.5 (WP)	189-690 (BT) 384-430 (GE) 206-508 (WP)
Cypress Creek	-	9	-	-	-	9	117.9 (BT)	84-205 (BT)
Fiddes Creek	-	1	-	-	-	1	127 (BT)	127 (BT)
Chowade River	-	1	-	-	-	1	157 (BT)	157 (BT)
	Total	140	13	3	131	287		

2.3 Otolith and Fin Ray Microchemistry

Otolith and fin ray microchemistry analyses were conducted by TrichAnalytics using LA-ICP-MS. Otoliths and fin rays were prepared following similar methods to Clarke et al. (2007b). Briefly, structures were sectioned using a sterilized razor blade or mini handsaw and embedded in epoxy (otoliths embedded sulcus-side up). The epoxy cured for over 8 hours before further preparation. The samples were first polished with 320-grit adhesive-backed lapping paper close to the core and by 600-grit lapping paper to expose the core. Final sanding was conducted using 1,200-grit lapping paper to remove micro-scratches and further polished using 0.24 µm diamond suspension spray on a polishing pad.

NWR-213 (New Wave Research Inc.) laser ablation instrument was coupled with an iCAP RQ series (ThermoFisher Scientific) ICP-MS. For otoliths, the laser ablation settings using a line scan were as follows:

- Power – 60%
- Frequency – 20 Hz
- Speed – 5 µm/s
- Spot size – 30 µm

For fin rays, which were considerably smaller than the otoliths, the laser ablation settings were adjusted to the following:

- Power – 40%
- Frequency – 20 Hz
- Speed – 5 µm/s
- Spot size – 5 µm

Line scans were plotted and run from the edge of each otolith through the core, and to the other edge, where possible (some otoliths were broken). For fin rays, a line scan was plotted and run from core to edge.

An external standard reference material SRM 612 (NIST 2012) was used to calibrate the concentration of the samples (otoliths and fin rays) for barium (Ba), strontium (Sr), and calcium (Ca). Calcium was used as an internal correction standard (40% for otoliths; 27% for fin rays; 8.5% for SRM 612). Detection limits were calculated using 3x standard deviation of the background signal for

that element and dividing it by the sensitivity of the signal determined with the SRM 612. Elemental concentrations (ppm) in the otolith or fin ray samples were calculated using the following equation:

Concentration (Ba or Sr) = [(signal – background)/sensitivity] * (40%/Ca in sample %)

where "signal" is the counts per second (cps) of Ba or Sr in the sample; "background" is the cps of Ba or Sr prior to initiating the laser; "sensitivity" is the calibration slope for Ba or Sr as determined by the SRM 612 standard; 40% is the calcium content in an otolith (exchange this value for 27% for calculating concentrations of Ba or Sr in fin ray samples); and "Ca in sample (%)" is the calculated concentration of calcium in the sample. Data was collected on the ICP-MS using Qtegra™ software (ThermoFisher Scientific), Version 2.8.3170.309.

2.4 Data Analysis

Water sample strontium and barium concentrations were converted to molar ratios (Ba:Ca and Sr:Ca) using the associated calcium concentration in the water sample using the following equations:

Sr:Ca (mol/mol) = ([Sr] / 87.62) / ([Ca] / 40.078)

Ba:Ca (mol/mol) = ([Ba] / 137.327) / ([Ca] / 40.078)

Molar ratios were used because barium and strontium concentrations in otoliths and fin rays are proportionate to the Ba:Ca and Sr:Ca ratios in the water the fish reside (Clarke et al. 2007a). The water chemistry ratios (mol/mol) for each location were used to develop the habitat models for each fish species.

Otolith and fin ray Ba and Sr concentrations were converted to micromoles (mmol) and corrected to Ca (converted to mol) to obtain Sr:Ca and Ba:Ca (mmol/mol) ratios using the following equations.

Sr:Ca (mmol/mol) = ([Sr] * 10^3 / 87.62) / (400 / 40.078)

Ba:Ca (mmol/mol) = ([Ba] * 10^3 / 137.327) / (400 / 40.078)

Three regions were identified on each otolith and fin ray (Zymonas and McMahon 2009; Earthtone and Mainstream 2013), including (see Figures 2 to 4):

- Edge – represents the habitat at the time of fish capture.

- First summer – first peak of zinc (Zn) concentrations after the core in the otolith and the first opaque (dark) region after the core in the fin ray before the winter annulus were inferred to represent the first summer rearing habitat of the fish.
- Core – small region in the center of the otolith or fin ray, representing the maternal yolk incorporation into the juvenile otolith/fin ray structure. This region is inferred to represent the most recent fish habitat occupied by the maternal parent, therefore the natal stream/river that the fish originated (Earthtone and Mainstream 2013).

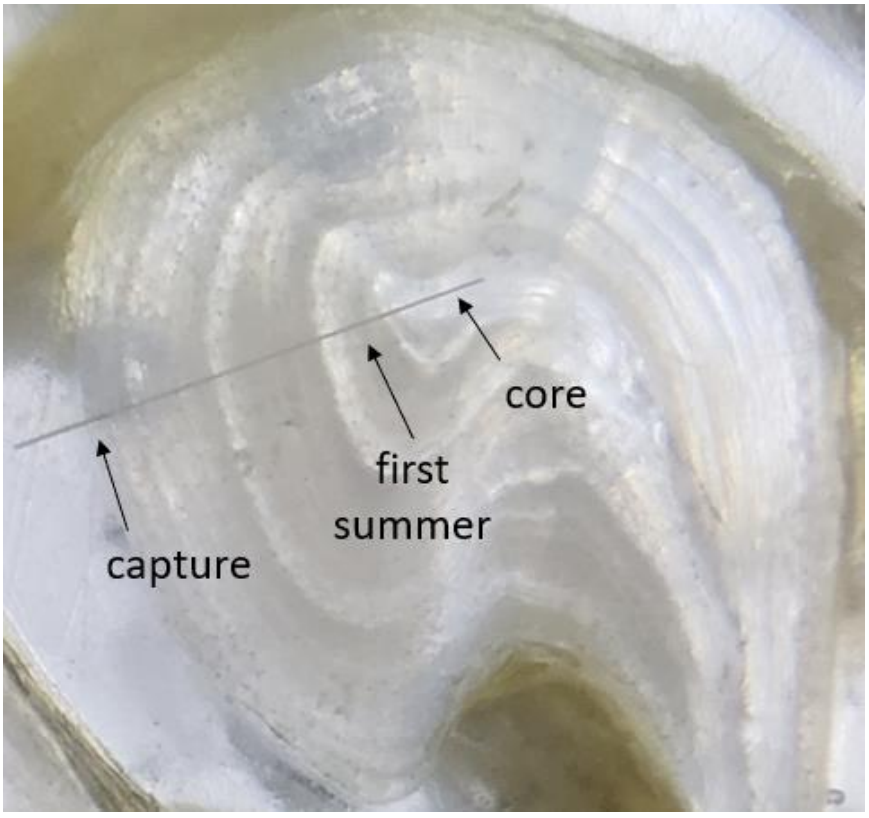

Figure 2. Fin Ray BT#4637 where core (natal), first summer, and capture (edge) regions are defined.

To develop the water to otolith and the water to fin ray Ba:Ca and Sr:Ca ratio accumulation models, incorporation coefficients for each type of structure and for each fish species were calculated using water chemistry and otolith/fin ray edge (capture) ratios that matched the fish capture location

water chemistry ratios (Wells et al. 2003; Clarke et al. 2007a; Earthtone and Mainstream 2013). The incorporation coefficient represents the proportion of Ba:Ca or Sr:Ca incorporated into the otolith or fin ray from the water (Earthtone and Mainstream 2013; Clarke et al. 2007a), calculated as follows:

$$\text{Incorporation Coefficient} = [\text{Sr or Ba (mmol): Ca (mol)}_{\text{otolith/fin ray}}] / [\text{Sr or Ba (mol):Ca (mol)}_{\text{water}}]$$

where the individual water molar ratios were first averaged for each capture location. This calculation was then used for each fish and then the overall incorporation coefficient for the species/tissue combination (e.g., Bull Trout fin ray) was calculated as an average and reported with standard deviation. Otolith and fin ray data were excluded from the calculation of the species/tissue incorporation coefficient if they were significantly different from incorporation coefficients from other fish of the same species captured from the same location. For all otoliths and fin rays, the capture (edge), natal (core, primordium), and first summer regions were calculated using the appropriate incorporation coefficient for species and structure.

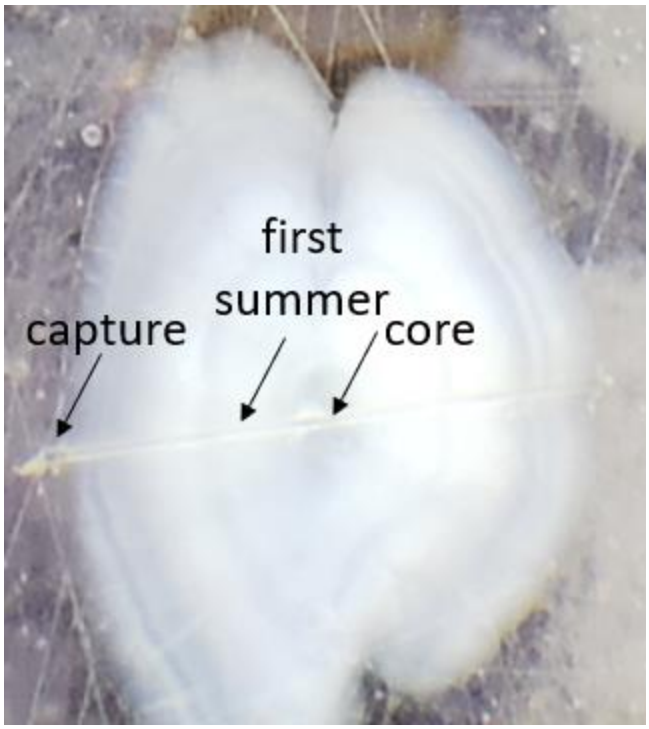

Figure 3. Otolith RB#1996 where core (natal), first summer, and capture (edge) regions are defined.

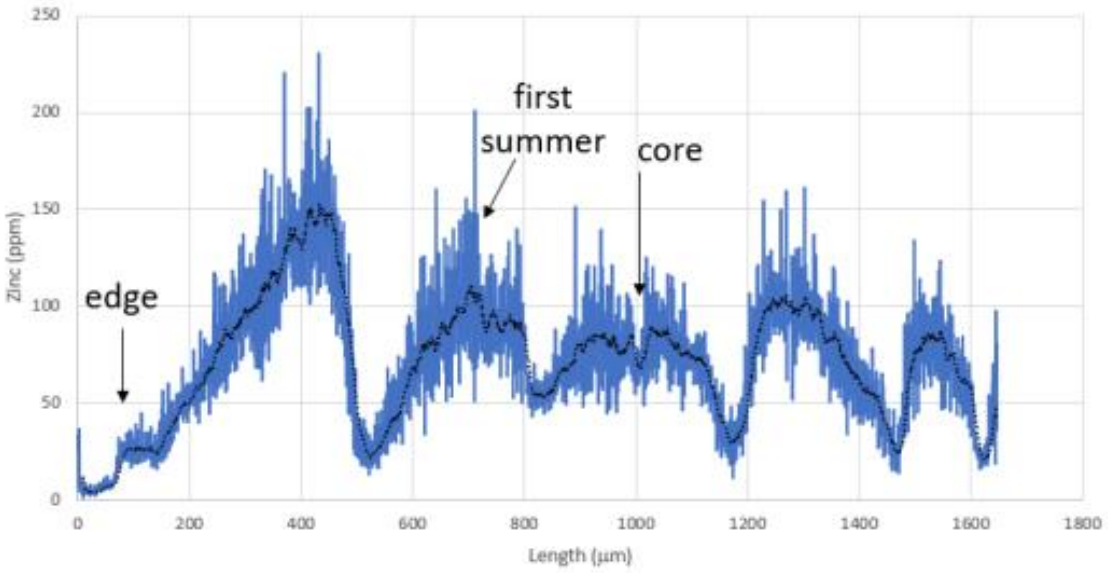

Figure 4. Otolith RB#1996 line scan of zinc in where core, first summer, and edge regions are defined.

Life history reconstruction plots using Sr:Ca and Ba:Ca were created for each species showing 1) edge (capture), 2) core (natal), and 3) first summer elemental signatures, along with the water chemistry from known prior locations used in their particular model. Data were integrated to two seconds (10 μm) per data point. The plots identify movement among the various watersheds throughout the life of the fish as determined through otolith or fin ray microchemistry analysis. The temporal characterization (life reconstruction plots) was divided into three time periods: 1) maternal/natal life history (Natal), which was represented by the entire core chemistry; 2) early life history and first summer (Early), which was the core edge to the first annulus (fin ray) or where the first concentration peak of zinc begins to decrease (otolith); and 3) post-recruitment life history(> 1 year old), which was from where the zinc concentration decreases (end of first summer) in the first peak until capture (edge).

Discriminant function analysis (DFA) using Addinsoft XLSTAT 2019 was then conducted to determine the probable natal and first summer habitat of each fish. DFA is a common approach to monitoring fish movement and has been used successfully to predict fish habitat by Earthtone and Mainstream (2013) for Arctic Grayling, Bull Trout, Rainbow Trout, Mountain Whitefish, Goldeye, and Walleye, from the Peace River watershed. Outside of the Peace River watershed, Sellheim et al. (2017) used DFA for White Sturgeon, Gibson-Reinemer et al. (2009) for Rainbow Trout, and Wells et al. (2003)

for Cutthroat Trout. Data used in the model included the individual water chemistry ratios for locations known to be habitat for the specific species modeled (Earthtone and Mainstream 2013; BC Hydro 2015), as well as the capture ratios obtained from the edge of the fin ray or otolith. Both water and otolith/fin ray capture ratios were excluded if they were different from the majority of ratios at the same location. Data were log10 transformed prior to running the model to help meet the assumptions of the DFA. Since DFAs are underpinned by analysis of variance (ANOVA), the same assumptions of an ANOVA also apply to DFAs. Most importantly the test assumes 1) homogeneity of variance among groups, and 2) normal distribution of data within groups. Log-transformation yielded data that better conformed to these assumptions.

All data points from individual water sampling locations were included in the model and then grouped by location. The model needs at least three data points per group/location in order to measure variability of the chemistry within that group/location. Groupings were structured to differentiate locations upstream and downstream of the Project (see Section 2.1 for how groups were derived). Only water chemistry from known prior locations were used in a fish species model. Known prior locations were based on Mainstream (2012) and Earthtone and Mainstream (2013).

A confusion matrix was used to quantify the predictive power (i.e., classification accuracy) of the model. Accuracy of the model was evaluated by comparing the predictive power with the expected classification rate, which is the percentage of accurate predictions that would be expected based on chance alone (Gibson-Reinemer, et al. 2009), using the following equation:

Expected Classification Rate (%) = 100% / # waterbodies used in the model

After a model was developed for a species (and structure), and accepted (predictive power > expected classification rate), the natal and first summer ratios of each fish of that species were entered into the model as unknowns to be predicted. The model provided a probability assigned to a specific habitat for each fish (from 0 to 1). A location was assigned to a particular fish if it had the highest probability and was >0.2 (i.e., highest expected classification rate calculated for all models), the same value previously assigned by Earthtone and Mainstream (2013). If probability was <0.2, then "unknown" was assigned as the location for that fish, because the probability for that waterbody does not exceed the expected classification rate. Inherent in these models are potential misclassifications in the model predictions (i.e., predictive power <100%) associated with overlap of water chemistry signatures among locations. Misclassifications associated with habitat probabilities included the following:

- If natal and summer habitat were predicted to be from distinct and geographically removed river systems (e.g., natal habitat was predicted in Colt Creek in the Halfway River watershed, but first summer was predicted in Pine River) where one or the other is not logically possible (e.g., it is not physically possible for an age-0 fish to move that distance over the short time frame); or
- If natal and/or summer habitats were predicted to be waterbodies with no past or current evidence of recruitment for that species (e.g., Bull Trout predicted to have natal and/or first summer habitat in the Peace River).

In these instances of suspected misclassification, the model probabilities were re-examined, and the highest probable informed prior habitat was then assigned as the predicted habitat, unless the probability was <0.2, where the predicted habitat would then be assigned "unknown".

3.0 RESULTS

3.1 Surface Water Chemistry

Data for surface water samples collected at eighty (80) locations from 2008 to 2018 were provided to TrichAnalytics Inc. to use in the model to predict natal and first summer habitat. Review of the data indicated similar results by others (Earthtone and Mainstream 2013), in that water chemistry was consistent over time for the waterbodies that had multiple years of data and multiple locations (e.g., Peace River, Figure 5). Therefore, it was determined that using older water chemistry data, where recent data were unavailable, would be a satisfactory proxy for the development of the habitat models. Where multiple years of data were available, all data was used in the model.

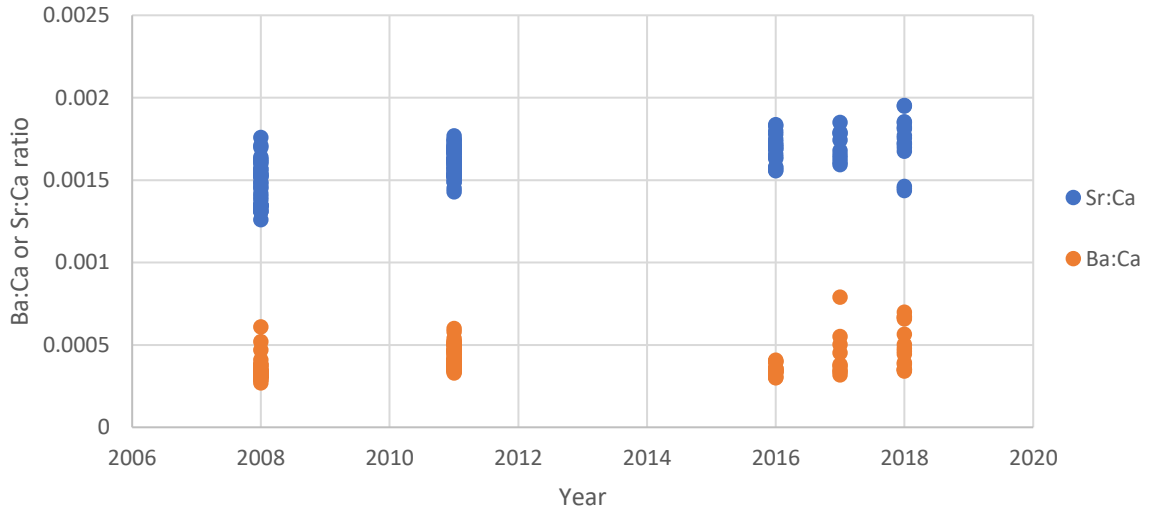

Figure 5. Peace River (including Dinosaur and Williston Reservoirs) water chemistry from 2008 to 2018 (includes all sampled locations, with outliers removed).

Surface water chemistry patterns were similar to previous studies (Earthtone and Mainstem 2013) mainly because a substantial amount of the previous water chemistry data were also used for this report. Moberly River, and Colt, Kobes, Chowade, Cypress, and Fiddes creeks had quite distinct water chemistry signatures from each other and from all other locations (Figure 6). However, there was considerable overlap in water chemistry signatures among other locations, specifically: Peace River had overlap with Halfway, Beatton, and Pouce Coupe/Clear rivers; Halfway had overlap with Peace and Pouce Coupe/Clear rivers; Pine River had overlap with Beatton and Farrell rivers; and Kiskatinaw River had overlap with Beatton and Smoky rivers. When all water quality data were plotted, the Sr:Ca and Ba:Ca chemistry ratio data formed an unevenly distributed L-shaped pattern (Figure 6). Therefore, the data were log10 transformed for plotting and was necessary for meeting statistical assumptions of the DFA modeling (Figure 7). Transformation of the data resulted in improved spatial differentiation among the Peace, Halfway, Pine, Beatton and Pouce Coupe/Clear river sampling locations.

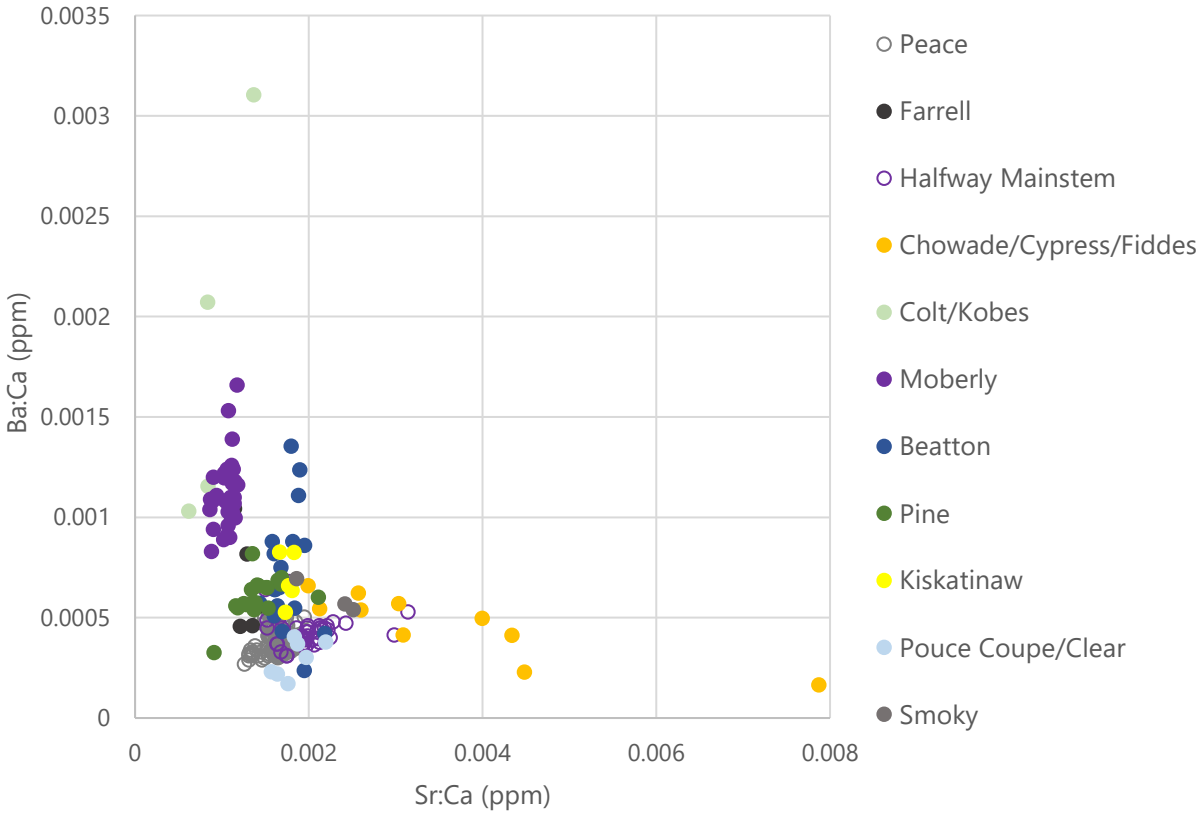

Figure 6. Sr:Ca and Ba:Ca water chemistry ratios in various waterbodies in the Peace River watershed.

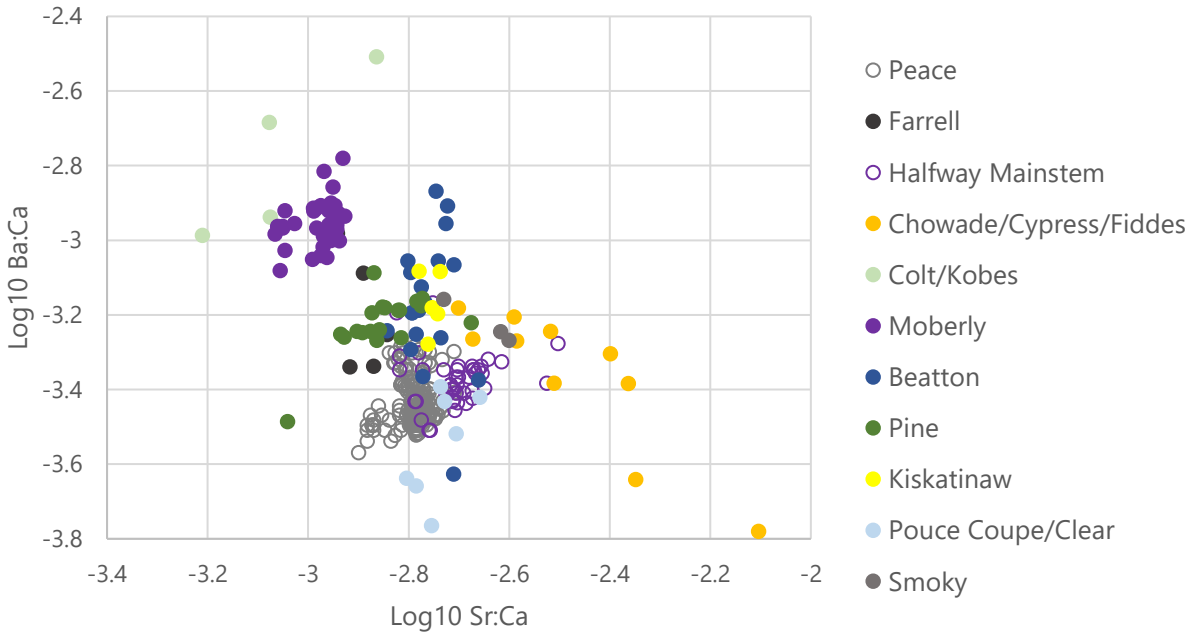

Figure 7. Sr:Ca and Ba:Ca water chemistry ratios (log10 transformed) at various waterbodies in the Peace River watershed.

The log10 transformed data (Figure 7) were used as the base layer for plotting the habitat of the various fish species. However, only the water sample stations used in each fish species model were included in the associated figures for that species.

3.2 Otolith and Fin Ray Microchemistry

A summary of average capture Sr:Ca and Ba:Ca ratios from each species is provided in Table 7 (otoliths) and Table 8 (fin rays). Outliers from the dataset were removed prior to calculation of the incorporation coefficients (Table 9). Appendix A provides the analytical results for individual fish.

While three Mountain Whitefish fin rays were received, the incorporation coefficient was calculated using two (one was considered an outlier). Fin ray data were not used to interpret the results due to the inconsistencies in this small sample size of three. However, Mountain Whitefish otolith samples were provided, therefore interpretation was based on those results.

Table 7. Average (and standard deviation) of capture elemental chemistry in the otoliths from each species separated by capture location.

Capture Location	Number Analyzed	Capture Sr:Ca (µmol/mol)	Standard Deviation (µmol/mol)	Capture Ba:Ca (µmol/mol)	Standard Deviation (µmol/mol)
Arctic Grayling					
Peace 1	1	590.7	-	17.8	-
Peace 3	1	602.8	-	10.0	-
Moberly R.	1	423.3	-	63.0	-
Bull Trout					
Cypress Cr.	10	533.5	113.6	6.3	3.3
Fiddes Cr.	1	353.3	-	4.8	-
Chowade R.	3(1)	715.2	364.4	6.4	3.6
Rainbow Trout					
Peace 3	1	298.0	-	4.8	-
Peace 5	1	422.5	-	8.8	-
Colt Cr.	4	194.1	46.6	28.3	9.6
Cypress Cr.	2	493.1	16.9	7.8	1.5
Kobes Cr.	6	200.7	48.3	27.6	10.3
Farrell Cr.	1	254.0	-	17.7	-
Mountain Whitefish					
Peace 1	23	385.3	45.3	4.3	2.0
Peace 3	21	437.8	66.1	7.0	3.1
Peace 5	6	373.0	21.3	5.7	1.1
Peace 6	10	397.9	38.2	6.6	2.1
Peace 7	2	370.2	20.5	5.2	1.4
Peace 9	25	372.1	31.9	6.2	2.2
Pine R.	6	399.7	38.9	5.5	2.8
Colt Cr.	2	246.9	111.1	9.3	1.6

Note: (1) indicates summary statistics based on n=2, as one otolith could not be analyzed.

Table 8. Average (and standard deviation) of capture elemental chemistry in the fin rays from each species separated by capture location.

Capture Location	Number Analyzed	Capture Sr:Ca (µmol/mol)	Standard Deviation (µmol/mol)	Capture Ba:Ca (µmol/mol)	Standard Deviation (µmol/mol)
Bull Trout					
Peace 1	24	267.8	28.1	8.2	4.6
Peace 3	25	292.1	59.3	9.4	4.6
Peace 5	20	278.9	51.9	12.9	13.2
Peace 6	26	294.1	80.1	9.8	4.1
Peace 7	17	307.3	97.7	10.3	3.2
Peace 9	17	305.2	54.8	9.3	3.1
Cypress Cr.	9	406.5	62.1	17.6	10.3
Fiddes Cr.	1	312.8	-	31.8	-
Chowade R.	1*	-	-	-	-
Goldeye					
Peace 6	1	182.7	-	11.1	-
Peace 7	4	255.8	26.0	12.6	4.7
Peace 8	1	275.0	-	12.4	-
Peace 9	7	239.2	51.1	9.4	1.0
Mountain Whitefish					
Peace 1	1	376	-	3.0	-
Peace 3	1	582	-	18.1	-
Peace 7	1	356	-	4.2	-
Walleye					
Peace 1	1	277.8	-	38.2	-
Peace 3	30	246.5	30.1	28.4	8.7
Peace 5	20	234.8	30.2	25.9	8.0
Peace 6	23	237.2	34.8	22.9	11.0
Peace 7	22	254.9	65.7	22.3	7.7
Peace 9	35	263.6	67.5	26.3	10.4

Note: * indicates fin ray could not be analyzed.

Table 9. Incorporation coefficients from water to otolith or water to fin ray for each fish species.

Species	Structure	Sr:Ca Incorporation Coefficient	Ba:Ca Incorporation Coefficient
Arctic Grayling	Otolith	0.371 ± 0.005	0.035 ± 0.014
Bull Trout	Otolith	0.168 ± 0.029	0.010 ± 0.001
	Fin ray	0.163 ± 0.017	0.023 ± 0.004
Goldeye	Fin ray	0.143 ± 0.023	0.025 ± 0.004
Mountain Whitefish	Otolith	0.245 ± 0.042	0.014 ± 0.006
	Fin ray	0.227 ± 0.009	0.089 ± 0.002
Rainbow Trout	Otolith	0.18 ± 0.034	0.012 ± 0.004
Walleye	Fin ray	0.151 ± 0.019	0.057 ± 0.016

3.3 Arctic Grayling (AG)

Three Arctic Grayling were captured: one in 2016 from Peace River - Section 3, and two in 2018 (one from Peace River – Section 1 and the other from the Moberly River). The following descriptions are based on a visual comparison of the data (no statistical tests were performed):

- The incorporation coefficients appeared similar to those calculated by others (Earthtone and Mainstream 2013).
- The three Arctic Grayling capture chemistries corresponded well with water chemistry results (Figure 8).

The discriminant function analysis using a total of 328 water and otolith capture chemistries (predictive power 84.8%; expected classification rate 12.5%; Appendix B) indicated that the three Arctic Grayling originated (natal habitat) in the Moberly River (Table 10, and Figures 9 and 11) and also spent their first summer in the Moberly River (Table 11, and Figures 10 and 12).

Only one (out of 6) suspected misclassification (16.7%) occurred, which could be expected based on the predictive power of the model. This misclassification was an Arctic Grayling predicted to have spent its first summer in Farrell Creek (probability of 0.39) after hatching in the Moberly River, which is not possible due to the considerable distance between these two waterbodies. The model was

re-examined and subsequently, Moberly River habitat was assigned (0.21 probability) to that individual (AG#3335). Overall, the results suggest that the three Arctic Grayling captured and analyzed in this report use the same or similar habitat during their first summer as their natal streams, but can migrate to other locations during their adult years, such as the Peace River. AG#13 (fork length = 66 mm) was the youngest Arctic Grayling sampled and had not left its natal habitat, unlike the older Arctic Grayling, AG#3335 (fork length = 238 mm) and AG#3884 (fork length = 229 mm), which migrated to the Peace River.

Overall, all sampled Arctic Grayling were recruited from within the LAA from areas immediately upstream of the Project.

Life history reconstruction plots were completed for the three Arctic Grayling individuals (Figures 13 to 15). A summary of predicted natal and first summer habitat for Arctic Grayling is provided in Appendix C.

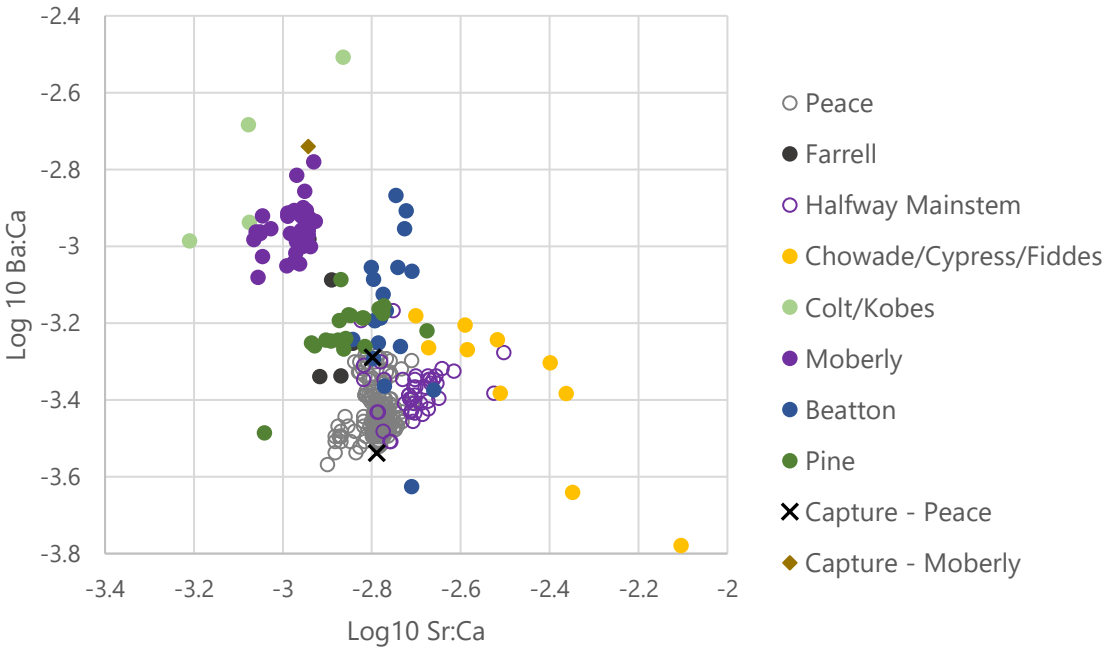

Figure 8. Capture chemistry of Arctic Grayling relative to water chemistry from all potential locations.

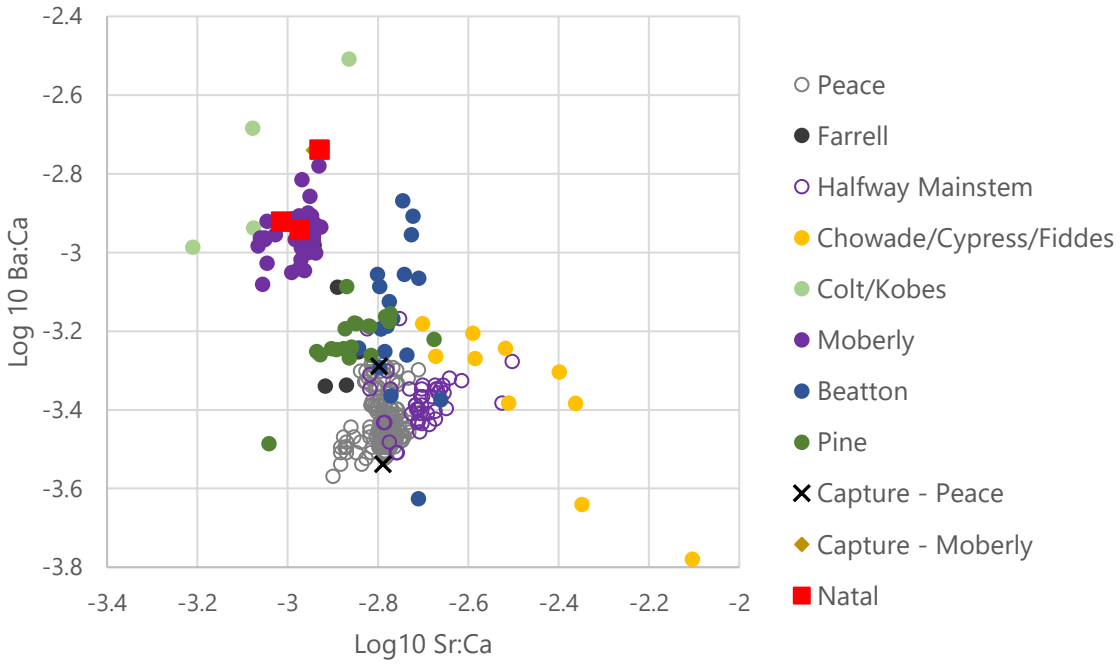

Figure 9. Natal chemistry of Arctic Grayling relative to water chemistry from other locations and capture chemistry.

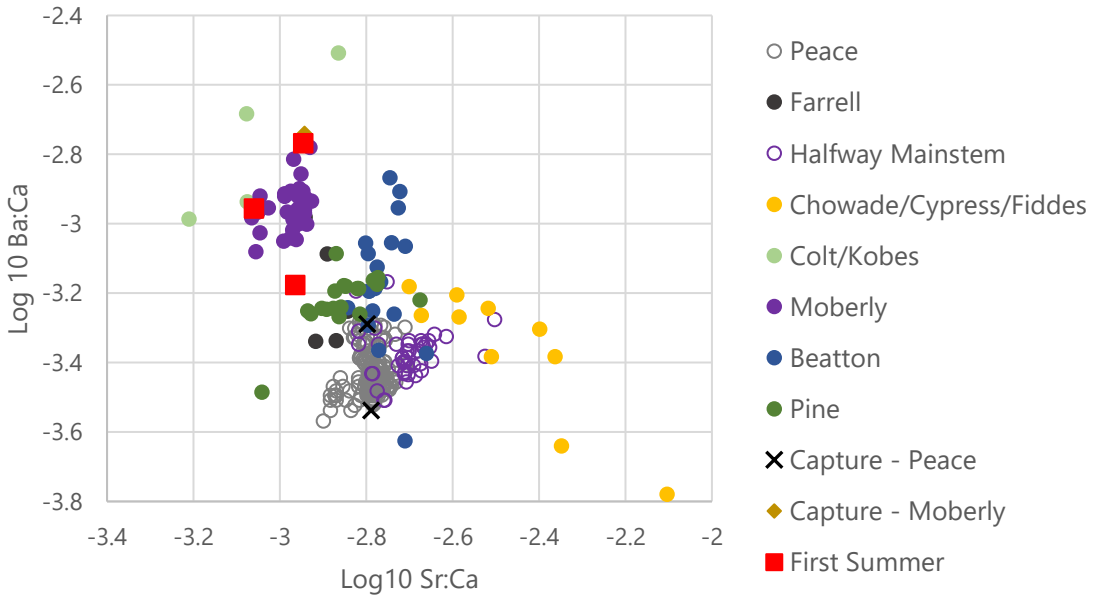

Figure 10. First summer chemistry of Arctic Grayling relative to water chemistry from other locations and capture chemistry.

Table 10. Predicted natal habitat for Arctic Grayling

	Predicted Habitats		Capture Areas										Total
			Halfway			Moberly	Pine	Beatton	Kiskatinaw	Peace			
	Area	Waterbody(s)	Mainstem	Colt/Kobes	Chowade/Cypress/ Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	Unknown	
Upstream	Farrell												
	Halfway River	Mainstem											
		Colt/Kobes											
		Chowade/Cypress /Fiddes											
	Moberly					1				2			3
Downstream	Pine												
	Beatton												
Peace													
Total						1				2			3

Table 11. Predicted first summer habitat for Arctic Grayling

			Capture Areas										Total
	Predicted Habitats		Halfway			Moberly	Pine	Beatton	Kiskatinaw	Peace			
	Area	Waterbody(s)	Mainstem	Colt/Kobes	Chowade/Cypress/ Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	Unknown	
Upstream	Farrell												
	Halfway River	Mainstem											
		Colt/Kobes											
		Chowade/Cypress/ Fiddes											
	Moberly					1				2			3
Downstream	Pine												
	Beatton												
Peace													
Total						1				2			3

N

Section 1 (n = 1)

Section 3 (n = 1)

Section 5 (n = 0)

Section 6 (n = 0)

Section 7 (n = 0)

Section 9 (n = 0)

Peace River

Halfway River

Moberly River

Pine River

Beatton River

Kiskatinaw River

Pouce Coupe River

Clear River

Charlie Lake

Williston Reservoir

Williston Lake

Colt Creek

Kobes Creek

BRITISH COLUMBIA

ALBERTA

Fort St. John

Taylor

Hudson's Hope

Dawson Creek

Chetwynd

Index

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User

Origin

Moberly River

Fish Count by Section

Observation Size

1

2 - 4

>= 5

1:600,000

0 25 km

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

BC Hydro

Predicted natal habitat sources for Arctic Grayling

Figure 11

Date	Jun 8, 2020	DWG NO	1016-N11-00749-8	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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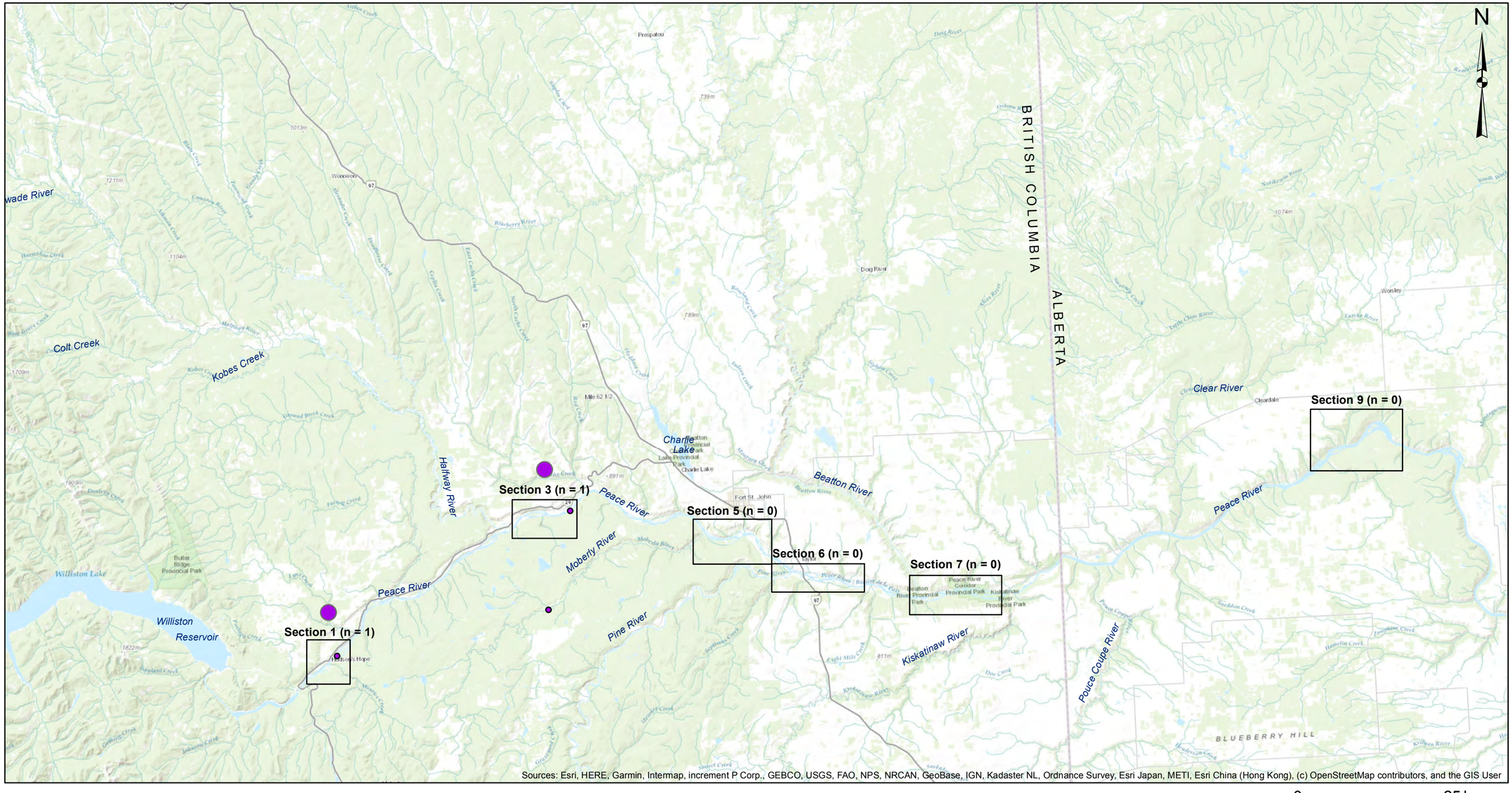

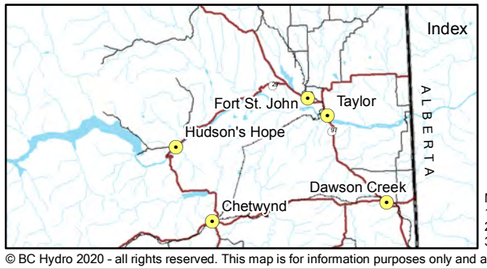

Origin

Moberly River

Fish Count by Section

Observation Size

1

2 - 4

>= 5

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

1:600,000

0 25 km

BC Hydro

Predicted first summer habitat sources for Arctic Grayling

Figure 12

Date	Jun 8, 2020	DWG NO	1016-N11-00749-7	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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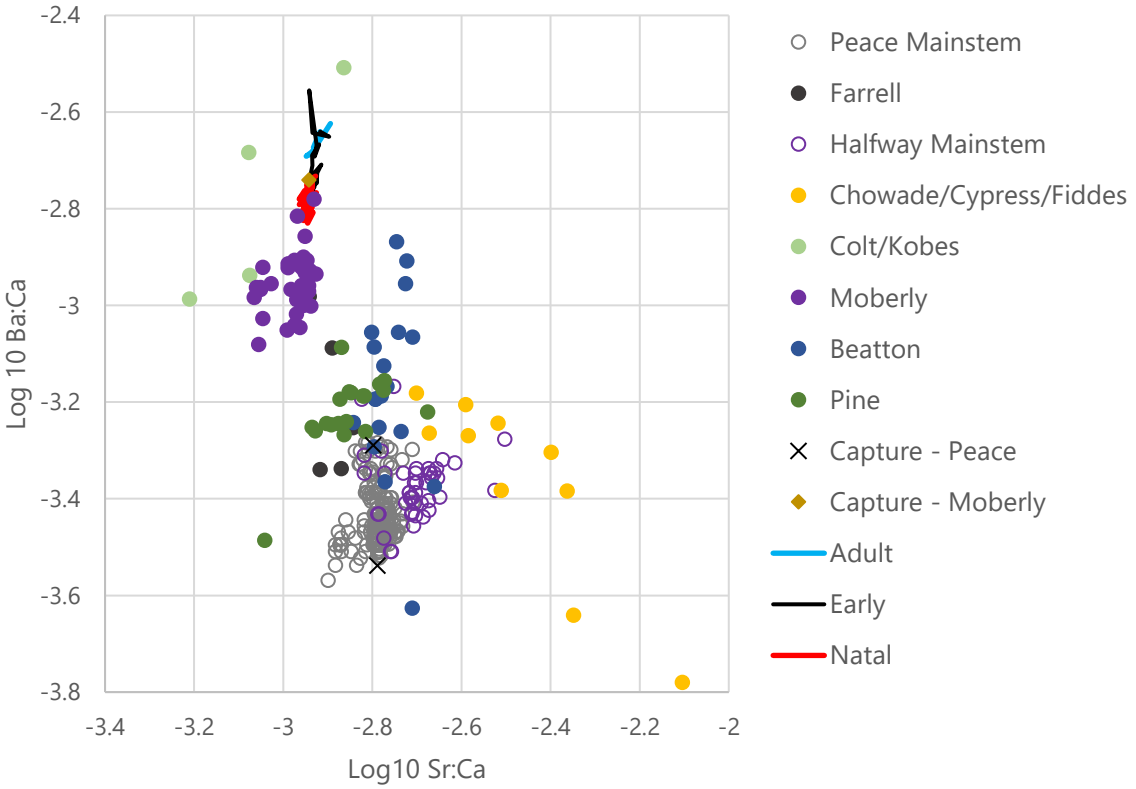


Figure 13. Reconstructed life history of AG #13 (fork length = 66 mm). This individual was recruited from the Moberly River, where the model predicts it spent its first summer and remained until capture.

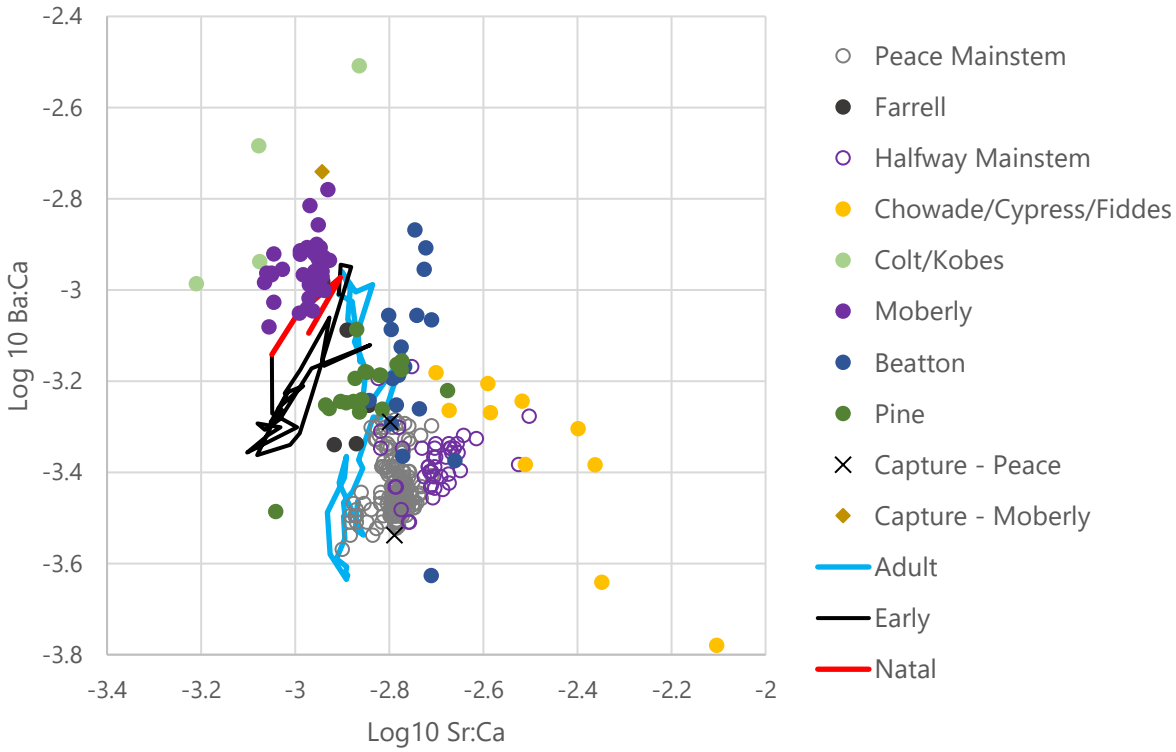


Figure 14. Reconstructed life history of AG #3335 (fork length = 238 mm). This individual's natal and first summer habitat is the Moberly River. The following year and during adulthood, AG#3335 migrated to the Peace River, where it was captured.

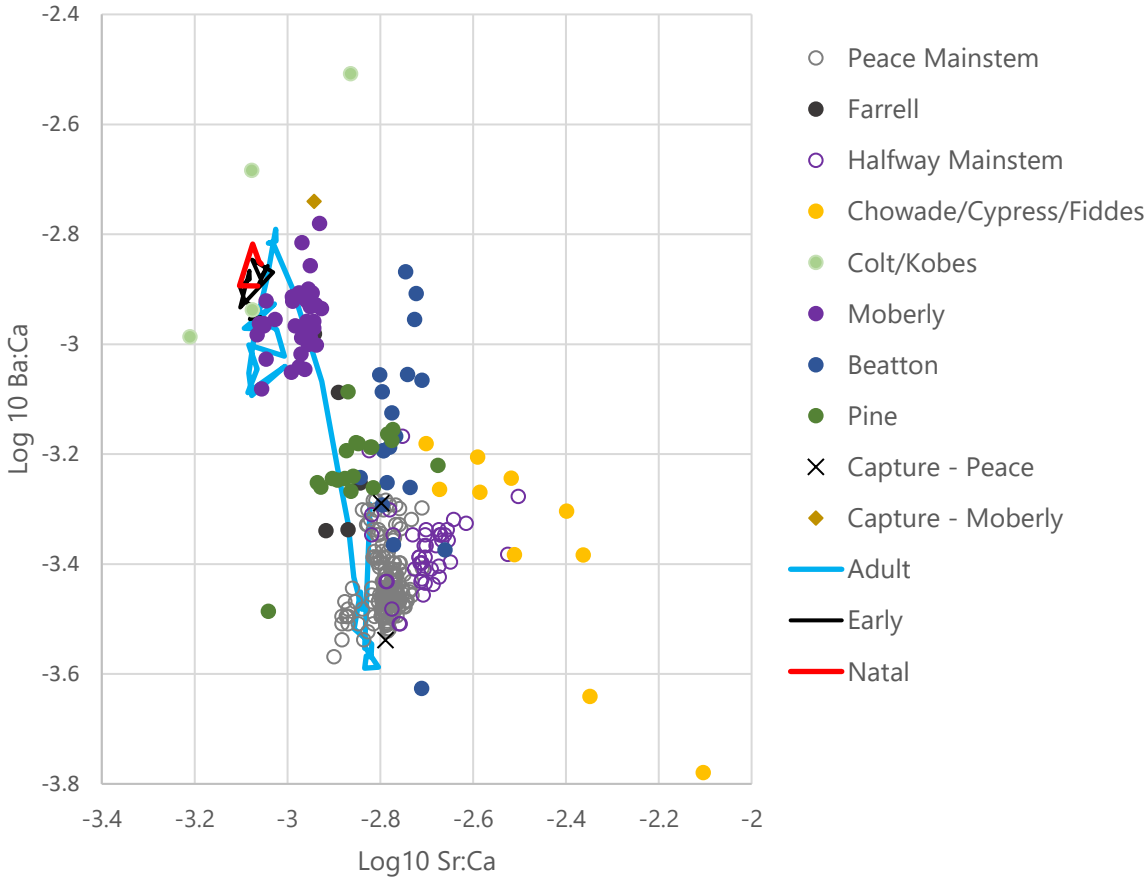


Figure 15. Reconstructed life history of AG #3884 (fork length = 229 mm). This individual recruited from the Moberly River, where it remained for the first summer, then migrated to the Peace River as an adult, where it was captured.

3.4 Bull Trout (BT)

One hundred and forty (140) Bull Trout were captured from 2016 to 2018, of which 11 had both otoliths and fin rays available for analysis. However, otolith #79 and fin ray #1154 (low signal for Ca) could not be analyzed, but Bull Trout #1154 had an otolith for analysis that was successfully modeled (n=139 Bull Trout modeled in total). Two structures provided an opportunity to determine whether they provided similar habitat predictions from the same fish. Most of the Bull Trout were captured in the Peace River (n=129), while the remaining Bull Trout were captured in Cypress Creek (n=9), Fiddes Creek (n=1), Chowade River (n=1). The 11 Bull Trout that had both fin rays and otoliths were from Cypress and Fiddes creeks.

For the discriminant analysis it was necessary to group Chowade River (n=3), and Cypress (n=5) and Fiddes (n=2) creeks water chemistry together due to a small number of water samples available from these locations in 2008-2018 and their poor differentiation (the waterbodies are also geographically close together, and within the Halfway River watershed). The model's predictive power was 86.0% (n=421; expected classification rate 16.7%; Appendix B). For the 13 Bull Trout otoliths, the model predicted 100% of both natal and first summer habitat in the Chowade River or Cypress/Fiddes creeks. The fin rays produced the same habitat predictions as the otoliths when both tissues available from the same fish. Overall, the identical otolith and fin ray predictions from these 10 fish confirmed that the use of only one of these structures in a model should be as accurate as using the other structure for Bull Trout. There were no suspected misclassifications in the model for these otoliths or paired fin rays.

Sr:Ca and Ba:Ca chemistry ratios in the edge portion of the fin rays (i.e., capture) from Bull Trout captured in the Peace River (n=129) correlated with the water chemistry ratios at the capture locations (Figure 16). Most of the Peace River-captured Bull Trout had lower Ba:Ca ratios than those in the fin rays from fish captured in Cypress and Fiddes creeks, although with some variability along the Ba:Ca ratio axis. Two Cypress-captured Bull Trout had elevated Ba:Ca ratios in their fin rays compared to the rest of the Bull Trout captured in Cypress Creek.

For fin rays, there were 18.7% (52 out of 278) misclassifications suspected in natal and first summer habitat predictions, similar to the 14% misclassifications expected in the model based on the predictive power. For natal predictions, most (17 out of 22; 77%) of the suspected misclassifications predicted Peace River, where Bull Trout are not known to spawn (Earthtone and Mainstream, 2013; Mainstream, 2012). For first summer predictions, again most (22 out of 30; 73%) misclassifications predicted Peace River, and the remainder of misclassifications for the Pine River and Moberly River. Moberly River chemistry can overlap with the Pine River and some tributaries in the Halfway River (Colt Creek) watershed. Peace River chemistry overlaps with Pine and Halfway rivers in the model, and all of these overlaps in water chemistry are suspected of having created the predicted misclassifications for the Bull Trout fin rays.

The adjusted predictions for Peace River captured Bull Trout suggest that the Halfway River watershed is the main recruitment source for sampled Bull Trout (86.8%, 112/129), where Chowade River and Cypress/Fiddes creeks (65.9% natal; 52.7% first summer), and Halfway River mainstem (17.1% natal; 27.1% first summer) recruited the most Bull Trout (Tables 12 and 13; Figures 17 to 20).

Other Halfway River watershed recruitment sources included Unknown locations (3.1% natal; 7.0% first summer) and Colt/Kobes creeks (<1% natal; 0% first summer). Outside of the Halfway River watershed, other recruitment sources of Bull Trout to the Peace River included Pine River watershed (total of 5.4% recruitment), Moberly River (3.9% recruitment), and an unknown location(s) (total of 3.9% recruitment).

Most Bull Trout (96.4%; 134/139) were recruited from within the LAA, whereas the remaining Bull Trout were recruited from unknown locations that may include waterbodies outside of the LAA. Of those with definite recruitment from within the LAA (n=134), 94.8% (127/134) recruited from areas upstream of the Project. Only 5.2% of the Bull Trout recruited from within the LAA were predicted to have been from the Pine River watershed downstream of the Project.

As highlighted in the reconstructed life histories of select Bull Trout, the younger/smaller fish had not left their natal habitat (Figures 21 and 22), while the older/larger fish had left their natal streams and migrated to the Peace River where they were ultimately captured (Figures 23 – 26). A summary of the predicted natal and first summer habitat of each Bull Trout is provided in Appendix C.

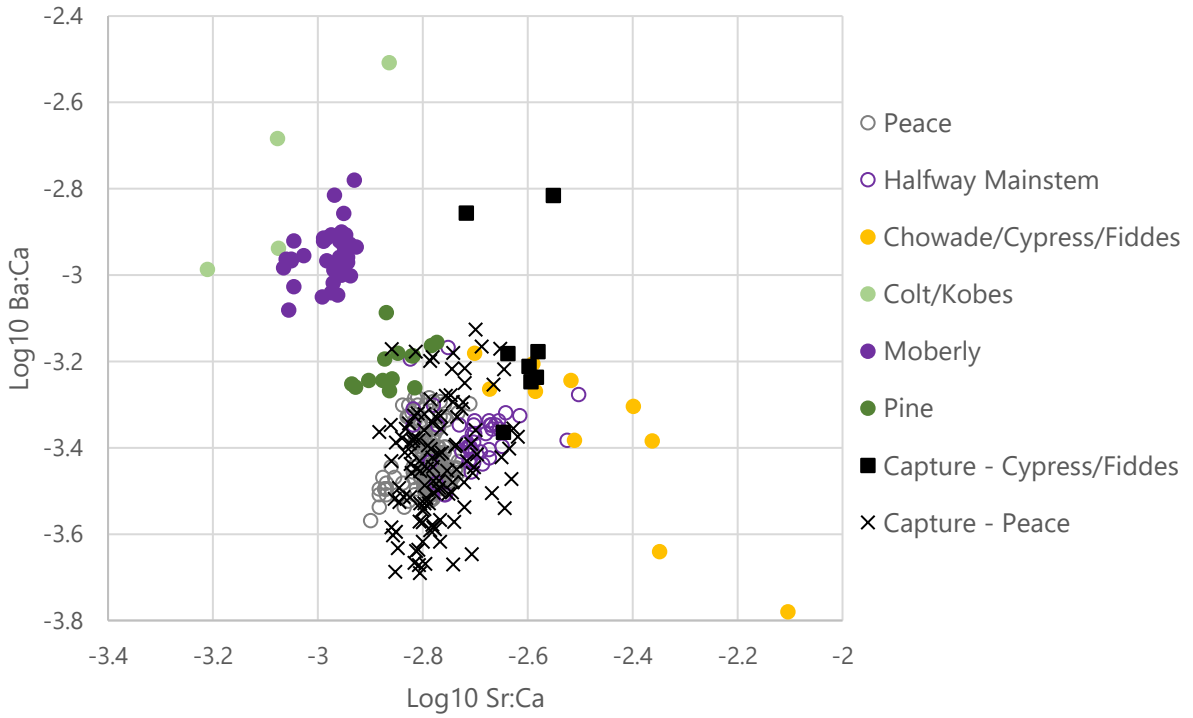


Figure 16. Capture elemental signatures relative to water chemistry at prior locations.

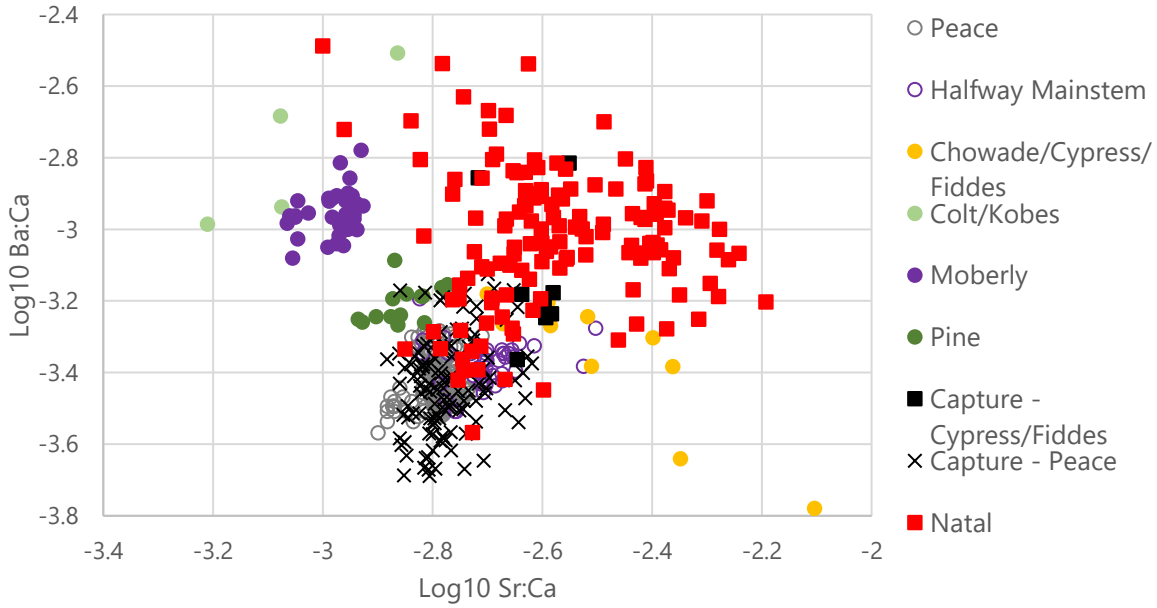


Figure 17. Predicted Bull Trout natal habitats relative to water chemistry at prior locations.

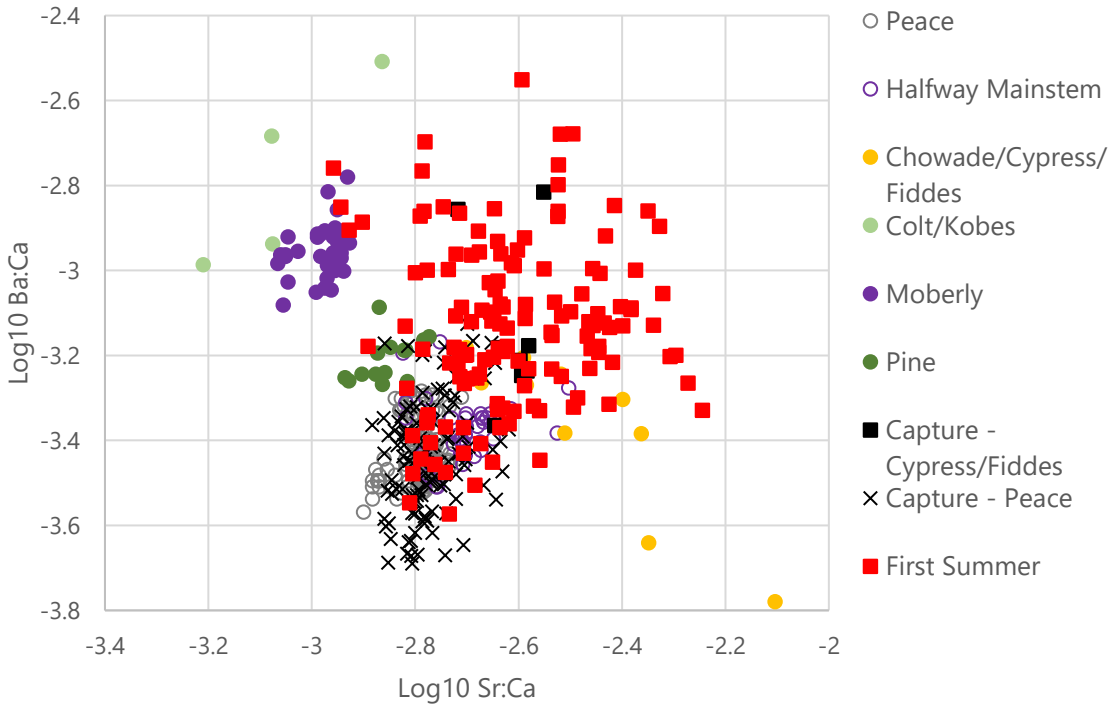


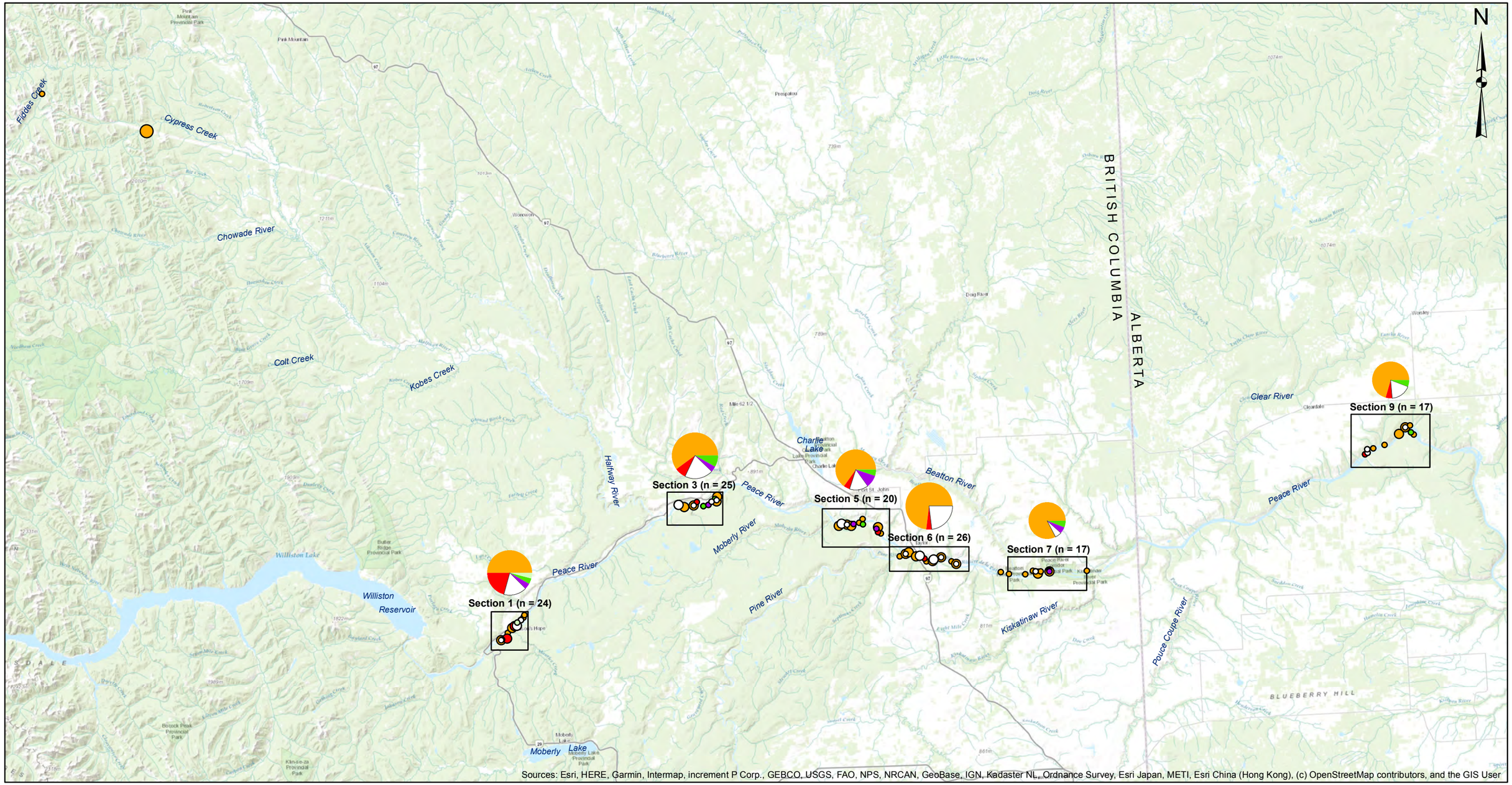
Figure 18. Predicted Bull Trout natal habitats relative to water chemistry at prior locations.

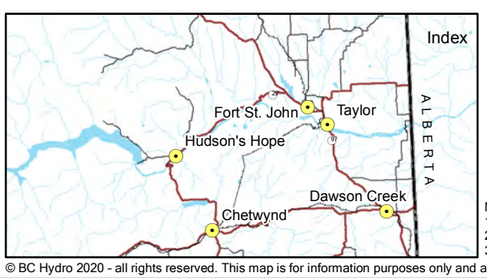
Table 12. Predicted natal habitats for Bull Trout.

	Predicted Habitats		Capture Areas: Halfway: Mainstem	Halfway: Colt	Halfway: Kobes	Halfway: Chowade	Halfway: Cypress	Halfway: Unknown	Halfway: Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Peace: Upstream	Peace: Downstream	TOTAL
	Area	Waterbody(s)	Mainstem	Colt	Kobes	Chowade	Cypress	Unknown	Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	
Upstream	Halfway River	Mainstem												9	13	22
		Unknown												3	1	4
		Colt/Kobes												1		1
		Chowade/Cypress/Fiddes					9		1					27	58	95
	Moberly													2	3	5
Downstream	Pine													3	3	6
		Mainstem														
		Unknown													1	1
	Peace															
	Unknown													4	1	5
	Total						9		1					49	80	139

Table 13. Predicted first summer habitats for Bull Trout.

			Capture Areas													
	Predicted Habitats		Halfway							Moberly	Pine	Beatton	Kiskatinaw	Peace		TOTAL
	Area	Waterbody(s)	Mainstem	Colt	Kobes	Chowade	Cypress	Unknown	Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	
Upstream	Halfway River	Mainstem												13	22	35
		Unknown												7	2	9
		Colt/Kobes Chowade/Cypress /Fiddes					9		1					20	48	78
	Moberly													2	3	5
Downstream	Pine													3	3	6
		Unknown													1	1
	Peace															
	Unknown													4	1	5
	Total						9		1					49	80	139





Origin

- Moberly River
- Colt Creek, Kobes Creek
- Pine River
- Chowade River, Cypress Creek, Fiddes Creek
- Halfway River
- Unknown

Fish Count by Section

Observation Size

- 1
- 2 - 4
- >= 5

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

1:700,000

0 25 km

BC Hydro

Predicted natal habitat sources for Bull Trout

Figure 19

Date	Jun 15, 2020	DWG NO	1016-N11-00749-4	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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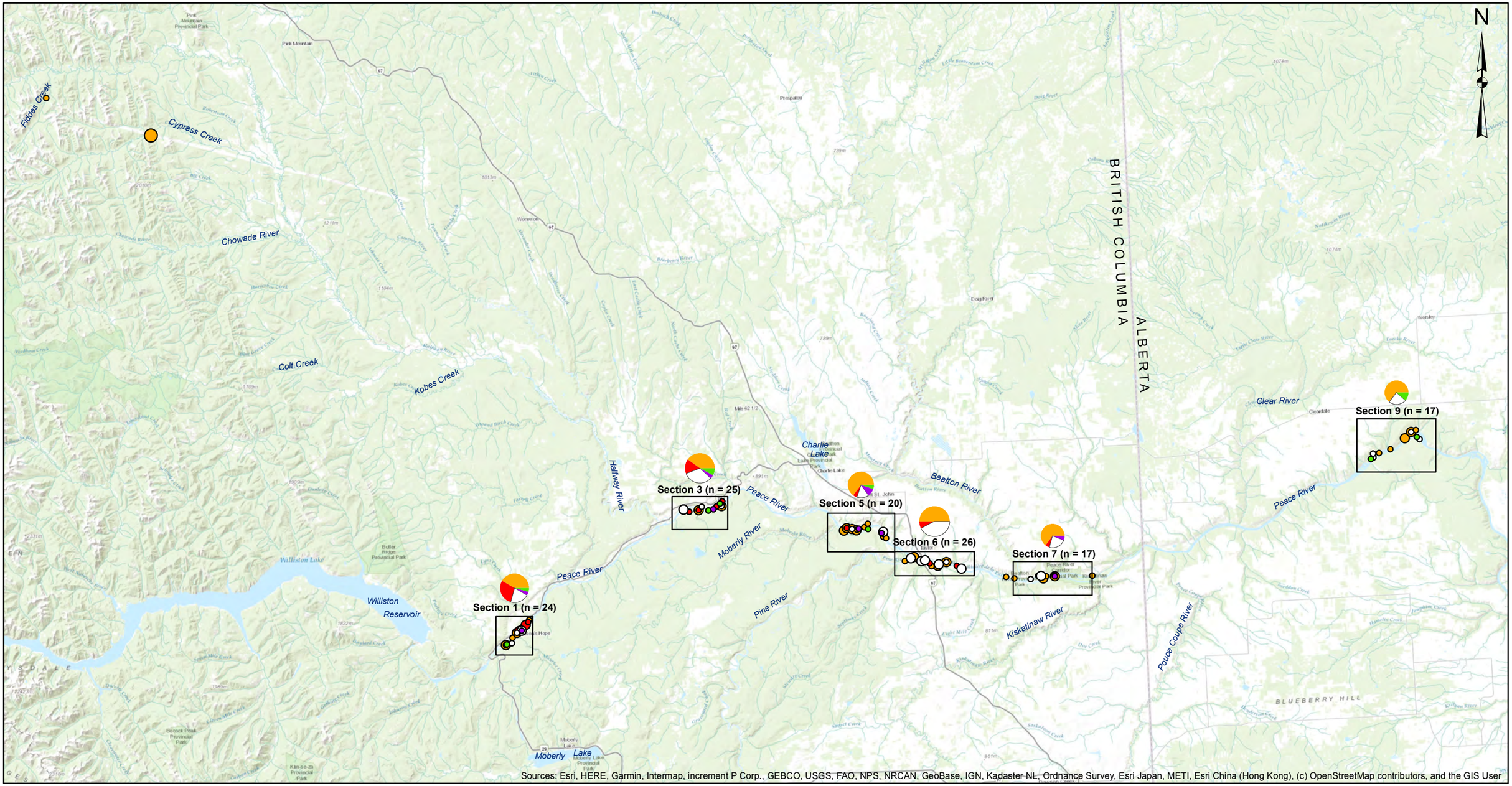

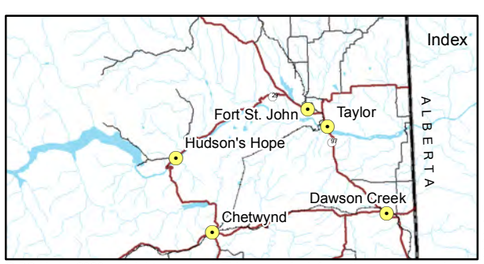

Origin

- Moberly River
- Pine River
- Chowade River, Cypress Creek, Fiddes Creek
- Halfway River
- Unknown

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

Fish Count by Section

Observation Size

- 1
- 2 - 4
- >= 5

1:700,000

0 25 km

BC Hydro

Predicted first summer habitat sources for Bull Trout

Figure 20

Date	Jun 15, 2020	DWG NO	1016-N11-00749-3	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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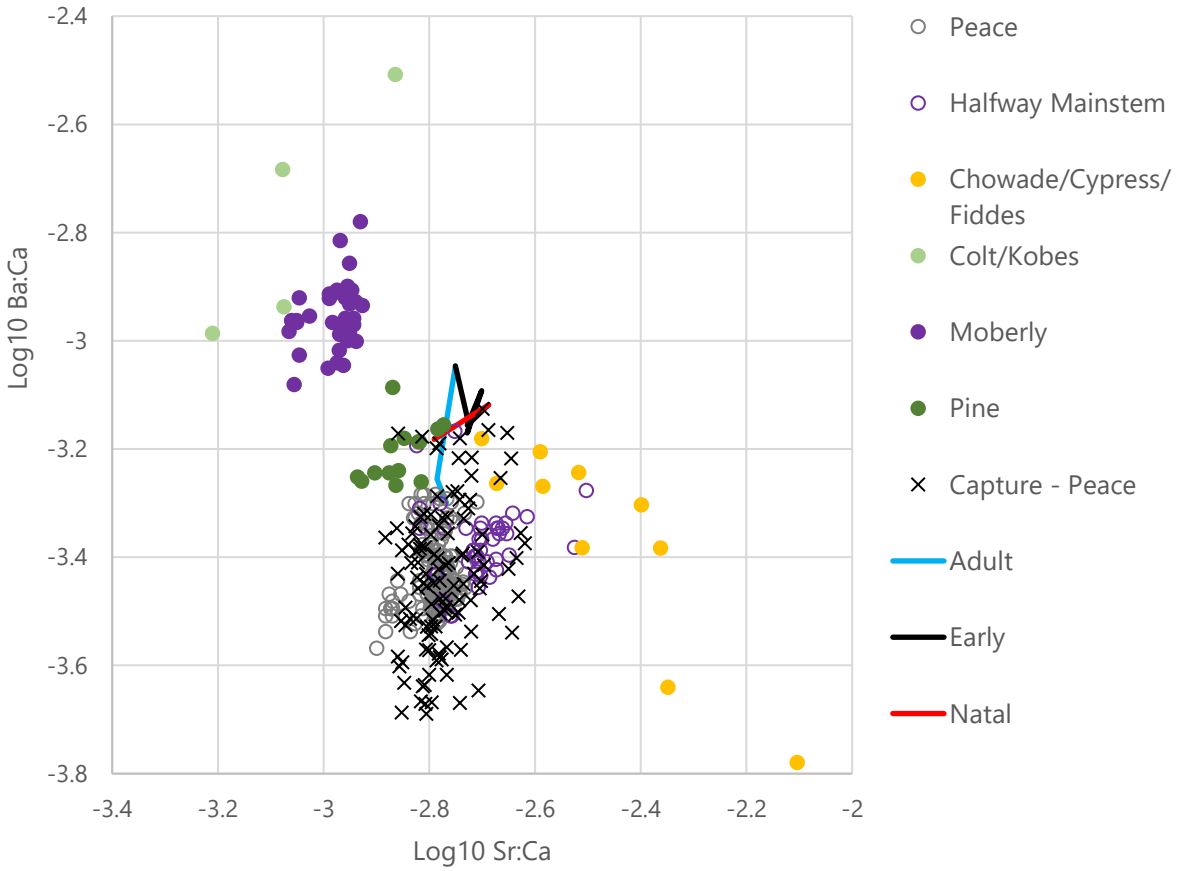


Figure 21. Reconstructed life history of BT #544 (fork length = 152 mm) captured in Cypress Creek. The plot suggests that it remained in a similar region throughout its life, and both the natal and first summer habitat is predicted to be Chowade River/Cypress/Fiddes creeks (yellow circles) within the Halfway River watershed.

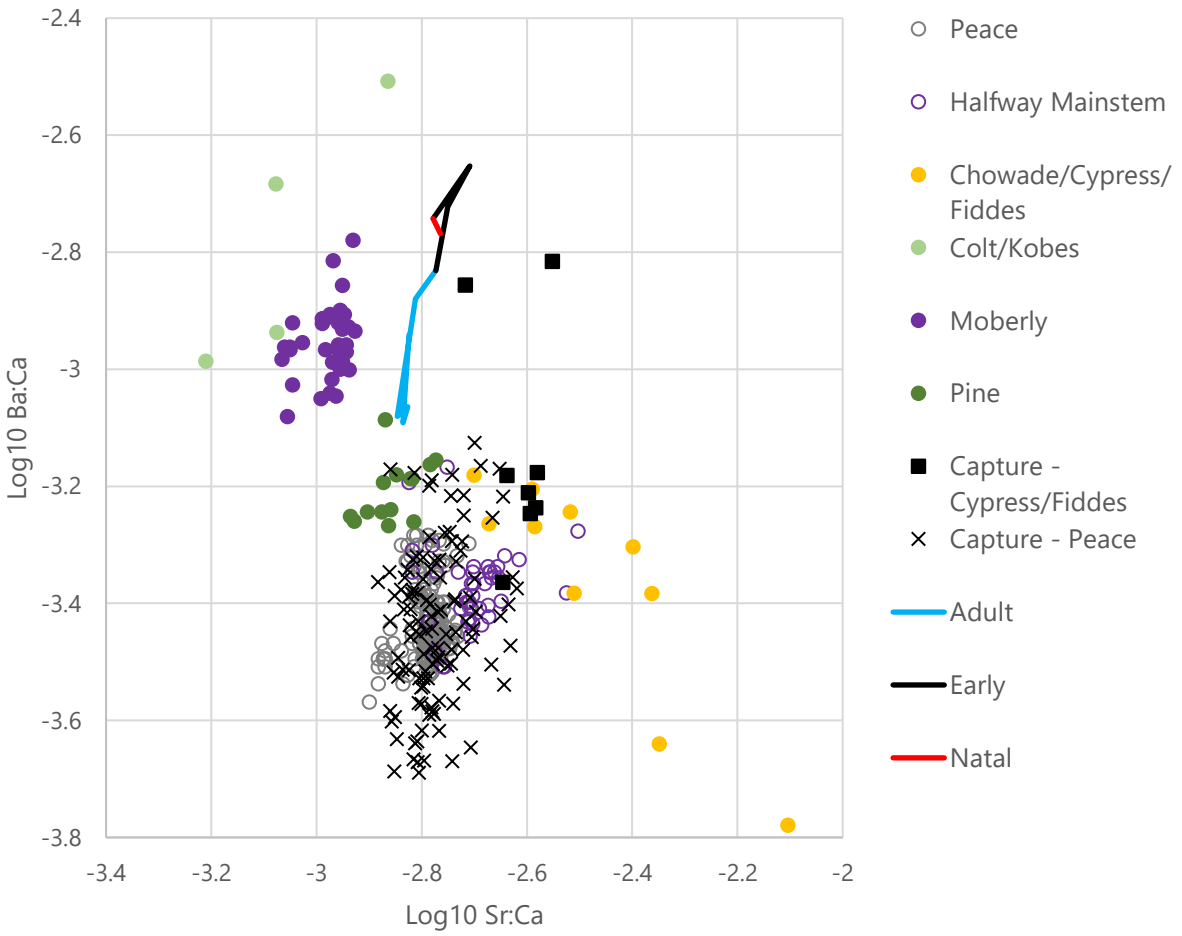


Figure 22. Reconstructed life history of BT #874 (fork length = 127 mm) captured in Fiddes Creek. The plot suggests that it remained in a similar region throughout its life never entering the Peace River to switch watersheds. Accordingly, the natal and summer habitat were both predicted to be Chowade River/Cypress/Fiddes creeks (yellow circles) within the Halfway River watershed.

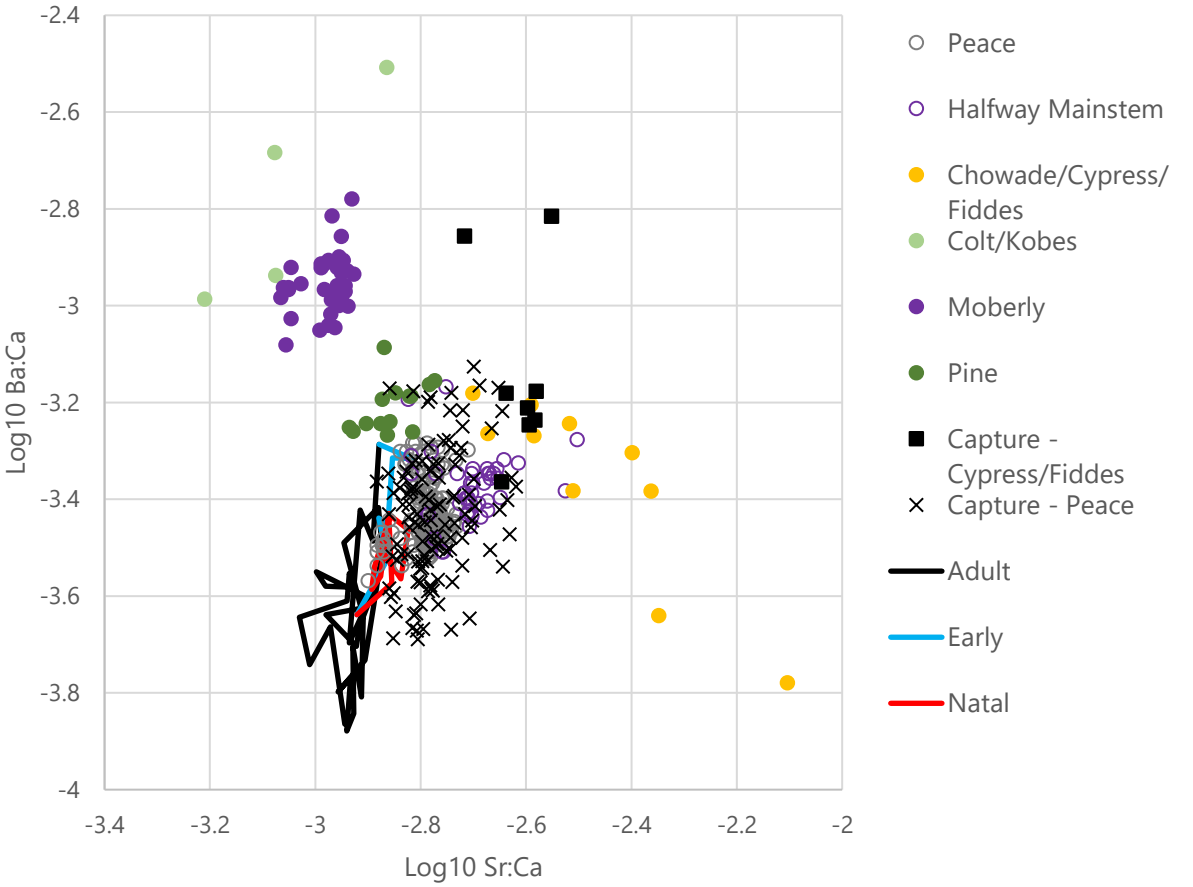


Figure 23. Reconstructed life history of BT #1377 (fork length = 416 mm) captured in Peace River. The plot suggests that the natal and first summer region is slightly higher in Sr:Ca and Ba:Ca than its adult habitat. Accordingly, the predicted natal and first summer habitat is Halfway River.

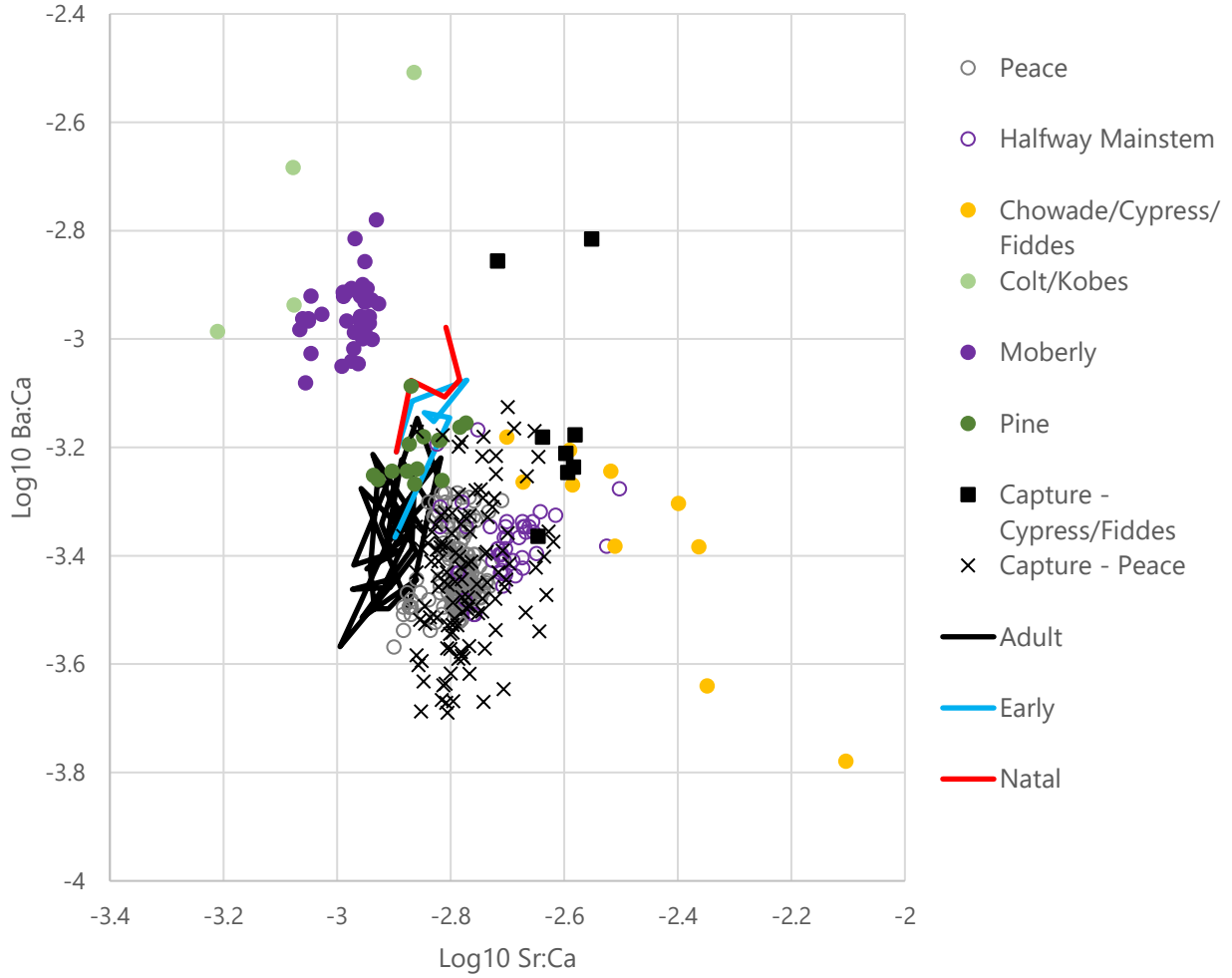


Figure 24. Reconstructed life history of BT #3236 (fork length = 531 mm) captured in Peace River. The plot suggests the recruitment habitat has elevated Ba:Ca, and accordingly the predicted natal and first summer habitat is Pine River (green circles).

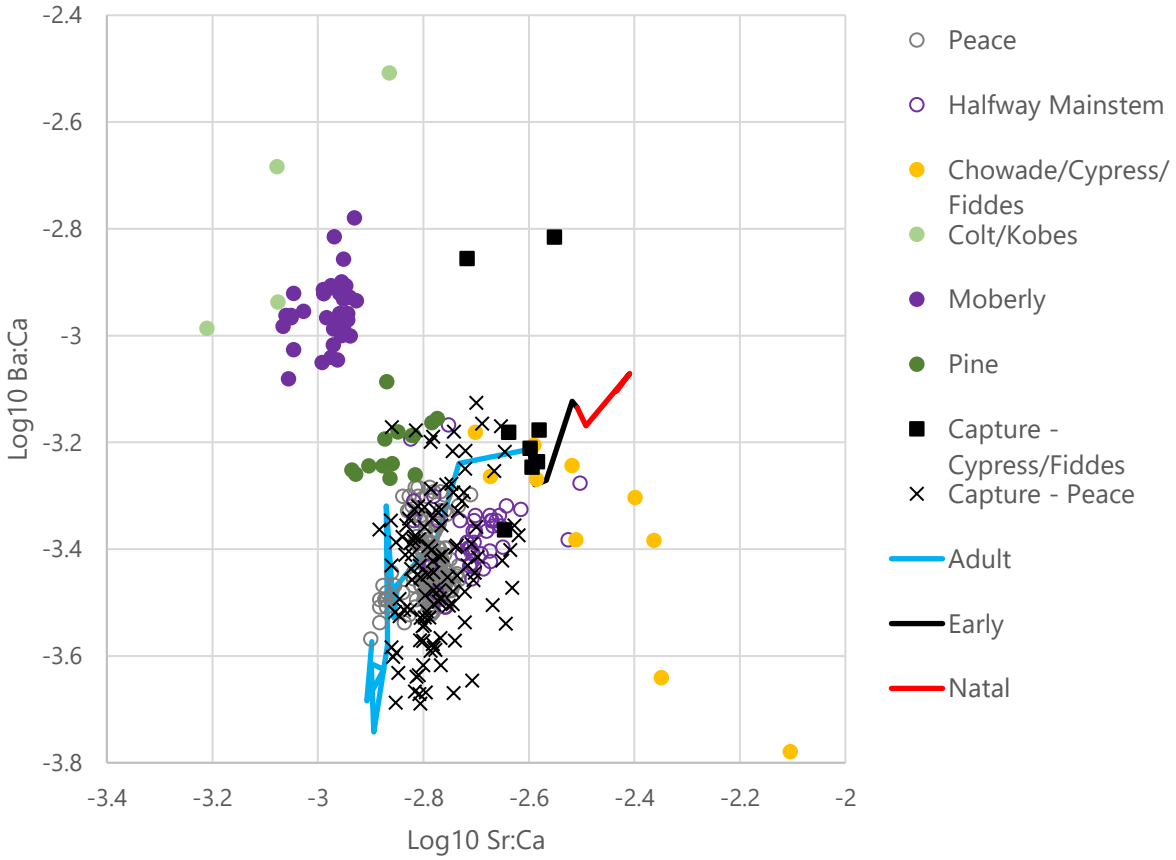


Figure 25. Reconstructed life history of BT #651 (fork length = 251 mm). The predicted natal and first summer habitat is Chowade River/Cypress/Fiddes creeks within the Halfway River watershed. The reconstruction of the natal and early life history aligns with that water chemistry (yellow circles). During its adult life, this fish migrated to the Peace River where it was captured.

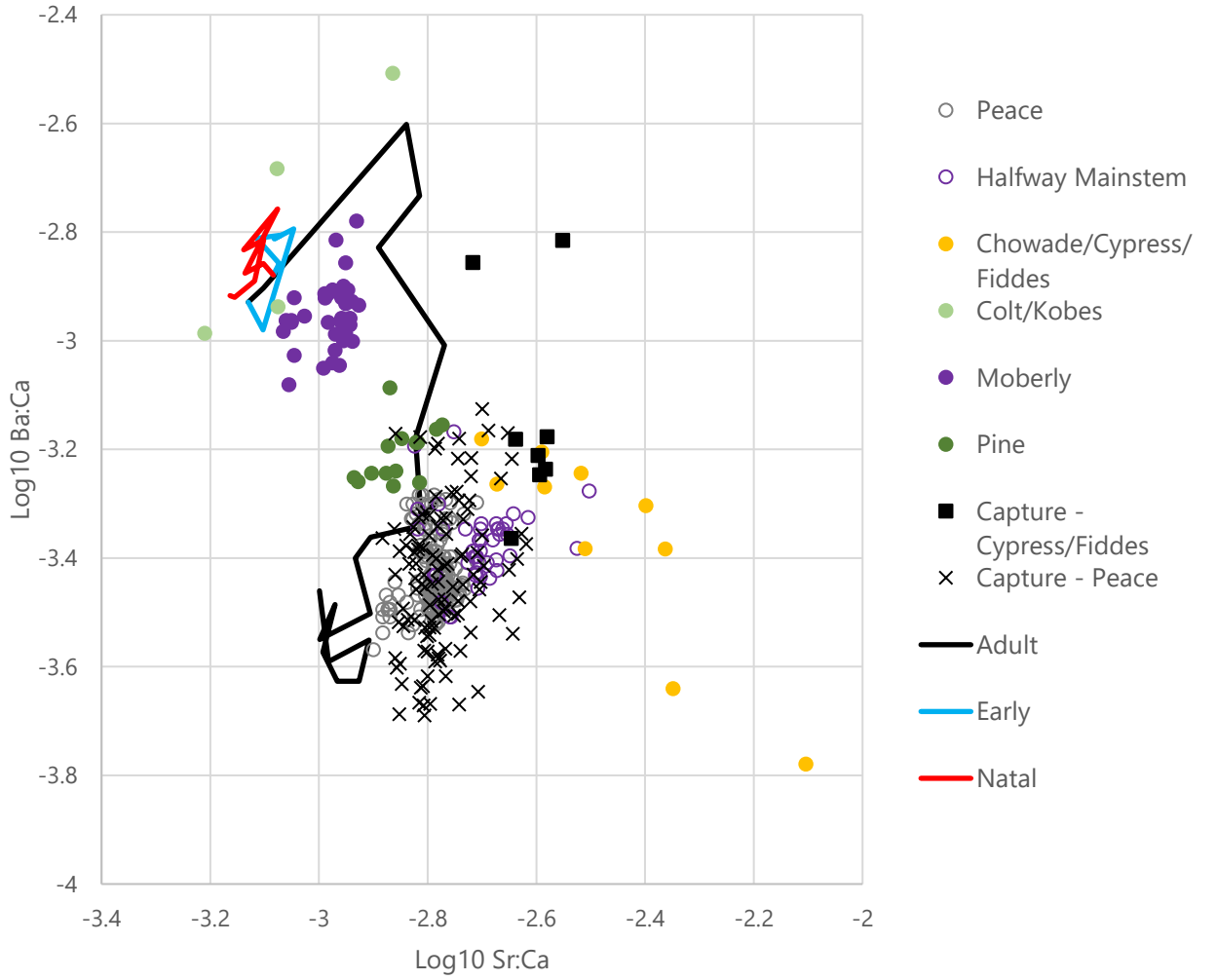


Figure 26. Reconstructed life history of BT #3823 (fork length = 337 mm). The predicted natal and first summer habitat is the Moberly River and the reconstruction of the natal and early life history is aligned with that water chemistry (purple circles). During its adult life history, this fish migrated to the Peace River where it was captured.

3.5 Goldeye (GE)

Thirteen Goldeye were captured from the Peace River – all of them from downstream (Sections 6, 7, 8, and 9) of the Project. The Goldeye capture chemistry in the otoliths had good correlation with water chemistry of the Peace River (Figure 27). The DFA (predictive power 91.6%, expected classification rate 16.7%; n=249; Appendix B) had no suspected misclassifications in the habitat predictions. The model predicted that the 13 Goldeye all recruited from the Smoky River (natal and first summer) in Alberta (Tables 14 and 15). While the model predicted the Smoky River as the natal and first summer habitat, the pattern of elevated Ba:Ca and Sr:Ca chemistry ratios (Figures 28 to 31) was similar to what was observed by Earthtone and Mainstream (2013) for Goldeye, where their model predicted "unknown" or Smoky River in those cases. It is possible that while not recruiting directly from the Smoky River mainstem, it could be that the "unknown" habitat reported by Earthtone and Mainstream (2013) resides within the Smoky River watershed. Migration patterns were similar among all Goldeye moving from elevated Ba:Ca and Sr:Ca chemistry ratios towards the Peace River during its adult life history (Figures 32 to 34). This same movement pattern was also observed in the Goldeye previously modeled (Earthtone and Mainstream 2013). Although, the previous report suggested some Peace River recruits (24% and 16%, for natal and first summer, respectively), the data reported herein does not indicate natal or first summer habitat in the Peace River for these sampled Goldeye.

Although Goldeye were captured downstream of the Project in the Peace River, there were no recruitment sources of Goldeye predicted within the LAA. All recruitment from these samples came from downstream of Many Islands, Alberta, specifically from the Smoky River watershed.

Reconstructed life histories of select Goldeye can be viewed in Figures 32 to 34. A summary of the predicted natal and first summer habitat for Goldeye is presented in Appendix C.

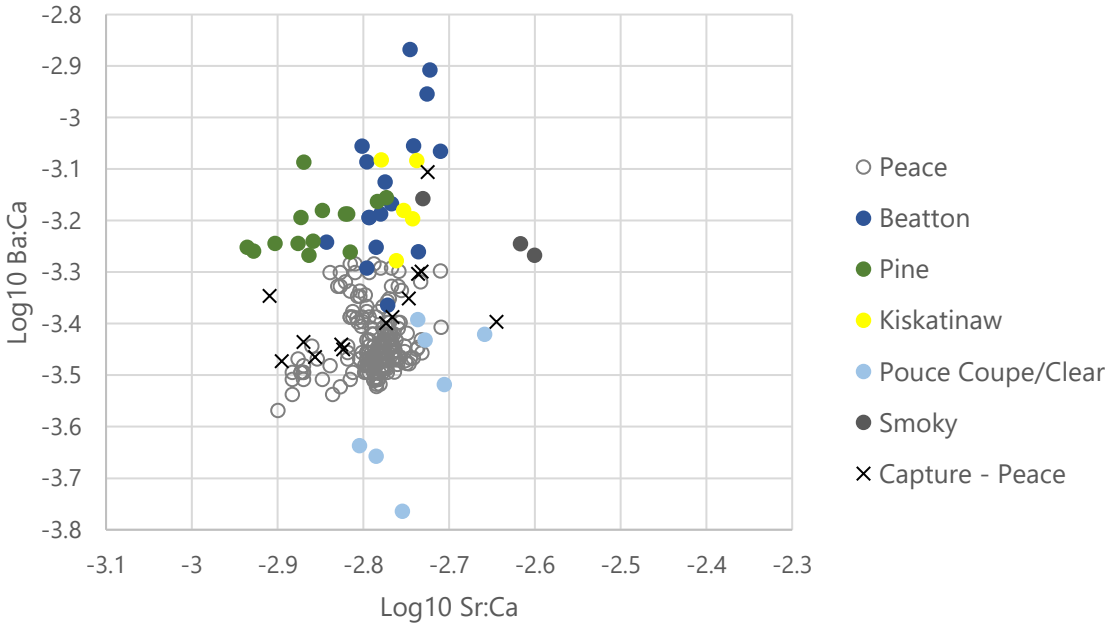


Figure 27. Capture elemental signatures of Goldeye relative to water chemistry at prior locations.

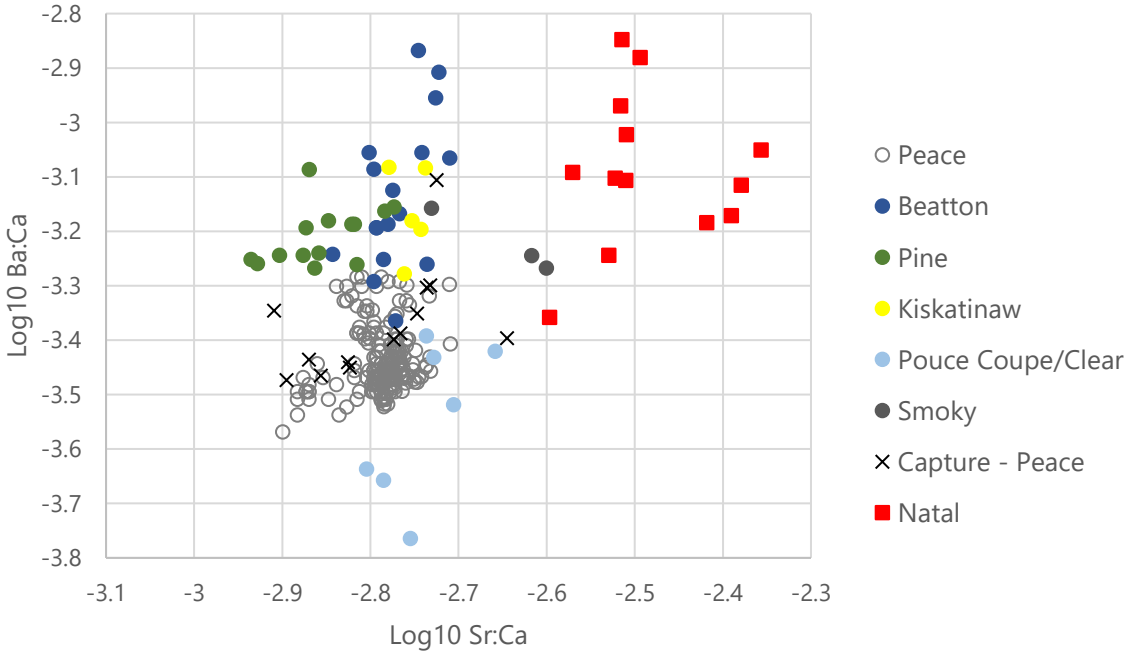


Figure 28. Predicted natal habitat of Goldeye relative to water chemistry at prior locations and capture signatures.

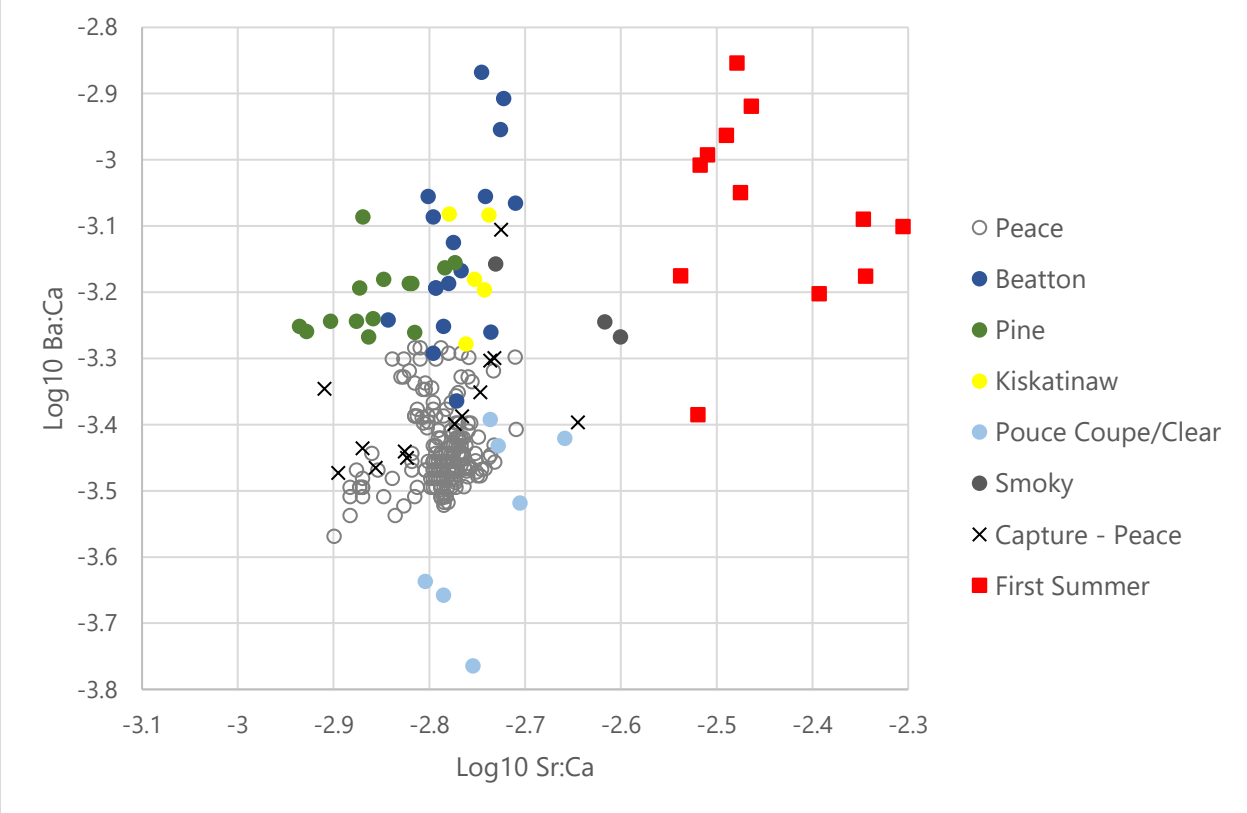


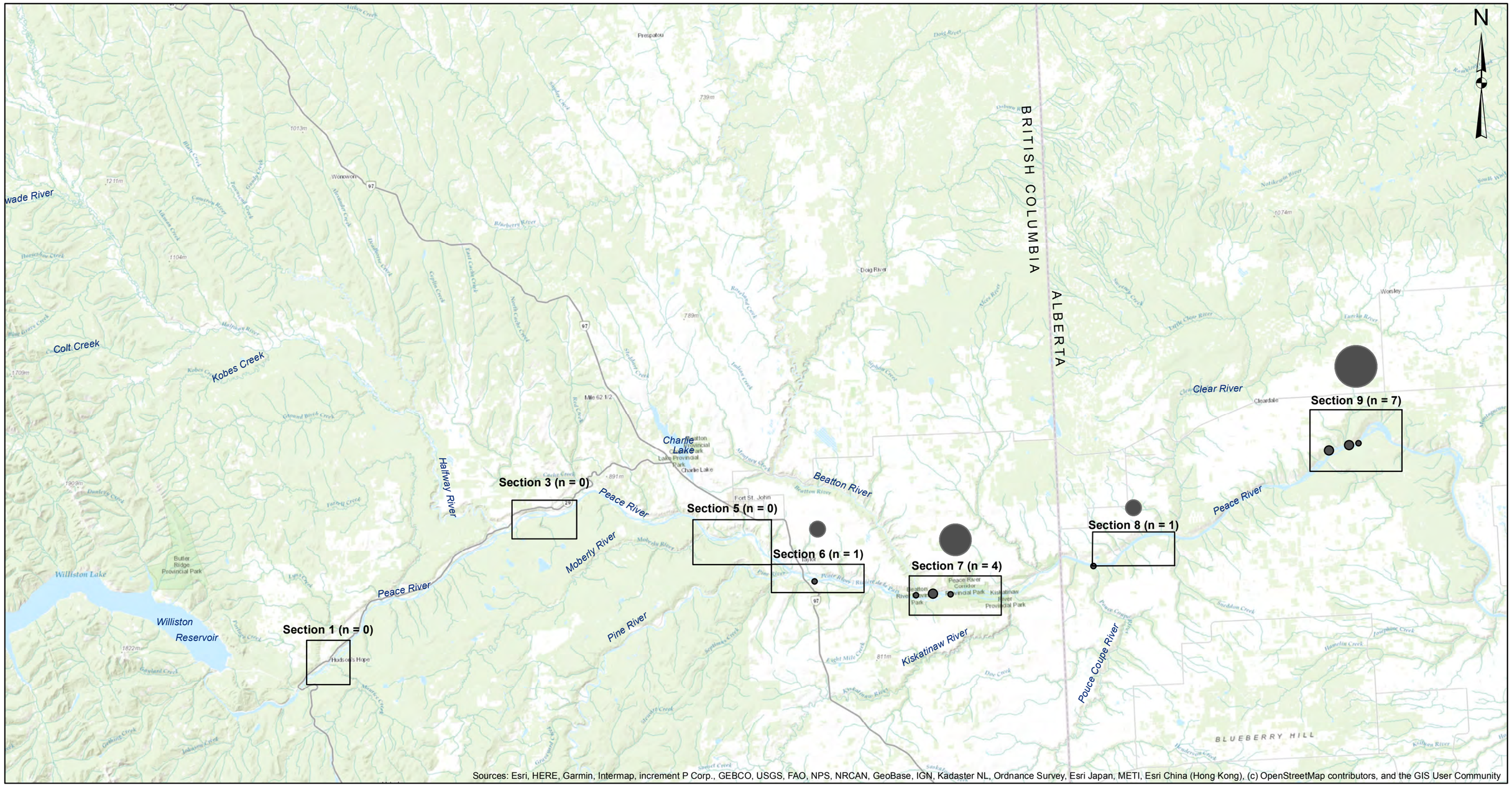
Figure 29. Predicted first summer habitat of Goldeye relative to water chemistry at prior locations and capture signatures.

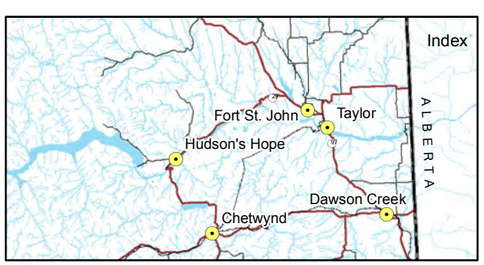
Table 14. Predicted natal habitat for Goldeye

		Capture Areas													
	Predicted Habitats	Halfway							Moberly	Pine	Beatton	Kiskatinaw	Peace		Total
	Area Waterbody(s)	Mainstem	Colt	Kobes	Chowade	Cypress	Unknown	Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	
Downstream	Pine														
	Beatton														
	Kiskatinaw														
	Pouce Coupe/Clear														
	Smoky/Little Smoky													13	13
Peace															
Total														13	13

Table 15. Predicted first summer habitat for Goldeye

	Predicted Habitats	Capture Areas													Total
		Halfway							Moberly	Pine	Beatton	Kiskatinaw	Peace		
	Area / Waterbody(s)	Mainstem	Colt	Kobes	Chowade	Cypress	Unknown	Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	
Downstream	Pine														
	Beatton														
	Kiskatinaw														
	Pouce Coupe/Clear														
	Smoky/Little Smoky													13	13
Peace															
Total														13	13





Origin

Smoky River

Fish Count by Section

Observation Size

1

2 - 4

>= 5

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

1:600,000

0 25 km

BC Hydro

Predicted natal habitat sources for Goldeye

Figure 30

Date	Jun 10, 2020	DWG NO	1016-N11-00749-6	R 1

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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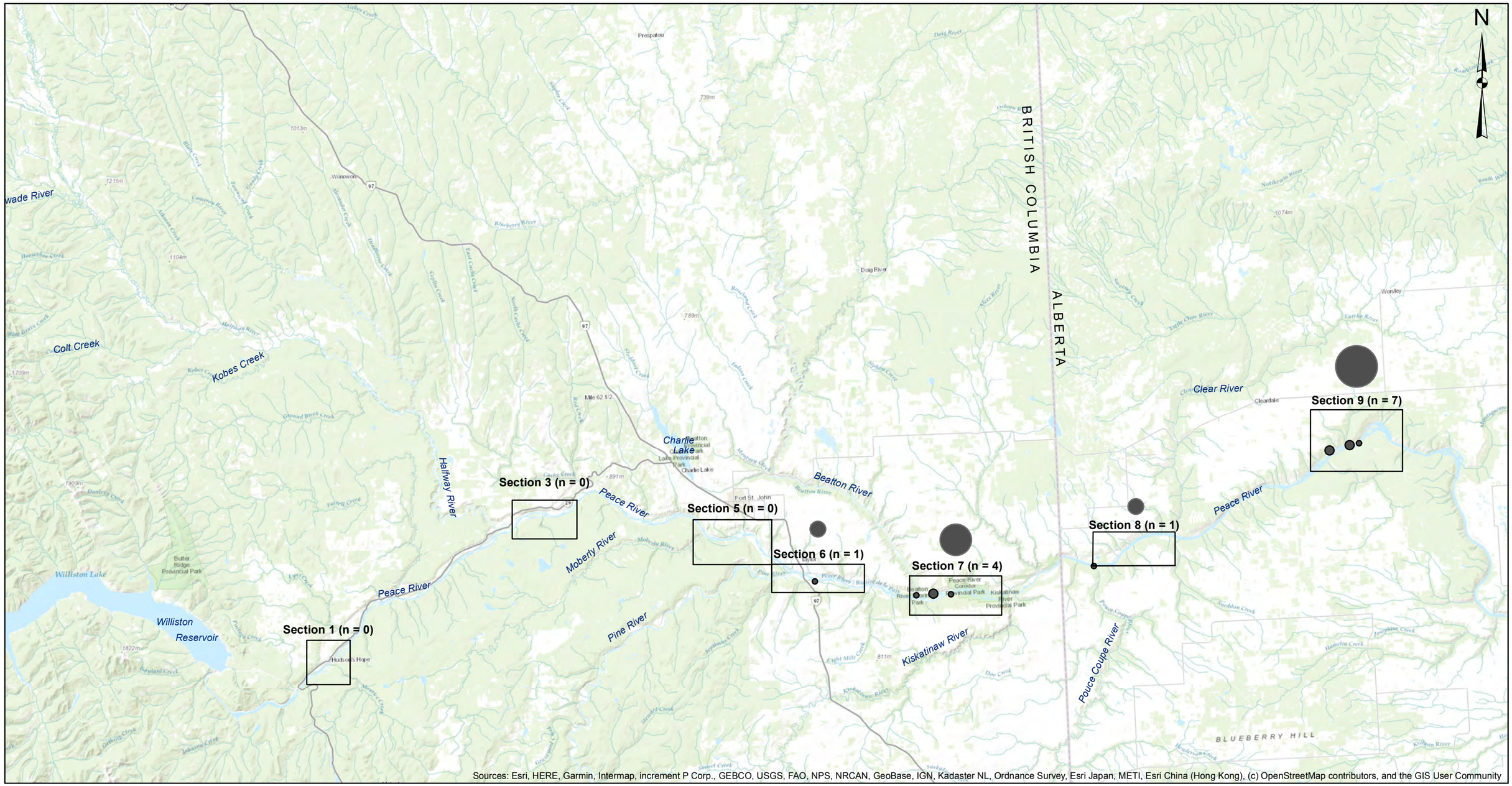

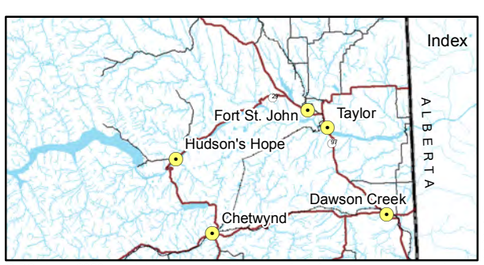

Origin

Smoky River

Fish Count by Section

Observation Size

1

2 - 4

>= 5

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

1:600,000

0 25 km

BC Hydro

Predicted first summer habitat sources for Goldeye

Figure 31

Date	Jun 10, 2020	DWG NO	1016-N11-00749-5	R 1

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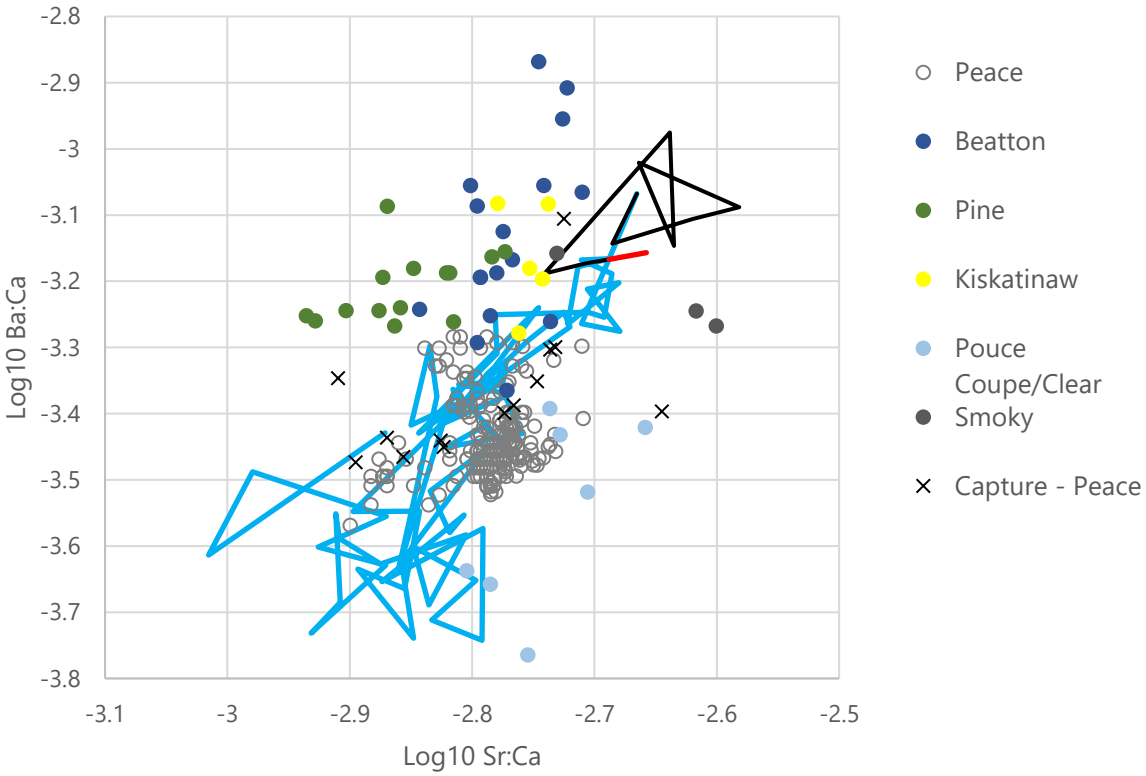


Figure 32. Reconstructed life history of GE #1369 (fork length = 410 mm) captured in the Peace River. The predicted natal and first summer habitat is the Smoky River. During its adult life history, this fish migrated to the Peace River.

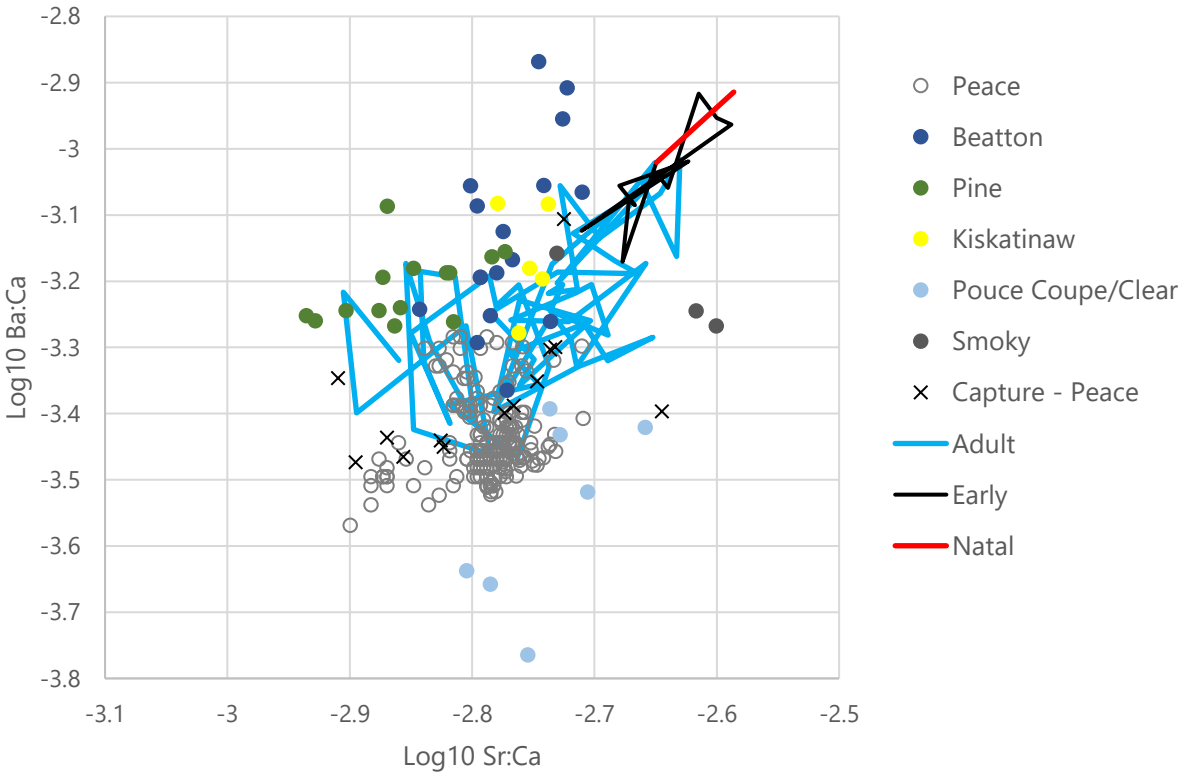


Figure 33. Reconstructed life history of GE #2498 (fork length = 379 mm) captured in Peace River. The predicted natal and first summer habitat is the Smoky River. During its adult life history, this fish migrated to the Peace River.

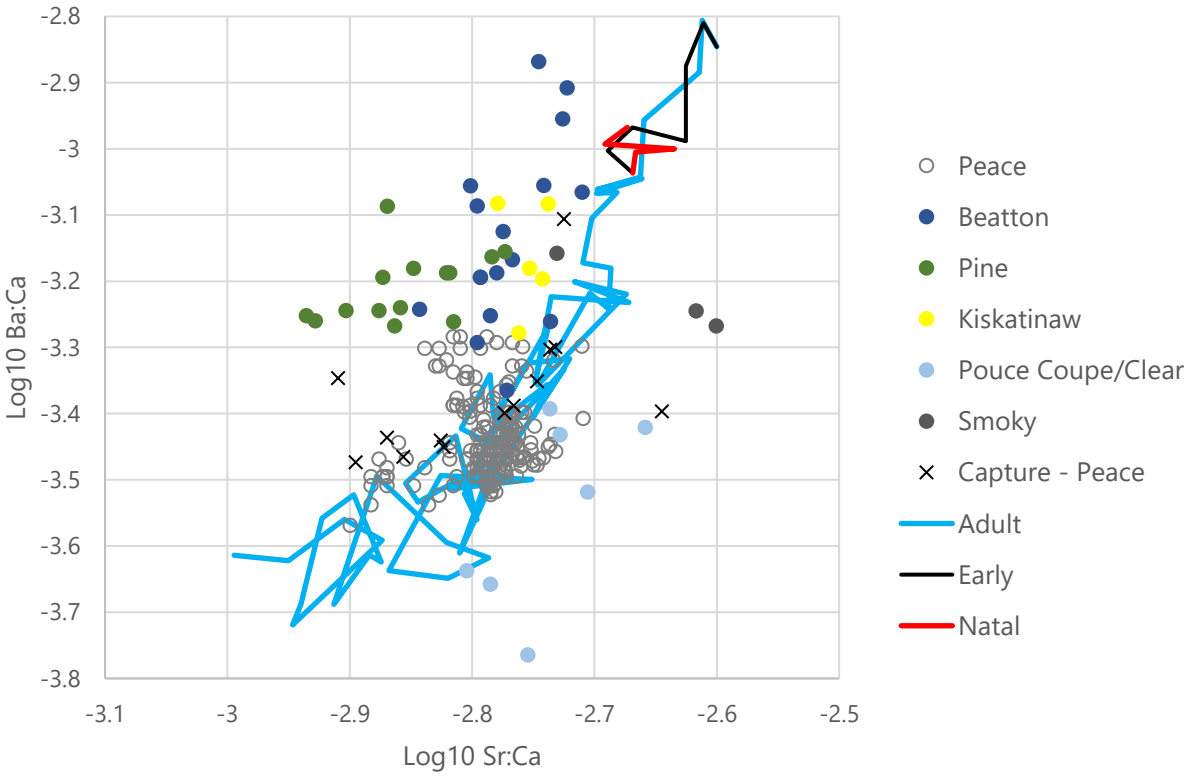


Figure 34. Reconstructed life history of GE #4617 (fork length = 393 mm) captured in Peace River. The predicted natal and first summer habitat is the Smoky River. During its adult life history, this fish migrated to the Peace River.

3.6 Mountain Whitefish (MW)

Ninety-five (95) Mountain Whitefish were captured from 2014 to 2018, with 87 individuals from the Peace River, six from the Pine River, and two from Colt Creek within the Halfway River watershed. Mountain Whitefish capture chemistry had good correlation with water chemistry data at those locations (Figure 35).

The discriminant analysis (predictive power 85.6%; expected classification rate 14.3%; n=383; Appendix B) had suspected 2.6% (5 out of 190) misclassifications in natal and first summer habitat predictions. The model predicted that most Mountain Whitefish had natal habitat in the Beatton River (47.4% or 45 out of 95) and the Peace River mainstem (37.9% or 36 fish), with smaller recruitment sources from the Moberly River (5.3% or 5 fish), Pine River (5.3% or 5 fish), and Halfway

River watershed (4.2% or 4 fish) (Figures 36 and 38; Table 16). Most Mountain Whitefish were predicted to have spent their first summer in the Peace River (84.2% or 82 fish), with other summer habitats making a less significant contribution, including the Beatton River (6.3% or 6 fish), Pine River (3.2% or 3 fish), Moberly River (2.1% or 2 fish), Halfway River (1% or 1 fish), and an unknown location (1% or 1 fish) (Figures 37 and 39; Table 17).

Of the 95 Mountain Whitefish modeled, 62.1% (59 fish) were determined to have been spawned in the LAA. It is possible that the other 37.9% (36 fish), which spawned in the Peace River, were also in the LAA. However, the Peace River extends beyond the LAA with water chemistry remaining similar to that within the LAA, so actual recruitment location within the Peace River is not possible to determine with the data available. At least 12 out of 95 (12.6%) Mountain Whitefish spent their first summer in the LAA (86.3% of the Mountain Whitefish spent their first summer in the Peace River or 1.1% in an unknown location). Of the 59 fish recruited from within the LAA, 84.7% (50 fish) were recruited from downstream waterbodies; specifically, the Beatton (76.3%; 45 fish) and Pine (8.5%; 5 fish) rivers. Alternatively, there was less recruitment from upstream sources (15.2% or 9 fish, natal; 5.1% or 3 fish, first summer), which were limited to the Moberly River (8.5% or 5 fish, natal; 3.4% or 2 fish, first summer) and Halfway River watershed (6.8% or 4 fish, natal; 1.7% or 1 fish first summer).

Reconstructed life histories of select Mountain Whitefish are provided in Figures 40 to 45. A summary of predicted natal and first summer habitat for Mountain Whitefish can be found in Appendix C.

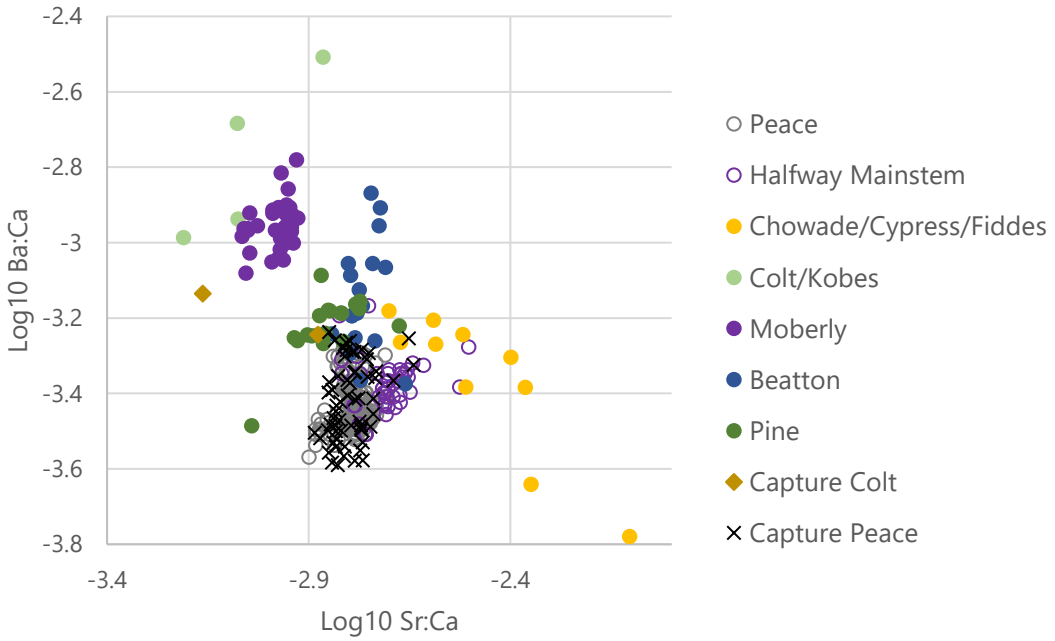


Figure 35. Capture elemental signatures of Mountain Whitefish relative to water chemistry at prior locations.

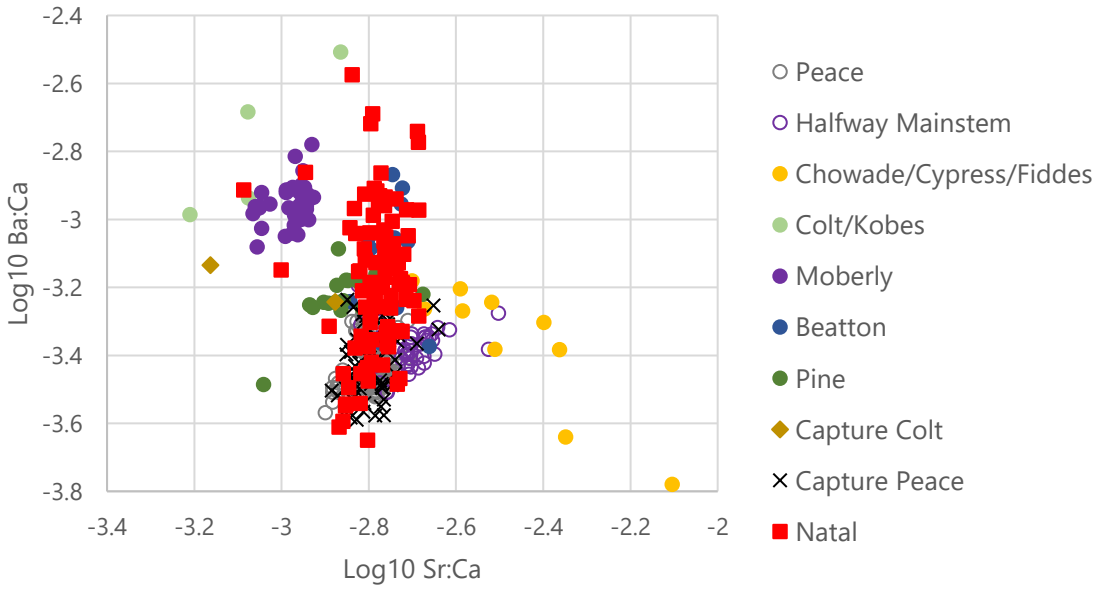


Figure 36. Predicted natal habitat of Mountain Whitefish relative to water chemistry at prior locations and capture signatures.

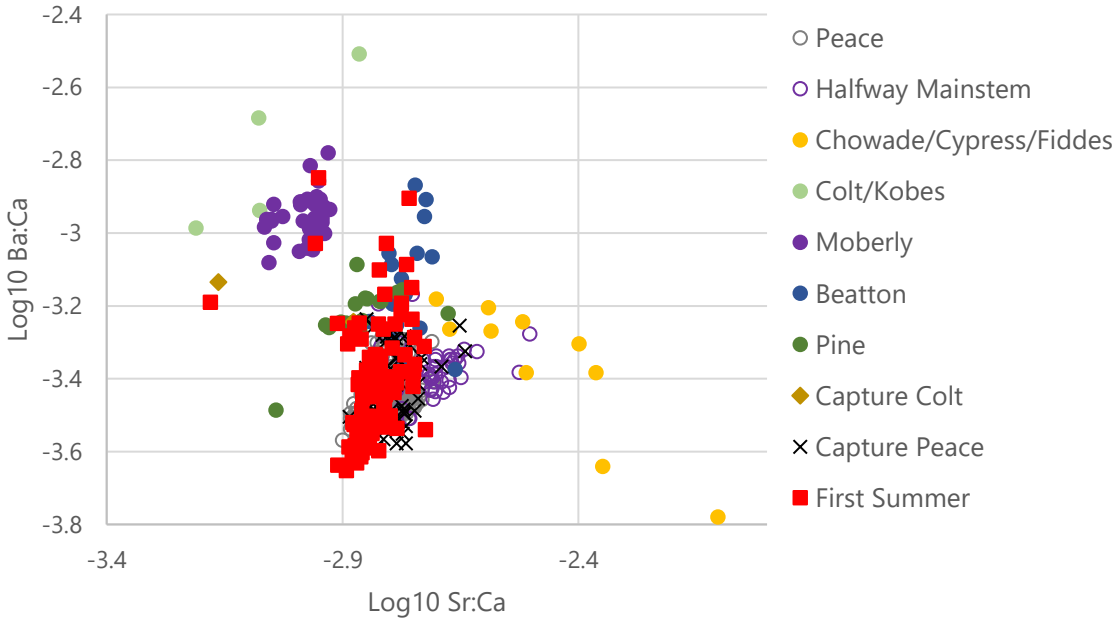


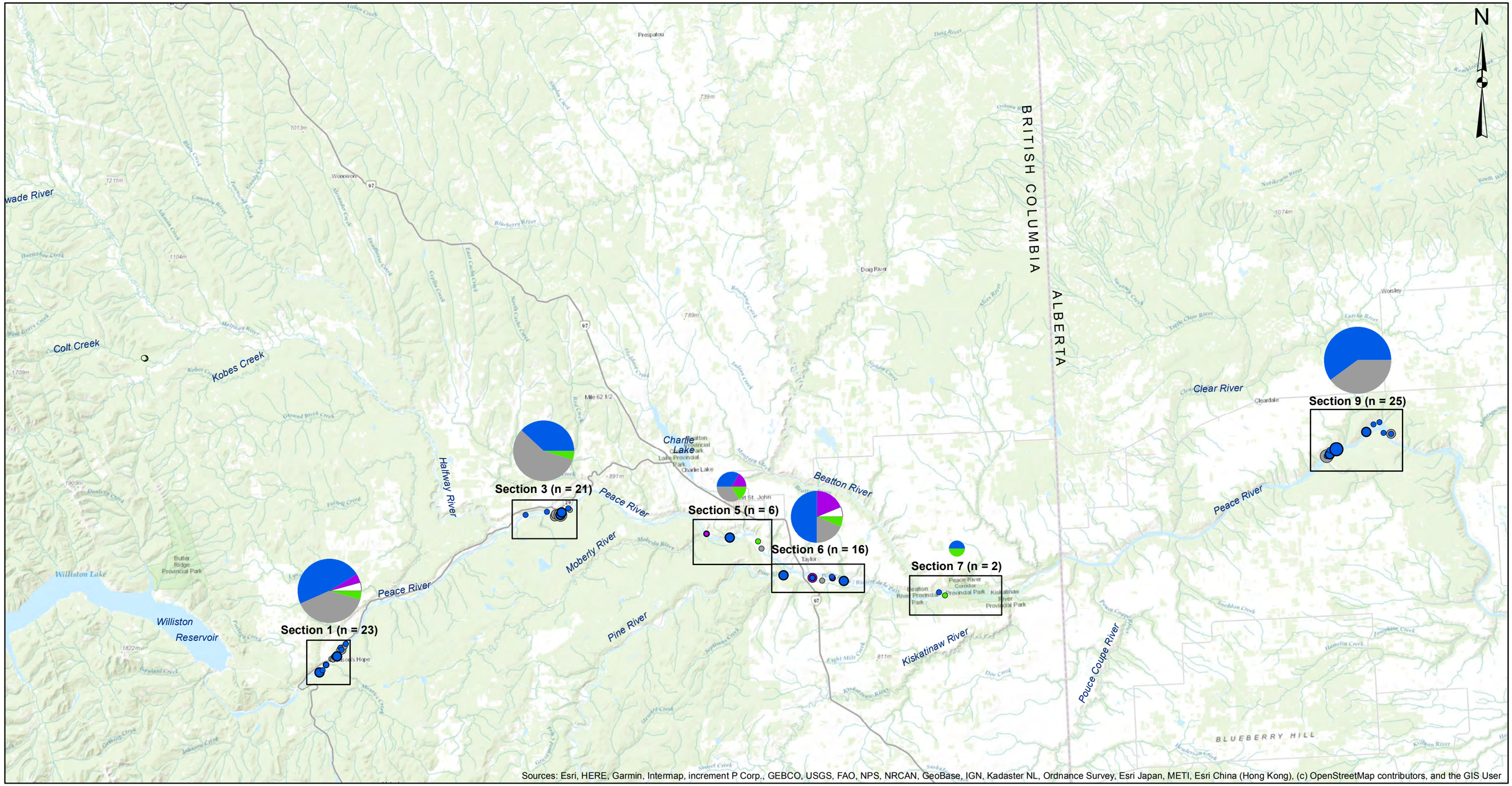
Figure 37. Predicted first summer habitat of Mountain Whitefish relative to water chemistry at prior locations and capture signatures.

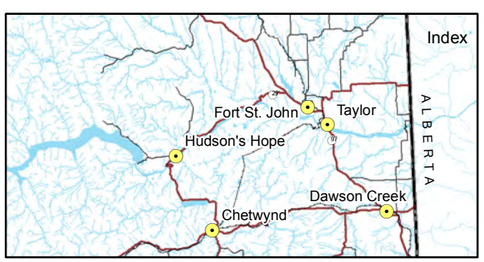
Table 16. Predicted natal habitat of Mountain Whitefish

	Predicted Habitats		Capture Areas: Halfway							Moberly	Pine	Beatton	Kiskatinaw	Peace		Total
	Area	Waterbody(s)	Mainstem	Colt	Kobes	Chowade	Cypress	Unknown	Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	
Upstream	Halfway River	Mainstem		1										1	1	3
		Colt/Kobes		1												1
		Chowade/Cypress/ Fiddes														
	Moberly													1	4	5
Downstream	Pine										1			2	2	5
	Beatton										3			19	23	45
	Peace										2			21	13	36
	Total			2							6			44	43	95

Table 17. Predicted first summer habitat of Mountain Whitefish

			Capture Areas												
	Predicted Habitats		Halfway							Moberly	Pine	Beatton	Kiskatinaw	Peace		Total
	Area	Waterbody(s)	Mainstem	Colt	Kobes	Chowade	Cypress	Unknown	Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	
Upstream	Halfway River	Mainstem		1												1
		Colt/Kobes Chowade/Cypress/ Fiddes														
	Moberly														2	2
Downstream	Pine										1			1	1	3
	Beatton													3	3	6
	Peace			1							5			40	36	82
	Unknown														1	1
	Total			2							6			44	43	95





Origin

- Peace River
- Moberly River
- Beatton River, Kiskatinaw River
- Pine River
- Halfway River
- Colt Creek, Kobes Creek

Fish Count by Section

Observation Size

- 1
- 2 - 4
- >= 5

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

1:600,000 0 25 km

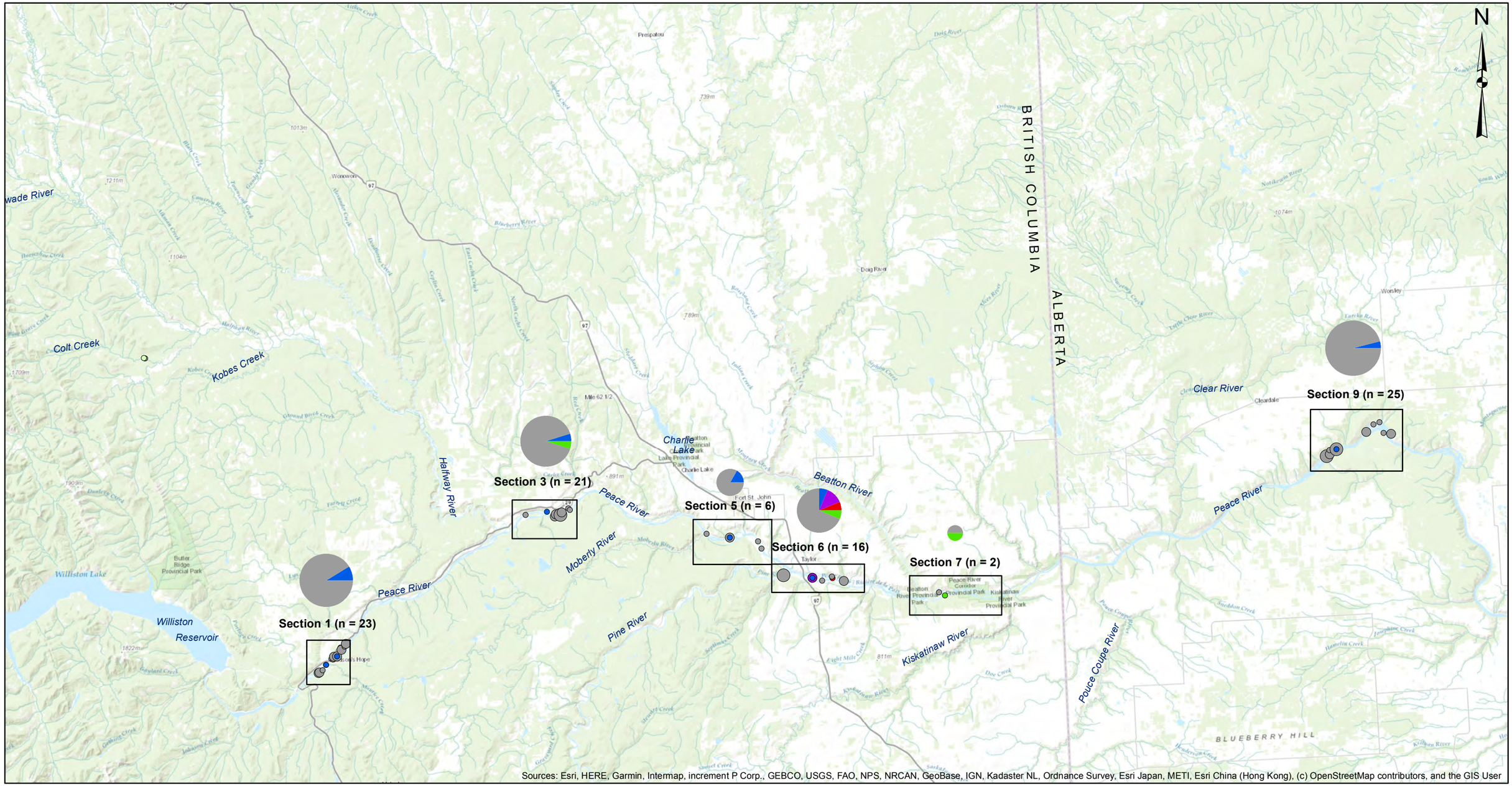
BC Hydro

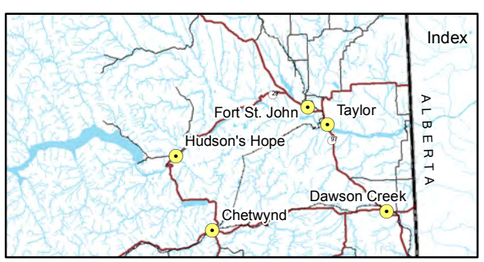
Predicted natal habitat sources for Mountain Whitefish

Figure 38

Date	Jun 8, 2020	DWG NO	1016-N11-00749-2	R 0

Path: X:\ArcGIS\Projects\Environment\Fisheries\Microchemistry_Predicted_Origin_MountainWhitefish_Natal_1016_N11_00749-2.mxd





Origin

- Peace River
- Moberly River
- Beatton River, Kiskatinaw River
- Pine River
- Unknown
- Colt Creek, Kobes Creek

Fish Count by Section

Observation Size

- 1
- 2 - 4
- >= 5

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

1:600,000 0 25 km

BC Hydro

Predicted first summer habitat sources for Mountain Whitefish

Figure 39

Date	Jun 8, 2020	DWG NO	1016-N11-00749-1	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

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Reconstructed life histories of select Mountain Whitefish to highlight examples of the major river recruitment locations of Mountain Whitefish to the Peace River are provided in Figures 31 to 36.

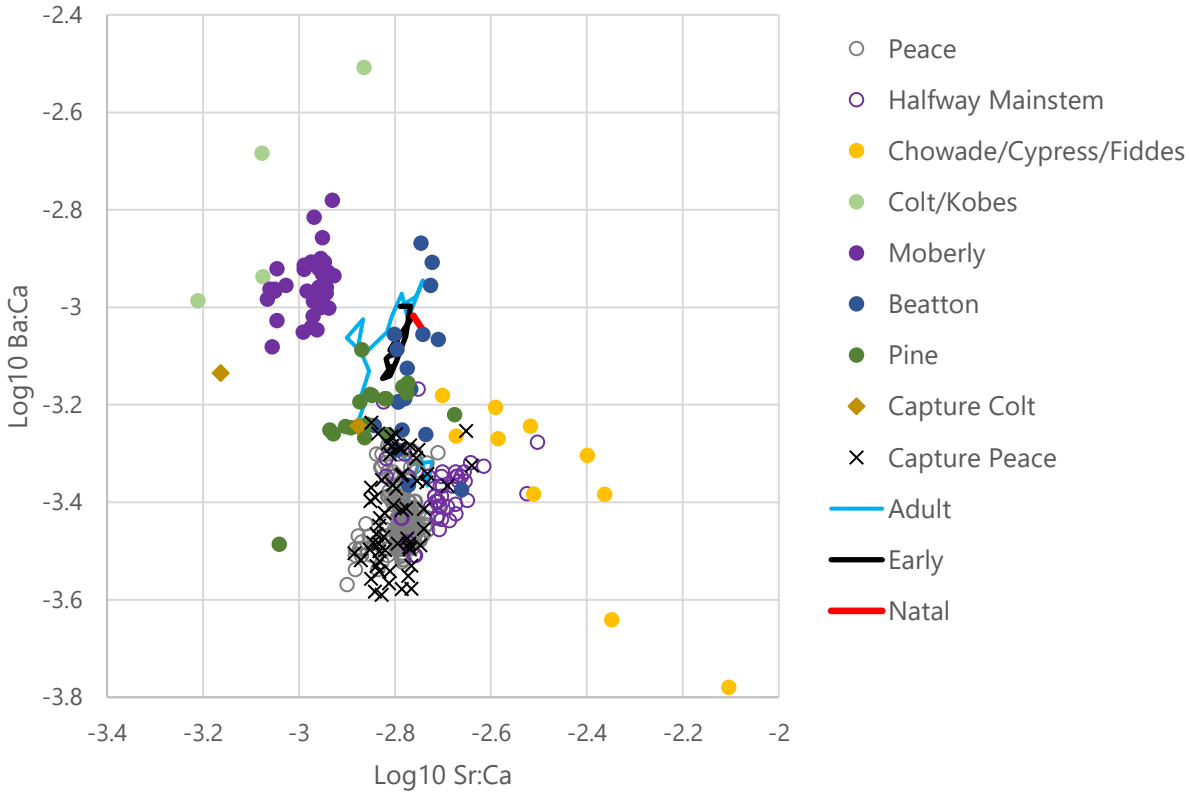


Figure 40. Predicted life history of MW #964 (fork length = 73 mm) captured in the Peace River. The predicted natal and first summer habitat is the Beatton River (blue circles), then the fish moved into the Peace River for its adult life. This is one of the examples of Mountain Whitefish that remained in its natal habitat for the first summer.

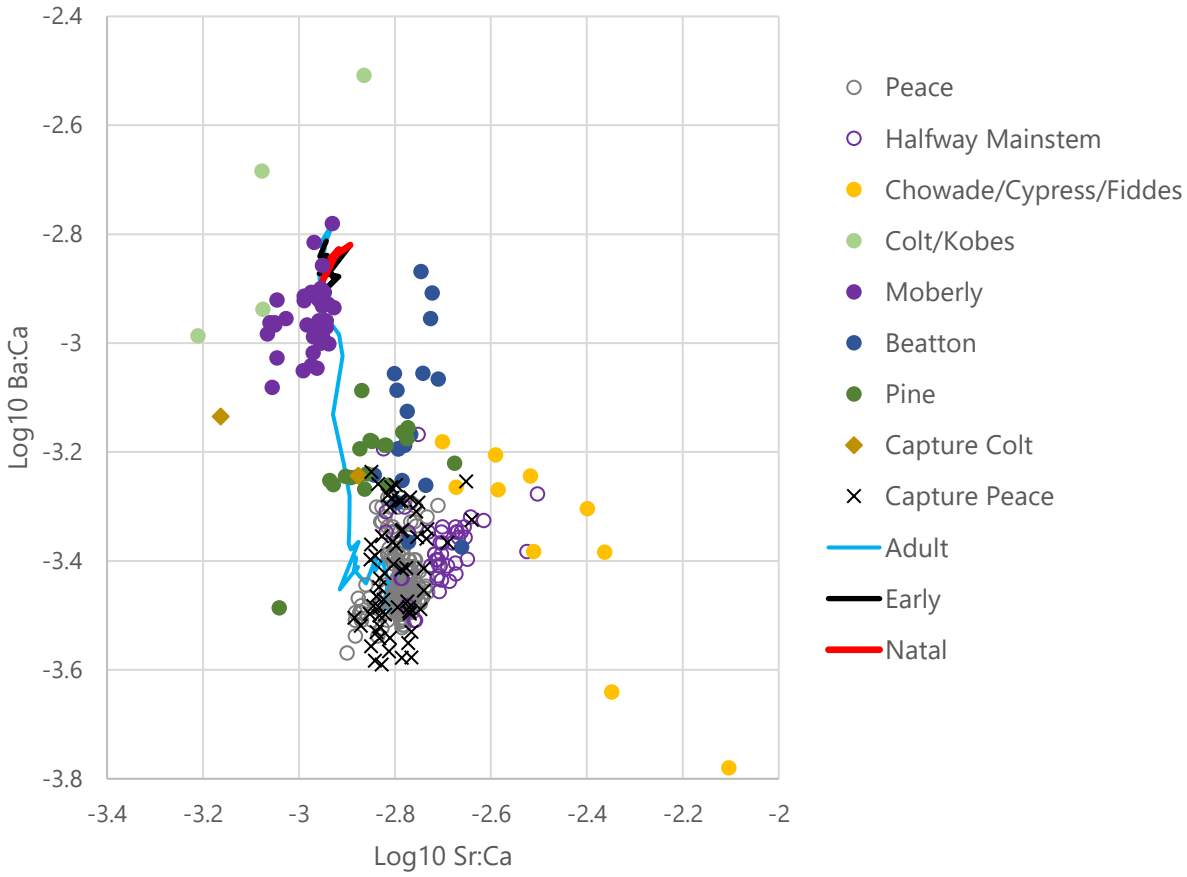


Figure 41. Predicted life history of MW #1000 (fork length = 89 mm) captured in the Peace River. The predicted natal and first summer habitat was the Moberly River (purple circles), then the fish moved into the Peace River for its adult life history. This is an example of the few Mountain Whitefish that remained in its natal habitat for the first summer prior to migrating to the Peace River.

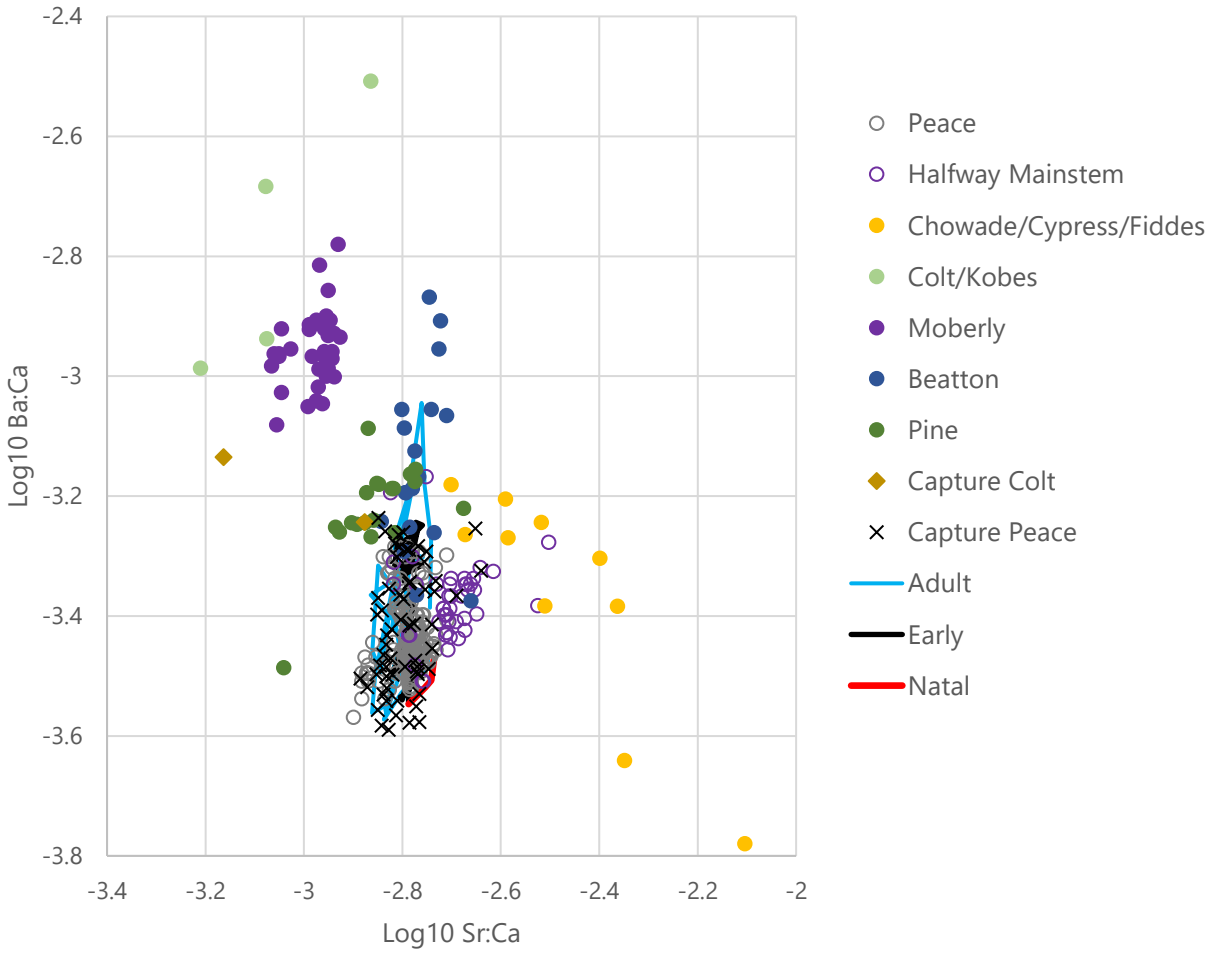


Figure 42. Predicted life history of MW #3035 (fork length 226 mm) captured in the Peace River. The model suggests this individual spent its entire life history in the Peace River, although based on the plot it may have spent part of its adult life in Pine River or Beatton River.

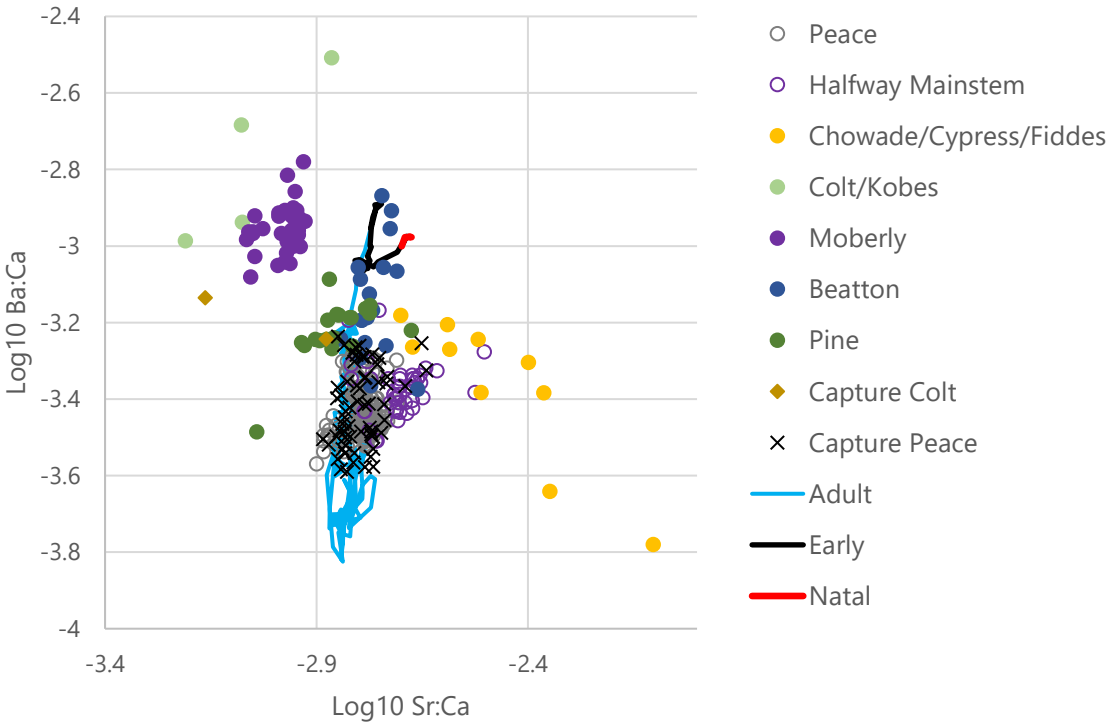


Figure 43. Predicted life history of MW #2693 (fork length = 307 mm) captured in the Peace River. The predicted natal and first summer habitat is the Beatton River (blue circles), then the fish moved into the Peace River for its adult life.

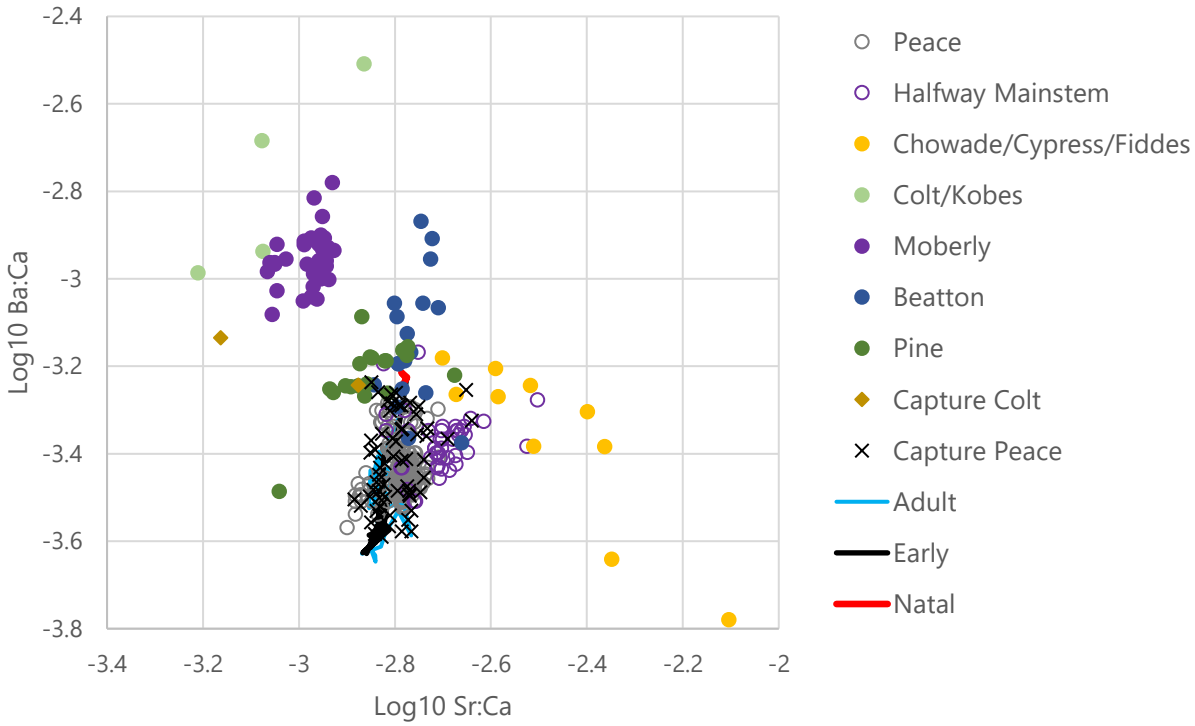


Figure 44. Predicted life history of MW #4505 (fork length = 173 mm) captured in the Peace River. The predicted natal and first summer habitat, and the reconstruction suggest this individual remained in the Peace River for its entire life history.

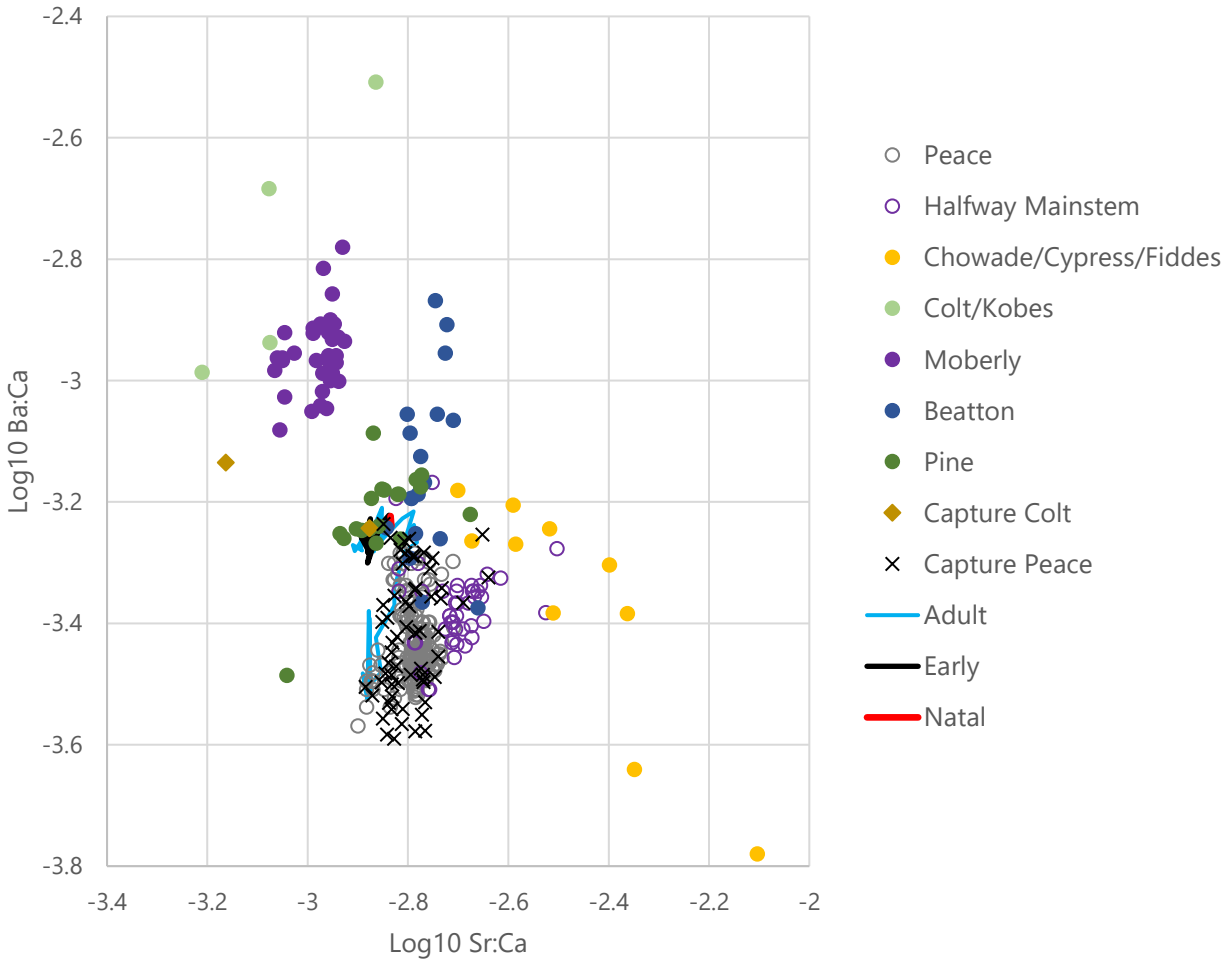


Figure 45. Predicted life history of MW #6316 (fork length = 91 mm) captured in the Peace River. The predicted natal and first summer habitat was the Pine River (green circles), then moved into the Peace River for its adult life history.

3.7 Rainbow Trout (RB)

Fifteen (15) Rainbow Trout were captured from 2014 to 2017; 12 from the Halfway River watershed (four individuals from Colt Creek, six from Kobes Creek, and two from Cypress Creek), two from the Peace River, and one from Farrell Creek. Capture chemistry in otoliths indicated excellent correlation with capture location water chemistry (Figure 46).

The DFA had predictive power of 88.1% (expected classification rate 20%; n=268; Appendix B). There were 4 out of 30 (13.3%) suspected misclassifications in predicted natal and first summer

habitat for Rainbow Trout. In those cases, the model was predicting Farrell Creek for fish recruitment habitat when the fish were captured or spent their first summer in the Halfway River watershed (Tables 18 and 19). The adjusted predictions suggest that the 12 Rainbow Trout that were captured in Halfway River watershed creeks were also recruited from creeks/rivers in the Halfway River watershed (Figures 47 to 50). The six Rainbow Trout captured in Kobes Creek and the four captured in Colt Creek were also recruited from their respective natal habitats. One Cypress Creek captured fish was recruited from Cypress Creek, while the other was predicted to have recruited from either Colt or Kobes creeks. The Rainbow Trout captured in Farrell Creek was recruited from an unknown location. None of the Halfway River captured Rainbow Trout migrated to the Peace River. For the two Rainbow Trout captured in the Peace River, both were recruited from the Halfway River watershed (one from the mainstem and the other from Colt/Kobes creeks). All Rainbow Trout were recruited from within the LAA upstream of the Project.

Life history reconstructions for the two Peace River captured Rainbow Trout and two Halfway River captured Rainbow Trout (one from Cypress River and one from Colt/Kobes creeks) are provided in Figures 51 to 54. There was no apparent relationship between age/size of the fish and migration from natal habitat to Peace River. The two Rainbow Trout captured in the Peace River were 147 mm and 193 mm in fork length, while the 13 Rainbow Trout captured in the Halfway River watershed ranged in size from 74 to 320 mm in fork length. A summary of predicted natal and first summer habitat for Rainbow Trout can be found in Appendix C.

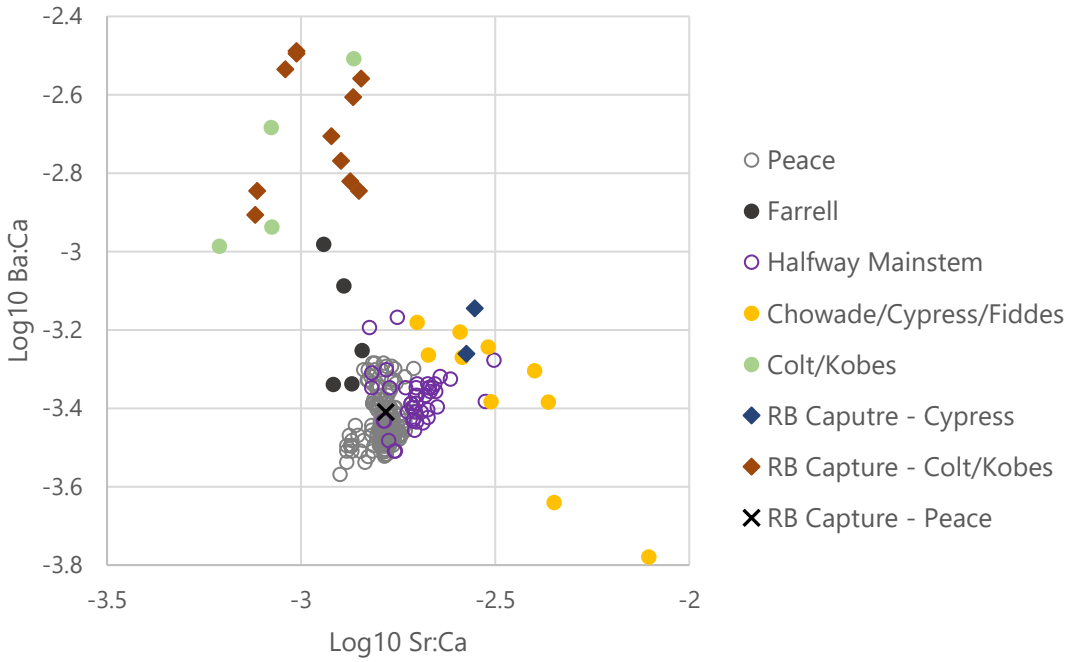


Figure 46. Capture elemental signatures of Rainbow Trout relative to water chemistry at prior locations.

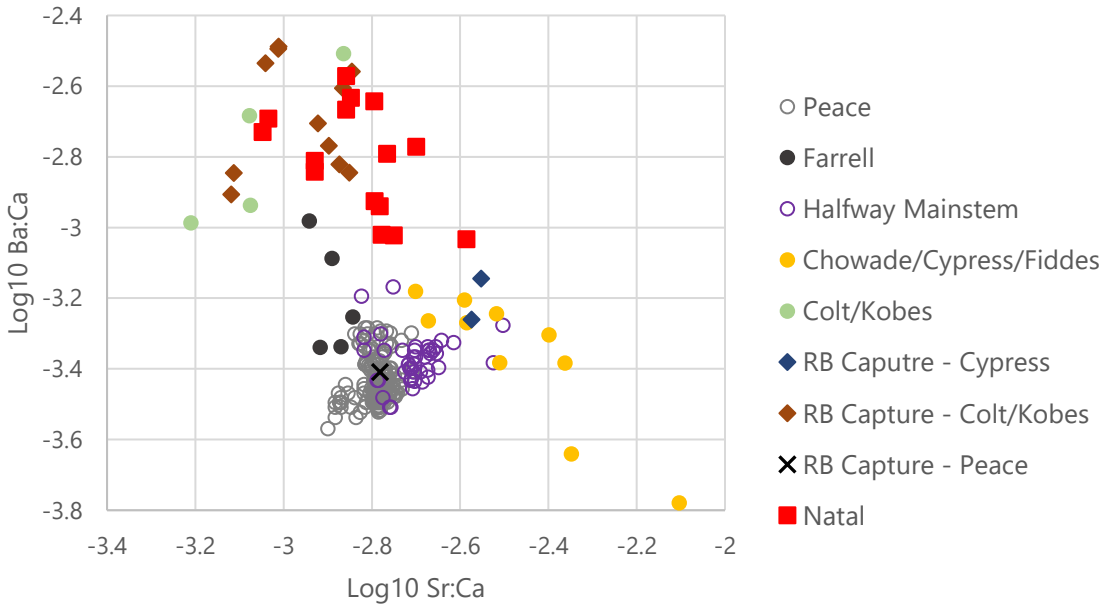


Figure 47. Predicted natal habitat of Rainbow Trout relative to water chemistry at prior locations and capture signatures.

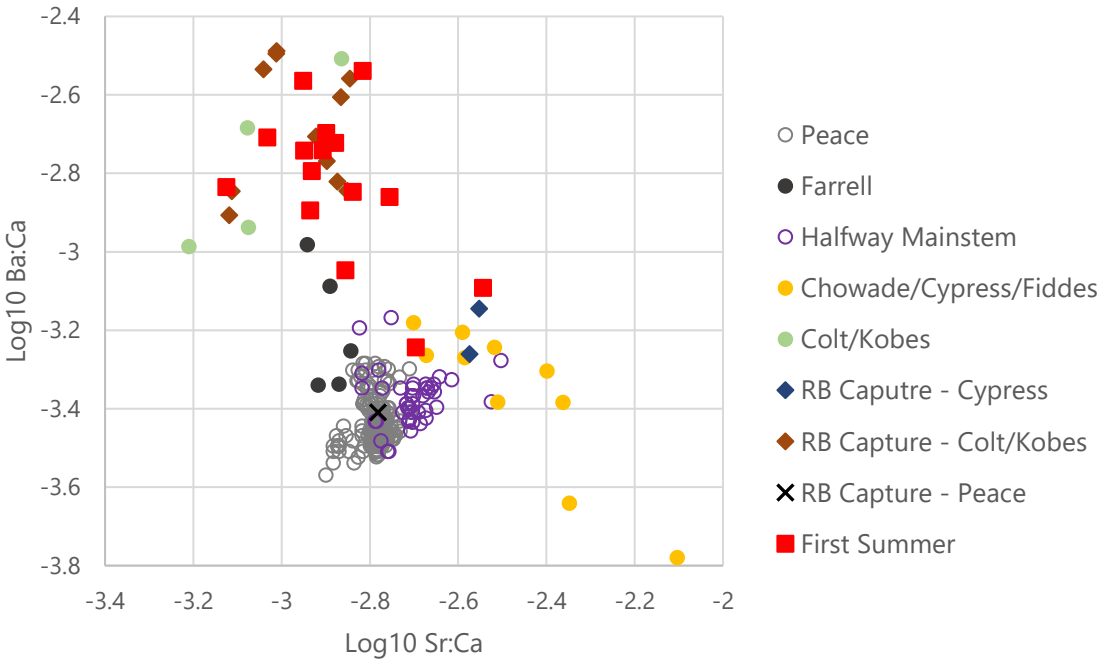


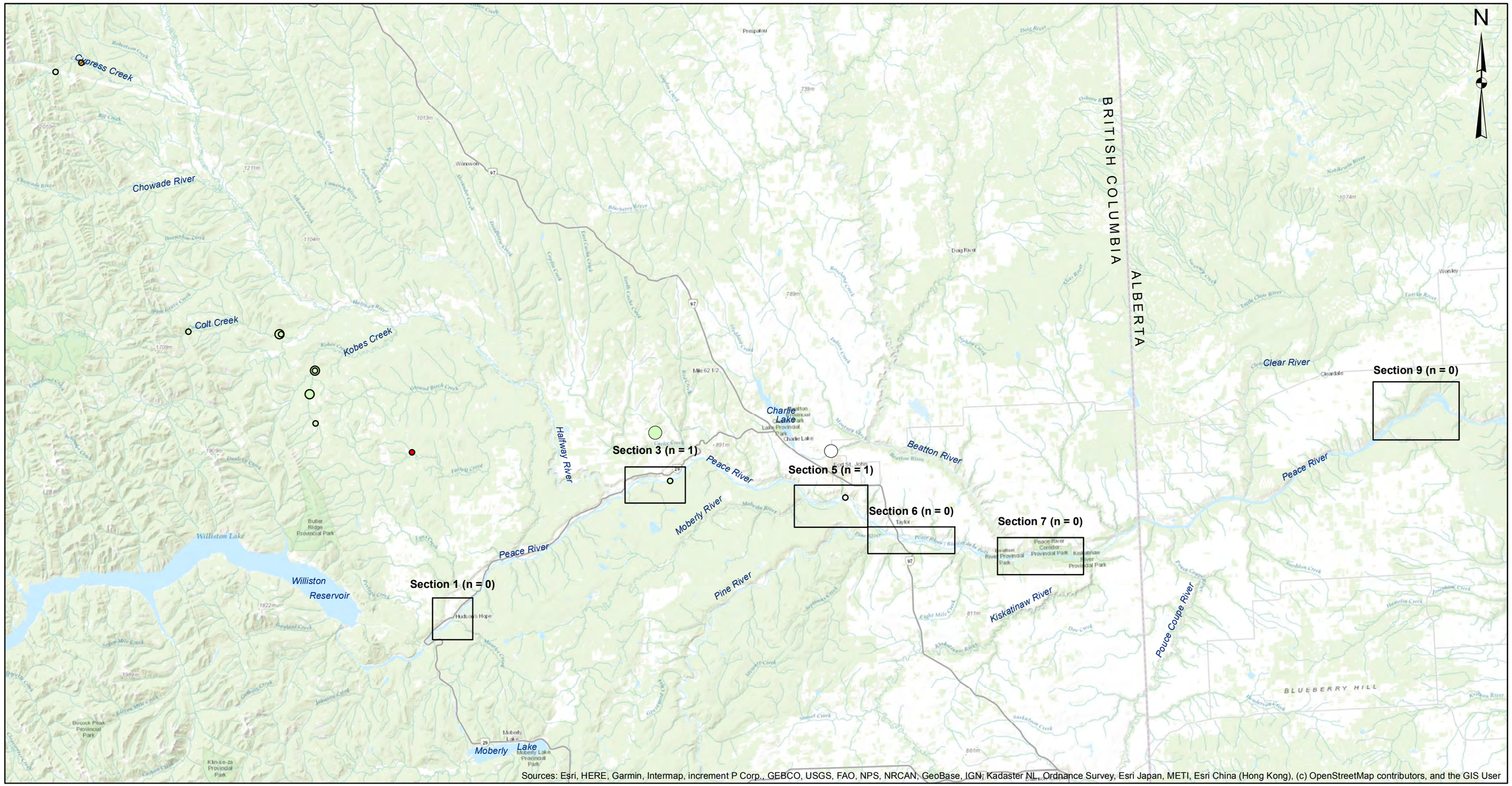
Figure 48. Predicted first summer habitat of Rainbow Trout relative to water chemistry at prior locations and capture signatures.

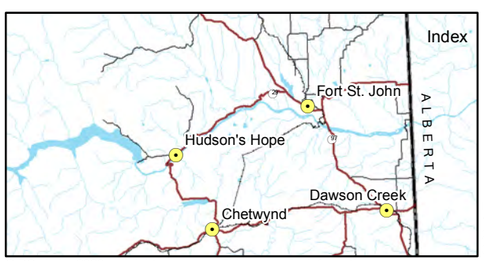
Table 18. Predicted natal habitat for Rainbow Trout.

	Predicted Habitats		Capture Areas: Farrell	Halfway						Moberly	Pine	Beatton	Kiskatinaw	Peace		Total
	Area	Waterbody(s)	Farrell	Mainstem	Colt	Kobes	Chowade	Cypress	Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	
Upstream	Farrell															
	Halfway River	Mainstem													1	1
		Unknown														
		Colt/Kobes			4	6		1						1		12
		Chowade/Cypress/ Fiddes						1								1
	Moberly															
Peace																
Unknown			1													1
Total			1		4	6		2						1	1	15

Table 19. Predicted first summer habitat of Rainbow Trout

	Predicted Habitats		Capture Areas: Farrell	Halfway						Moberly	Pine	Beatton	Kiskatinaw	Peace		Total
	Area	Waterbody(s)	Farrell	Mainstem	Colt	Kobes	Chowade	Cypress	Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	
Upstream	Farrell															
	Halfway River	Mainstem													1	1
		Unknown														
		Colt/Kobes			4	6		1						1		12
		Chowade/Cypress/ Fiddes						1								1
	Peace															
	Unknown		1													1
	Total		1		4	6		2						1	1	15





Origin

- Colt Creek, Kobes Creek
- Chowade River, Cypress Creek, Fiddes Creek
- Halfway River
- Unknown

Fish Count by Section

Observation Size

- 1
- 2 - 4
- >= 5

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

1:640,000 0 25 km

BC Hydro

Predicted natal habitat sources for Rainbow Trout

Figure 49

Date	Jun 8, 2020	DWG NO	1016-N11-00749-10	R 0

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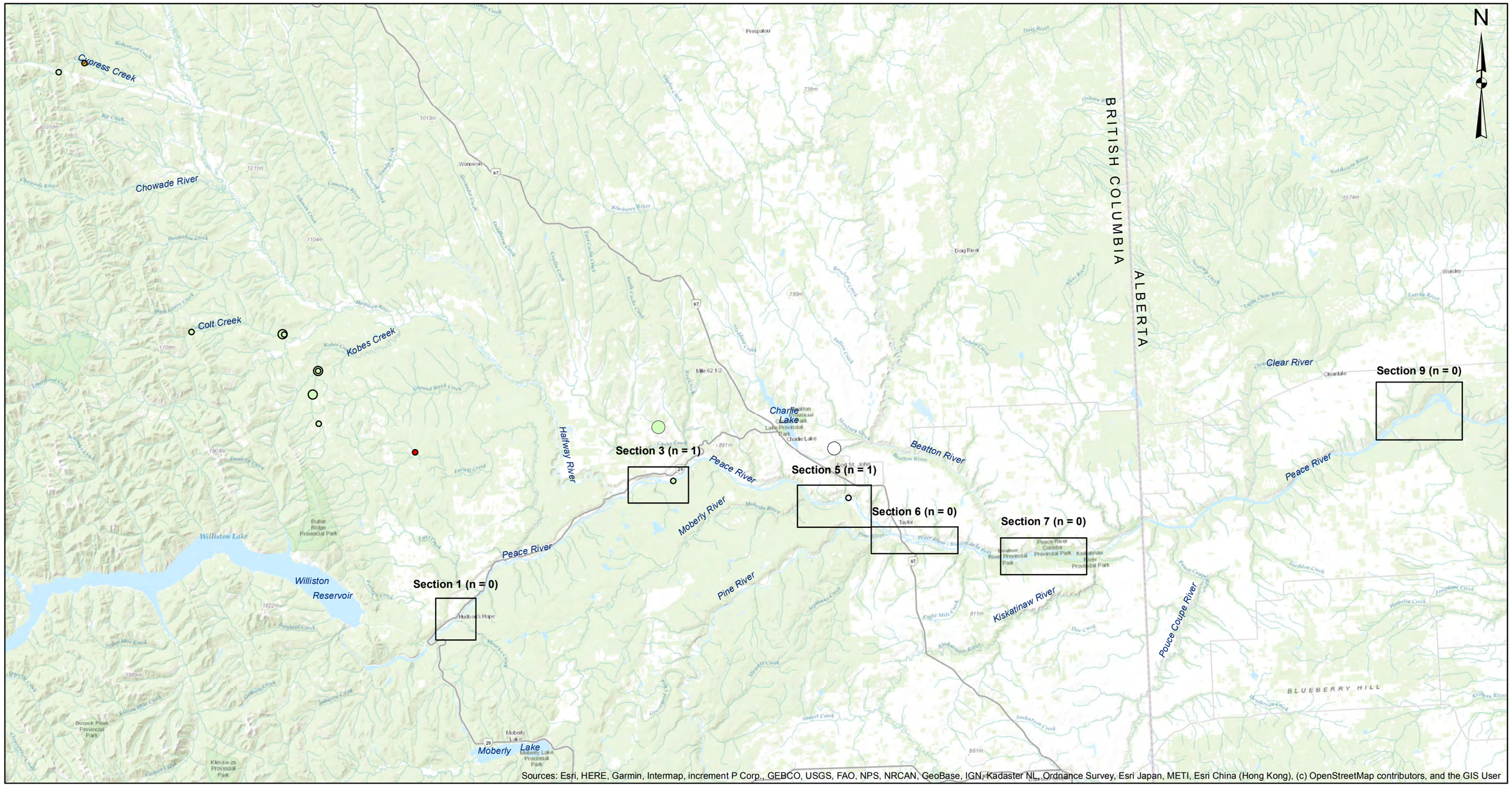

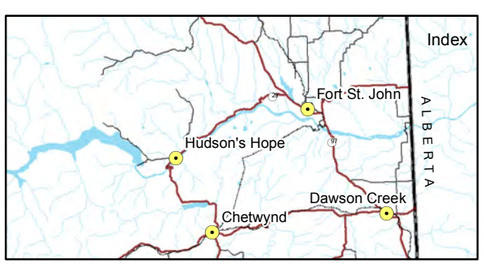

Origin

- Colt Creek, Kobes Creek
- Chowade River, Cypress Creek, Fiddes Creek
- Halfway River
- Unknown

Fish Count by Section

Observation Size

- 1
- 2 - 4
- >= 5

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

1:640,000 0 25 km

BC Hydro

Predicted first summer habitat sources for Rainbow Trout

Figure 50

Date	Jun 8, 2020	DWG NO	1016-N11-00749-9	R 0

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Construction of the Site C Clean Energy Project is subject to required regulatory and permitting approvals.

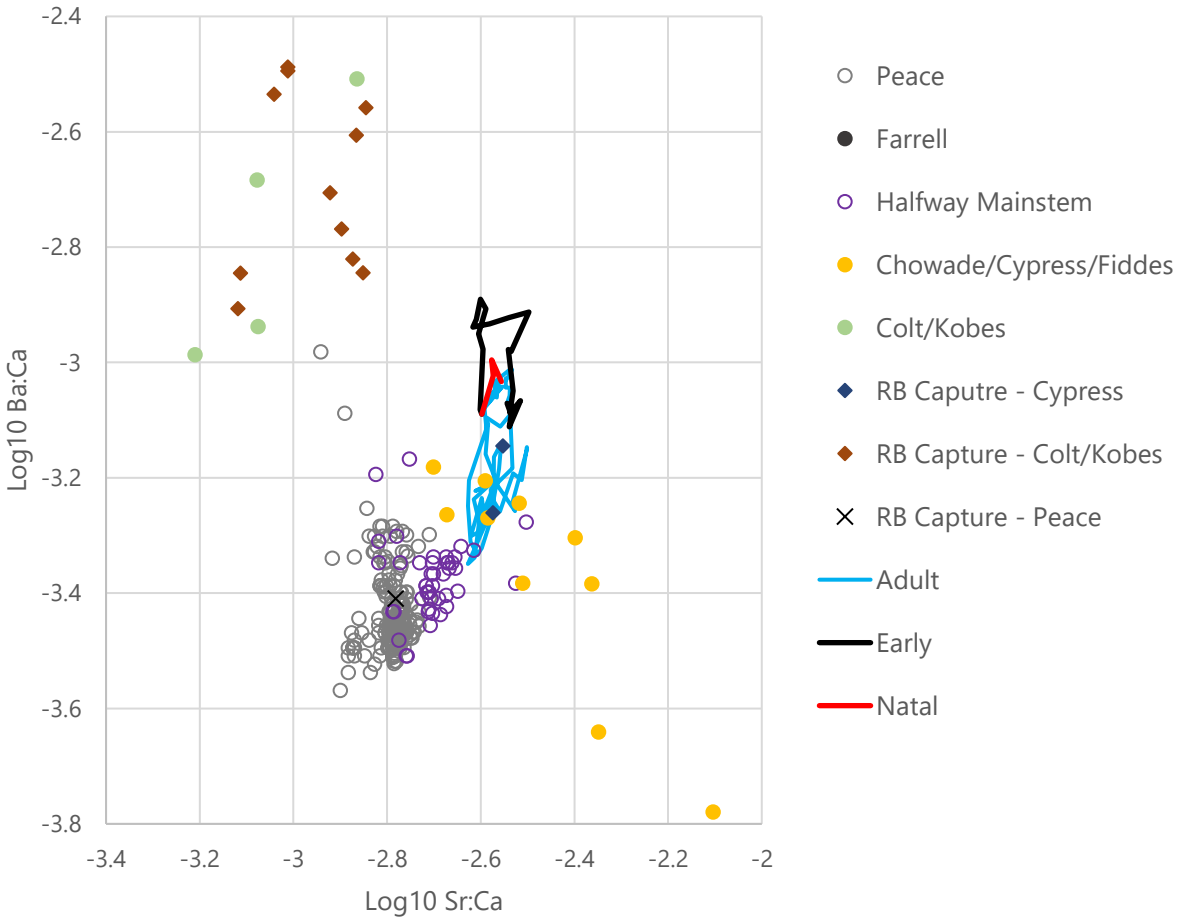


Figure 51. Predicted life history of RB #788 (fork length = 223 mm) captured in Cypress Creek of the Halfway River watershed. The predicted natal and first summer habitat, and the reconstruction suggest this individual remained in Cypress Creek for its entire life history.

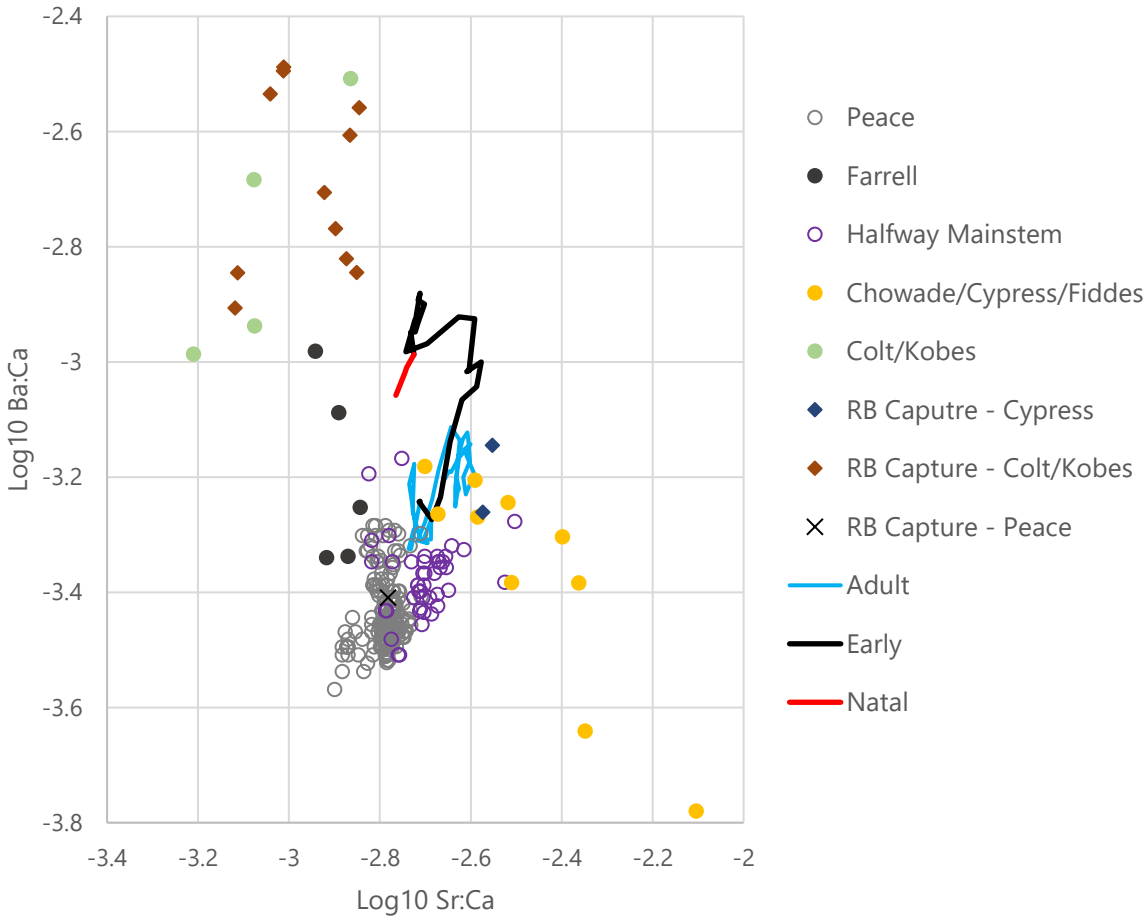


Figure 52. Predicted life history of RB #1430 (fork length = 193 mm) captured in the Peace River. The predicted natal and first summer habitat were both Halfway River mainstem. Based on the reconstruction, this individual spent most of its life history in the Halfway River and its tributaries, then only recently entered the Peace River where it was captured (Ba:Ca ratio is higher than predicted for Peace River).

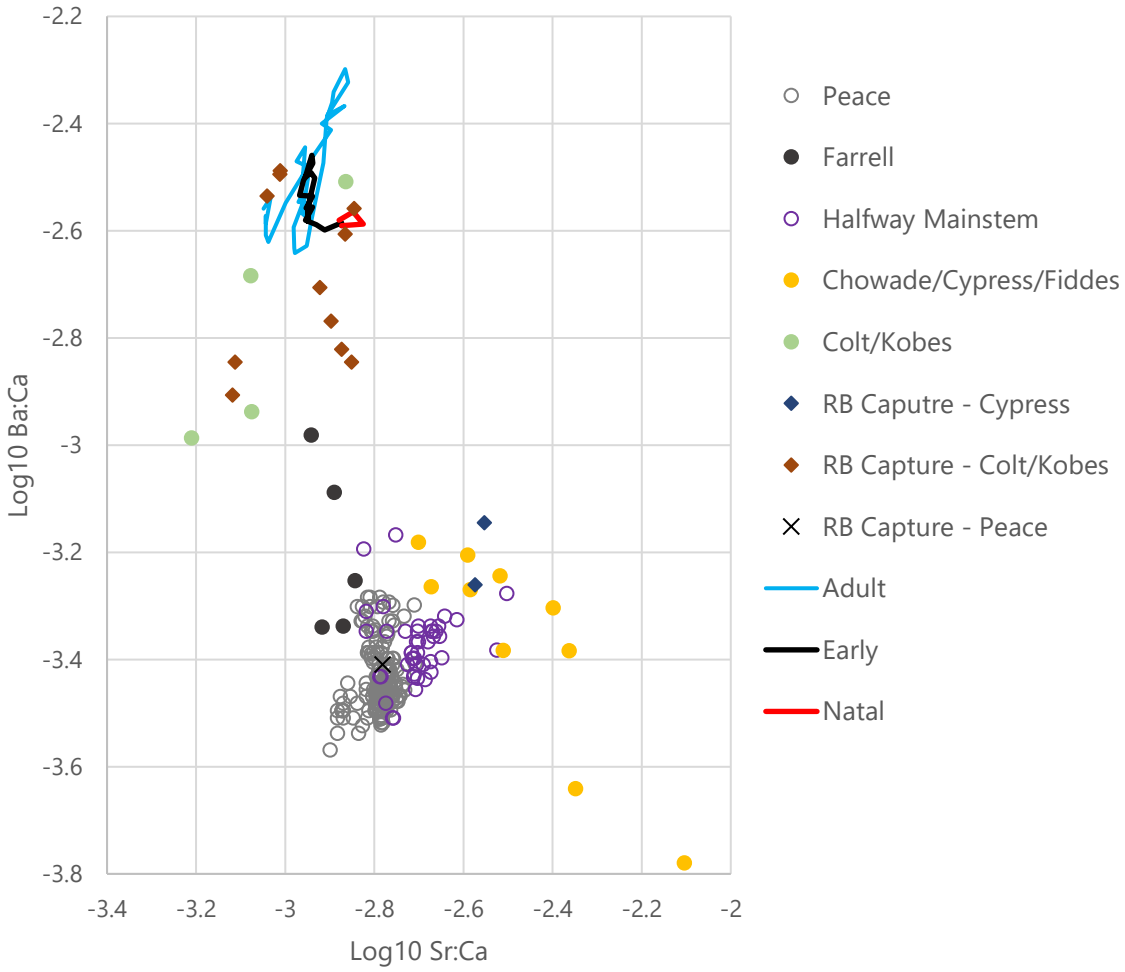


Figure 53. Reconstructed life history of RB #1920 (fork length = 111 mm) and the discriminant function analysis predict this fish spent its entire life in Kobes Creek in the Halfway River watershed.

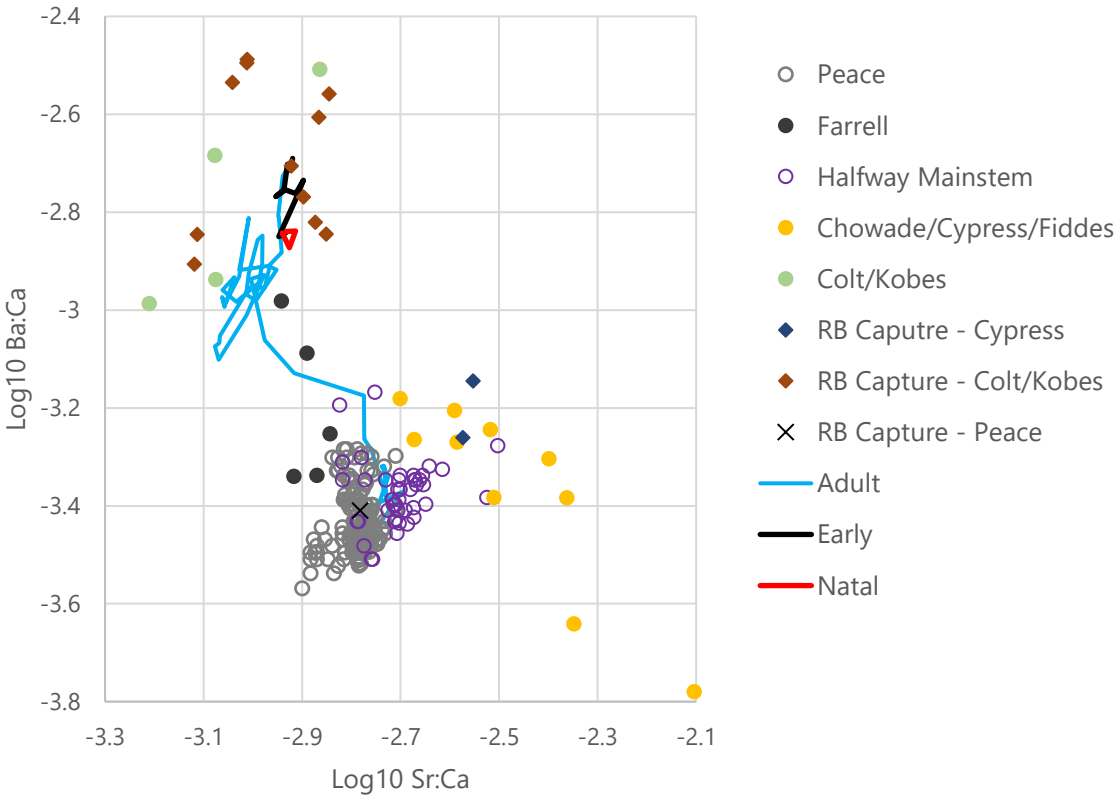


Figure 54. Reconstructed life history of RB #3870 (fork length = 147 mm) and the discriminant function analysis predict this fish recruited from Colt/Kobes creeks in the Halfway River watershed to the Peace River later in its adult life, where it was captured.

3.8 Walleye (WP)

One hundred and thirty-one (131) Walleye were captured from 2016 to 2018, from the Peace River, Sections 1, 3 (upstream), and Sections 5, 6, 7, 9 (downstream). The capture elemental chemistry correlated well with Peace River water chemistry with slight variability (Figure 55).

The DFA had a high predictive power of 93.7% (expected classification rate 16.7%; n=331; Appendix B). Suspected misclassifications were at 6.1% (16 out of 262), which is almost identical to what would be expected from the model (6.3%). The adjusted model predicted four important natal recruitment sources for Walleye to the Peace River from both upstream and downstream capture locations. The Peace River itself was the greatest predicted natal (54 out of 131; 41.2%) and first summer (81 fish; 61.8%) habitats (Figures 56 to 59; Tables 20 and 21). Either Pouce Coupe or Clear rivers, or both,

were also important recruitment sources for Walleye, with 29.8% (39 fish) natal (including eight Walleye or 6.1% from unknown locations within the Pouce Coupe River watershed) and 20.6% (27 fish) first summer habitat. Most of the Walleye that recruited from the Pouce Coupe River (27 out of 39 or 69.2%) remained in their natal habitat for their first summer, while the remaining 30.8% (12 fish) were predicted to have migrated to the Peace River by the first summer. Smoky River had similar importance for Walleye recruitment with 20.6% natal (27 out of 131) and 16.0% first summer (21 fish) habitats (including one Walleye from an unknown tributary within the Smoky River watershed). Similarly, most Walleye remained in the Smoky River for their first summer (21 out of 27; 77.8%), with the remaining 22.2% (6 fish) migrating to the Peace River by the first summer. The last major recruitment source was the Beatton River with 11 out of 131 Walleye or 8.4% natal habitat, but only one Walleye remaining in Beatton River for the first summer. Accordingly, 90.9% (10 out of 11) of Walleye with natal habitat in the Beatton River were predicted to have migrated to the Peace River during their first summer.

At least 50 out of 131 (38.2%) Walleye recruited from within the LAA, although another 54 Walleye could have also been recruited from within the LAA. For these fish, they were predicted to have recruited from the Peace River, but available data cannot discern whether Walleye recruited from the Peace River are within or outside of the LAA. At least 20.6% (27 out of 131) recruited from outside of the LAA, specifically the Smoky River. While 23.7% of Walleye were captured upstream of the Project (31 fish), the results suggest that at least 58.8% (77 fish) of Walleye were recruited from waterbodies downstream of the Project. Of the Walleye captured downstream of the Project, at least 23.0% (23 fish) were recruited from outside of the LAA in the Smoky River.

Reconstructed life histories of select Walleye can be viewed in Figures 60 to 64. A summary of the predicted natal and first summer habitat of Walleye can be found in Appendix C.

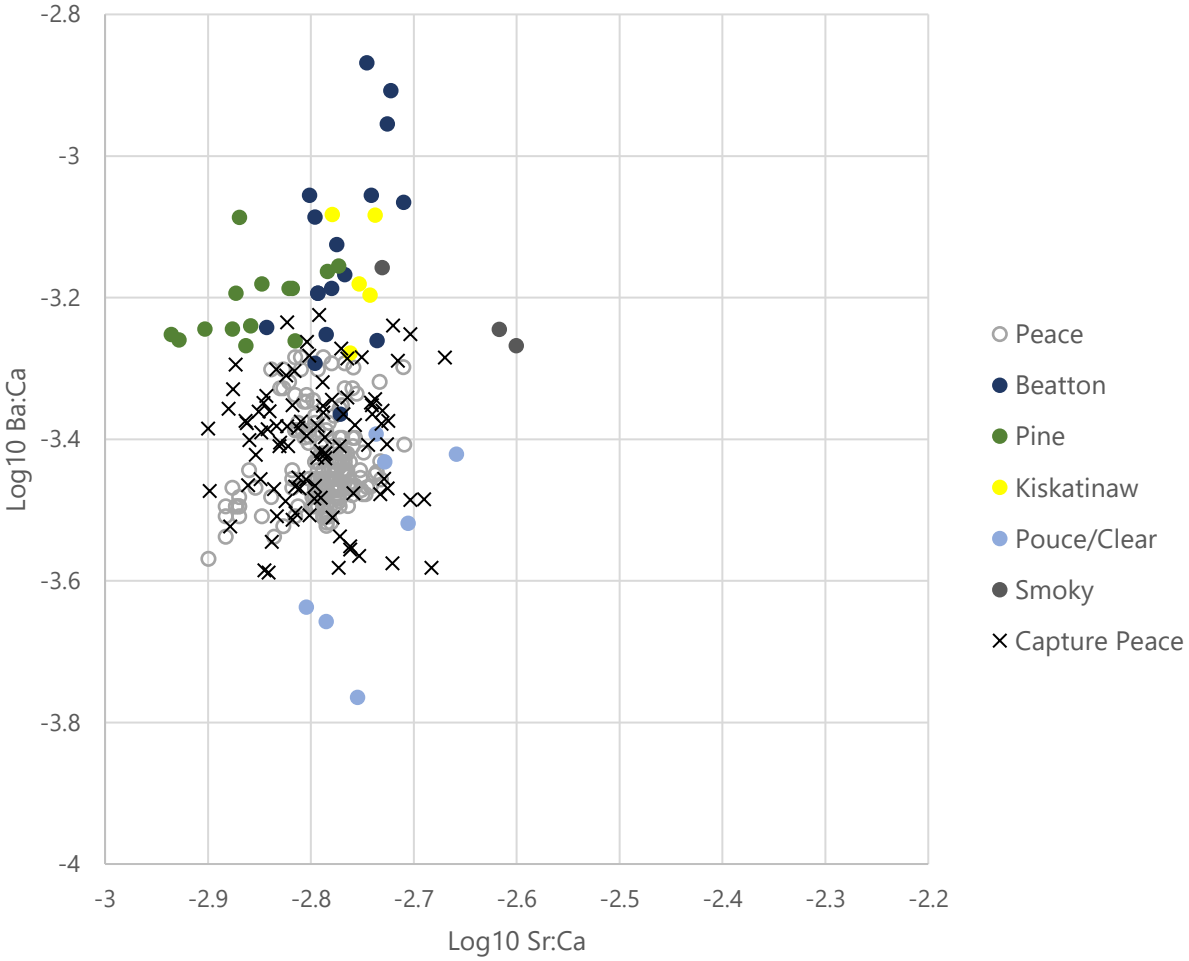


Figure 55. Capture elemental signatures of Walleye relative to water chemistry at prior locations.

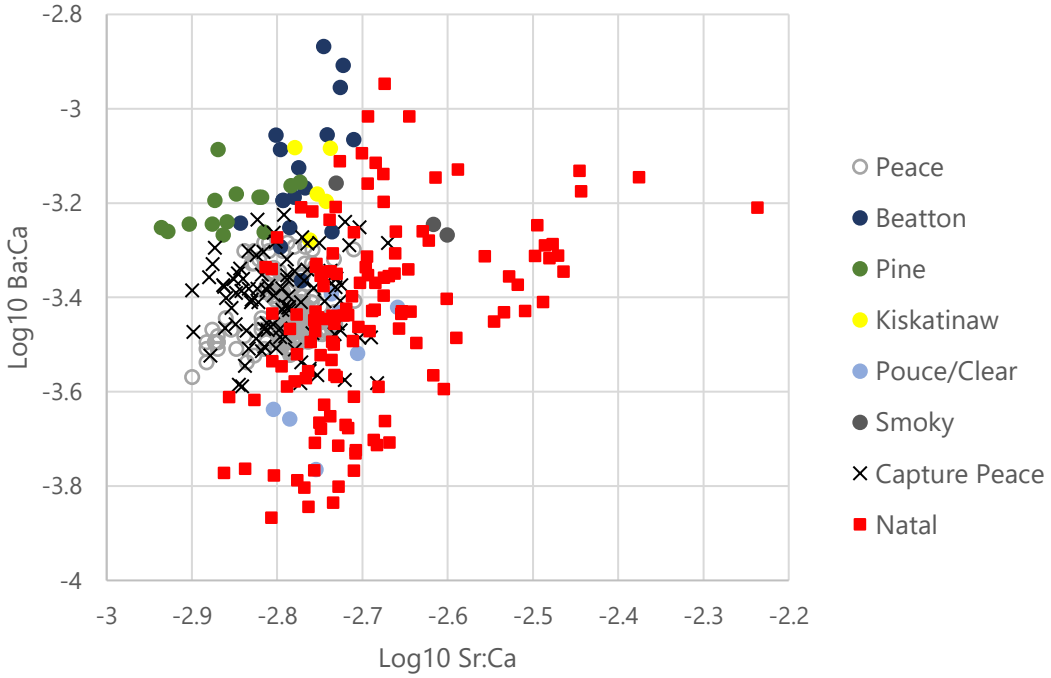


Figure 56. Predicted natal habitat of Walleye relative to water chemistry at prior locations and capture signatures.

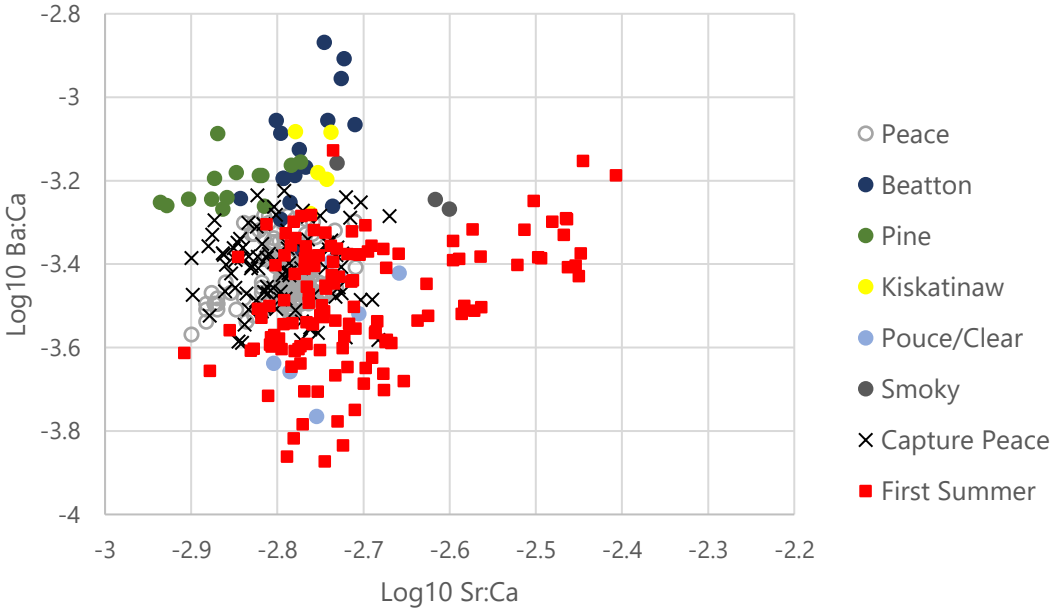


Figure 57. Predicted first summer habitat of Walleye relative to water chemistry at prior locations and capture signatures.

Table 20. Predicted natal habitat for Walleye.

		Capture Areas													
	Predicted Habitats	Halfway							Moberly	Pine	Beatton	Kiskatinaw	Peace		Total
	Area Waterbody(s)	Mainstem	Colt	Kobes	Chowade	Cypress	Unknown	Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	
Downstream	Pine														
	Beatton												1	10	11
	Kiskatinaw														
	Pouce Coupe/Clear												9	22	31
	Unknown												3	5	8
	Smoky												4	23	27
Peace													14	40	54
Total													31	100	131

Table 21. Predicted first summer habitat of Walleye.

	Predicted Habitats	Capture Areas													Total
		Halfway							Moberly	Pine	Beatton	Kiskatinaw	Peace		
	Area Waterbody(s)	Mainstem	Colt	Kobes	Chowade	Cypress	Unknown	Fiddes	Moberly	Pine	Beatton	Kiskatinaw	Upstream	Downstream	
Downstream	Pine														
	Beatton												1		1
	Kiskatinaw														
	Pouce Coupe/Clear												8	19	27
	Smoky												2	19	21
	Peace												20	61	81
	Total												31	100	131

N

Section 1 (n = 1)

Section 3 (n = 30)

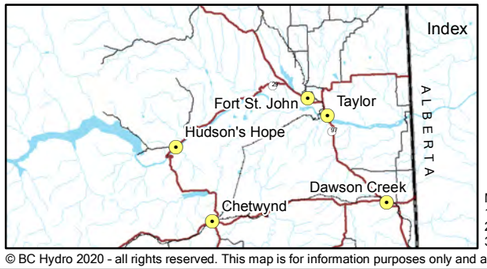
Section 5 (n = 20)

Section 6 (n = 23)

Section 7 (n = 22)

Section 9 (n = 35)

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User



Origin

- Peace River
- Smoky River
- Beatton River, Kiskatinaw River
- Pouce Coupe River, Clear River
- Unknown

Fish Count by Section

Observation Size

- 1
- 2 - 4
- >= 5

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

1:600,000

0 25 km

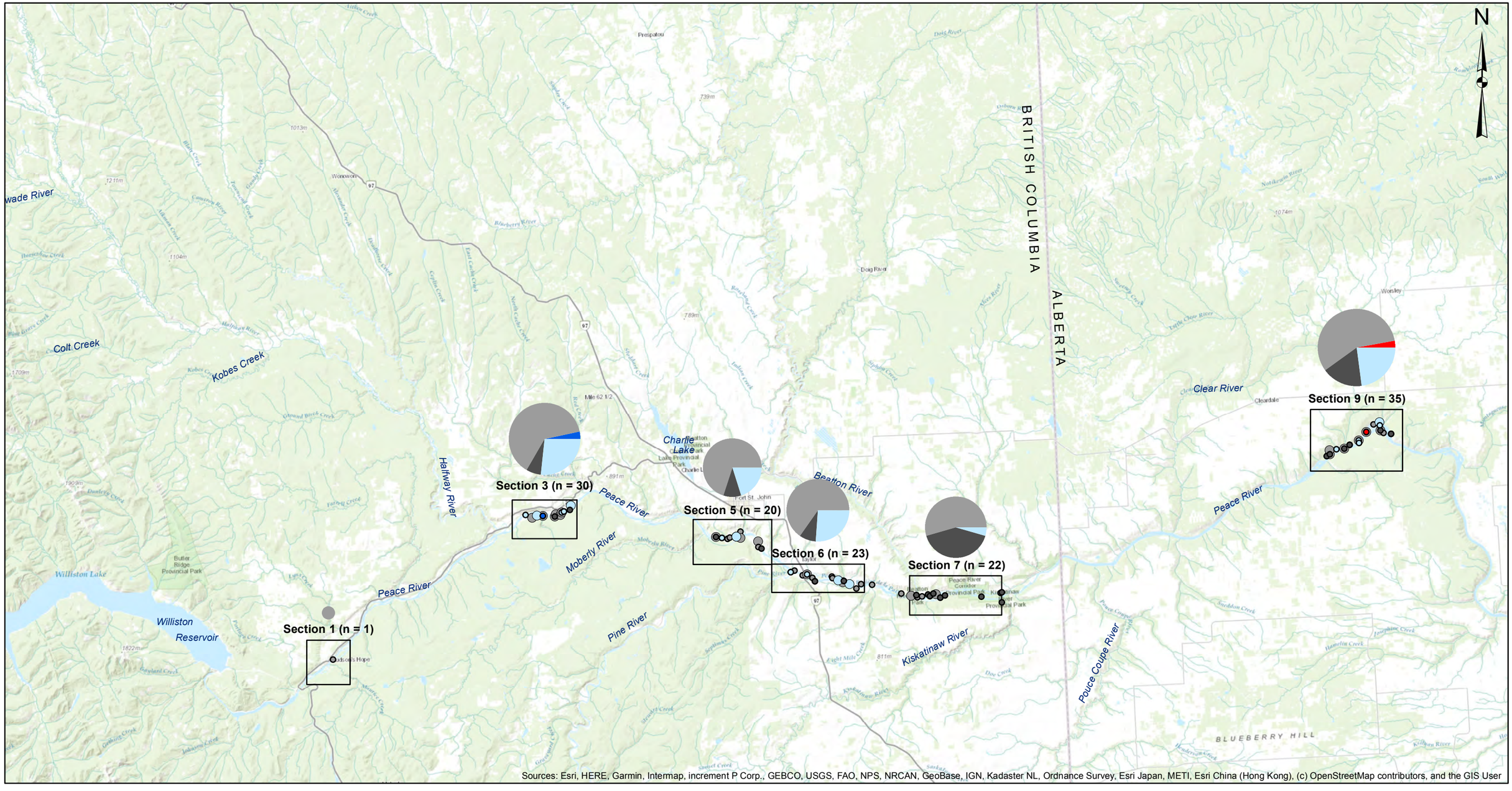
BC Hydro

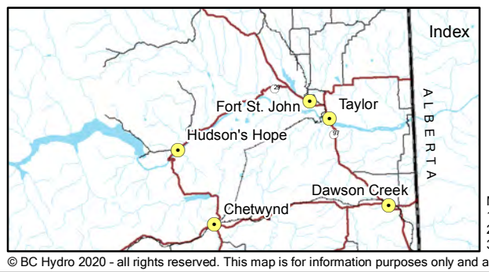
Predicted natal habitat sources for Walleye

Figure 58

Date	Jun 15, 2020	DWG NO	1016-N11-00749-12	R 0

Path: X:\ArcGIS\Projects\Environment\Fisheries\Microchemistry_Predicted_Origin_Walleye_Natal_1016_N11_00749-12.mxd





Origin

- Peace River
- Smoky River
- Beatton River, Kiskatinaw River
- Pouce Coupe River, Clear River
- Unknown

Fish Count by Section

Observation Size

- 1
- 2 - 4
- >= 5

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: ESRI Basemapping

1:600,000 0 25 km

BC Hydro

Predicted first summer habitat sources for Walleye

Figure 59

Date	Jun 15, 2020	DWG NO	1016-N11-00749-11	R 0

Path: X:\ArcGIS\Projects\Environment\Fisheries\Microchemistry_Predicted_Origin_Walleye_FirstSummer_1016_N11_00749-11.mxd

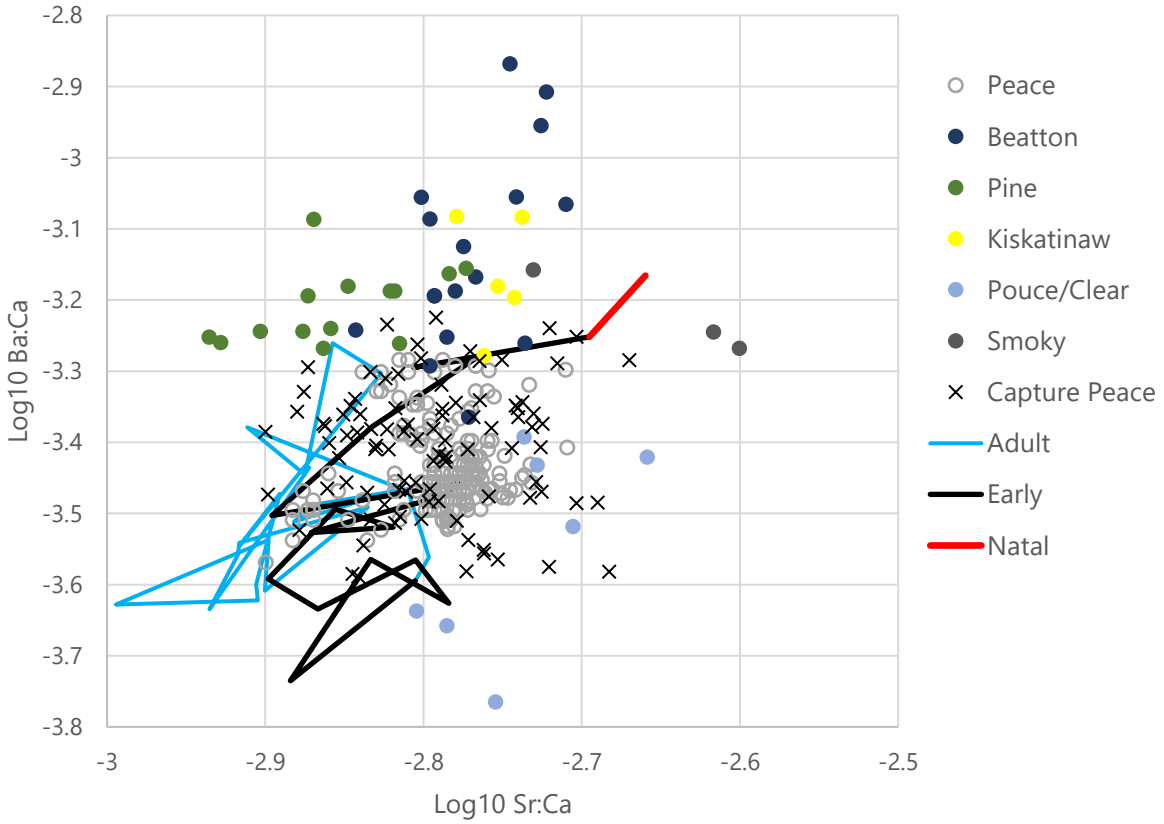


Figure 60. Predicted life history of WP #124 (fork length = 399 mm) captured in the Peace River. This fish was predicted to have been recruited from the Smoky River, and migrated to the Peace River for its first summer where it remained for the remainder of its life until capture.

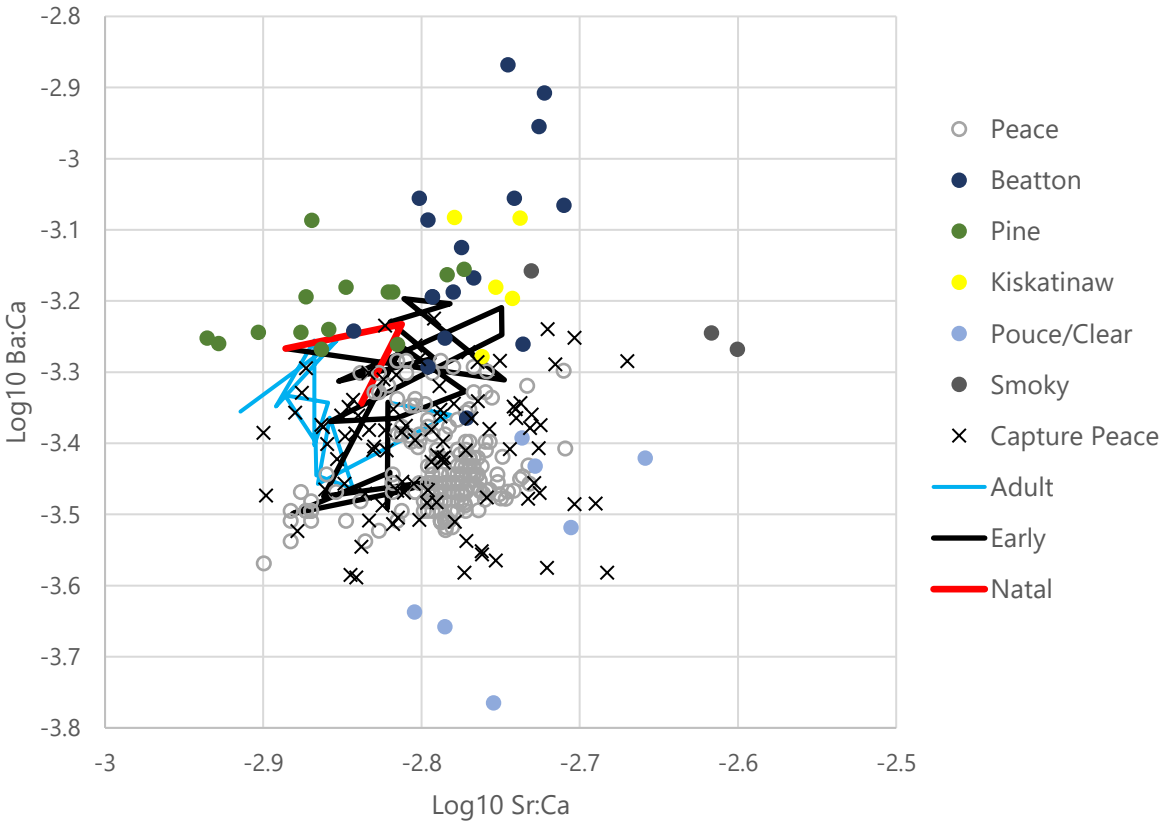


Figure 61. Predicted life history of WP #2576 (fork length = 407 mm) captured in the Peace River. The predicted natal habitat is the Beatton River where it migrated to the Peace River during its first summer (signature suggests some time in Beatton River early on) and spent the rest of its life in the Peace River.

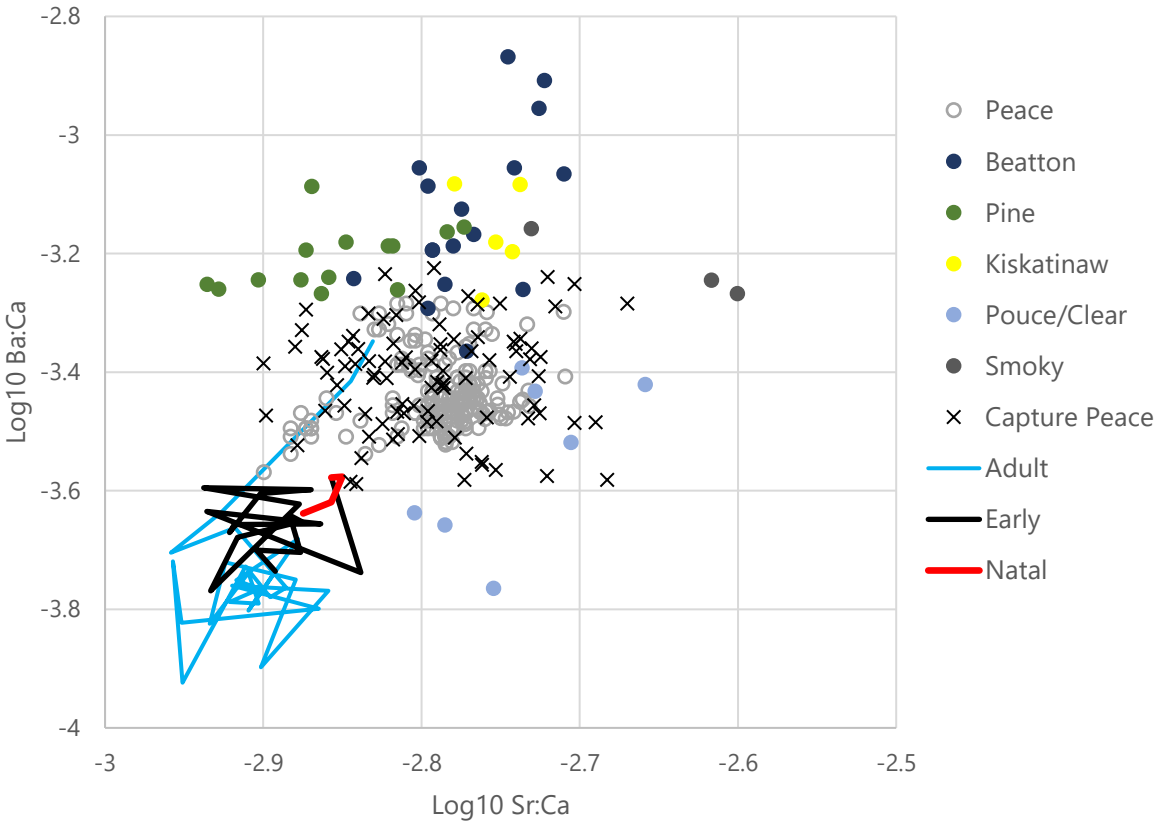


Figure 62. Predicted life history of WP #4608 (fork length = 375 mm) captured in the Peace River. While the predicted natal and first summer habitat is also the Peace River, the Ba:Ca and Sr:Ca ratios are much lower than the Peace River. It is possible that this structure chemistry is not characterized by any sampled waterbody.

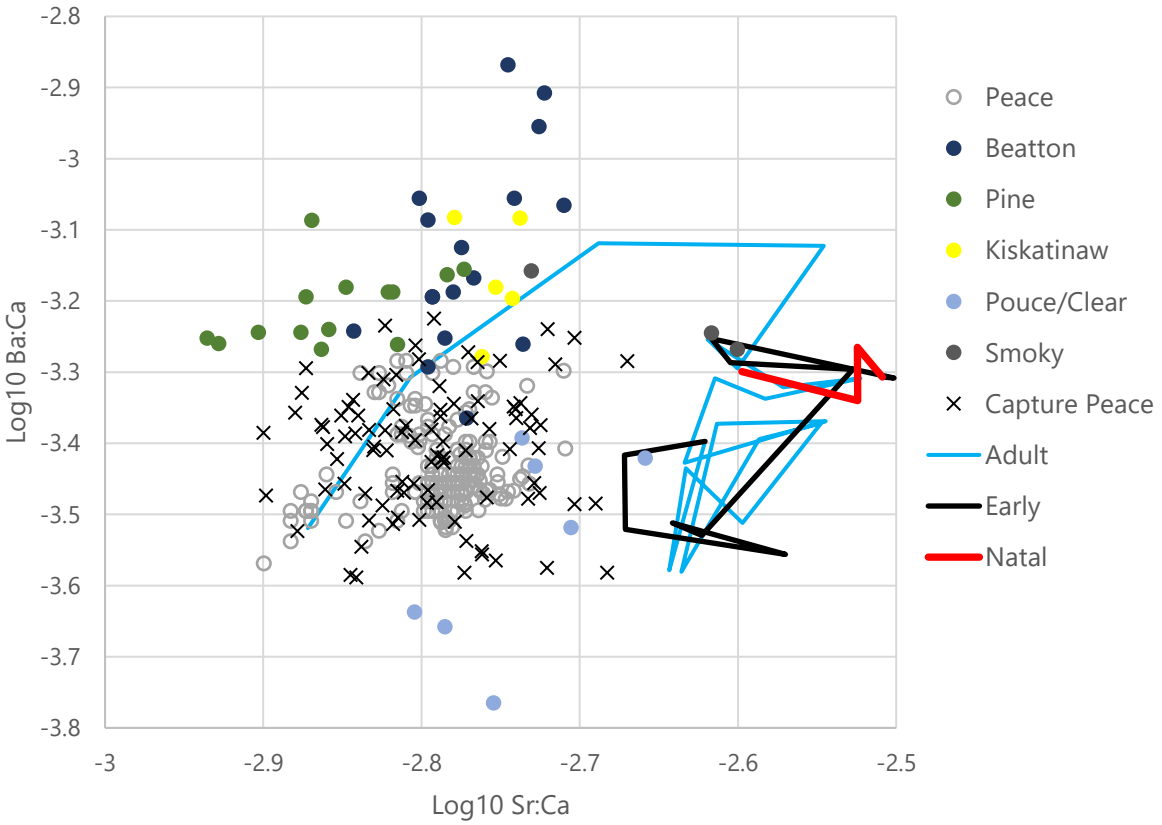


Figure 63. Predicted life history of WP #4683 (fork length = 270 mm) captured in the Peace River. The predicted natal and first summer habitat is the Smoky River where it seems to have spent most of its life, and then in later adult life it migrated to the Peace River.

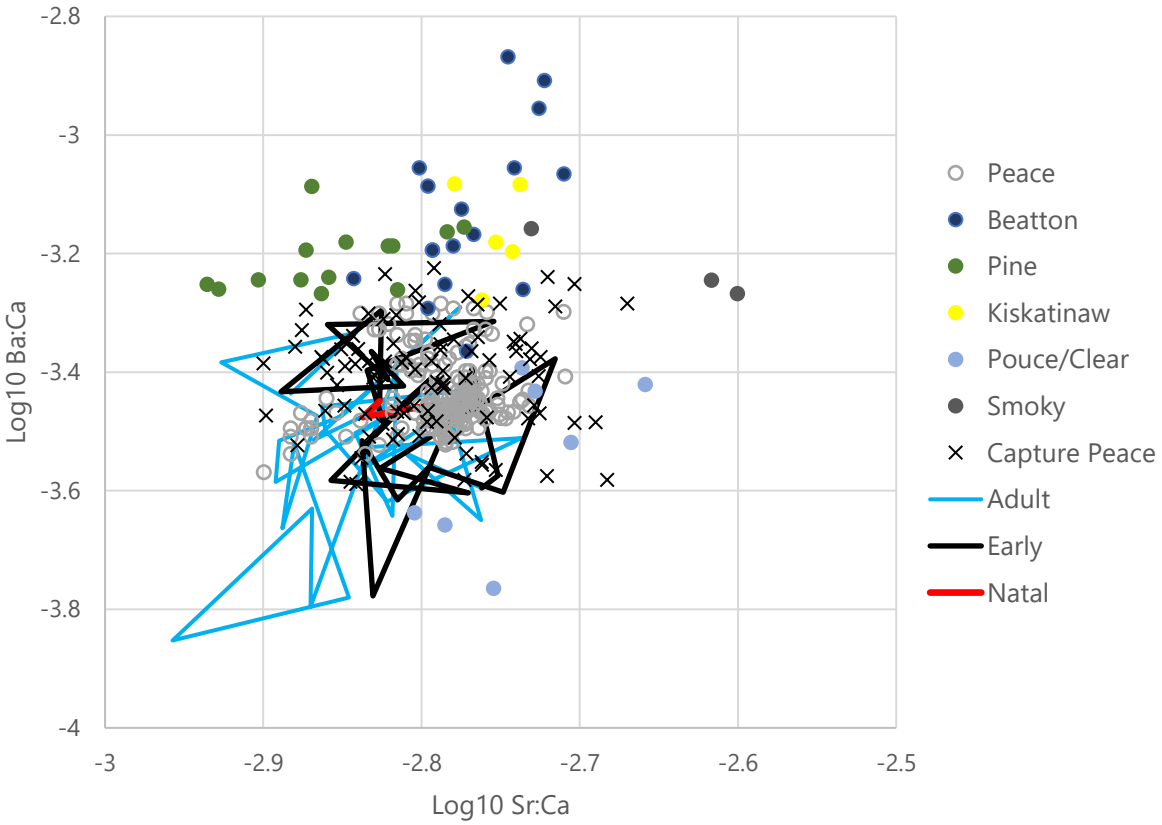


Figure 64. Predicted life history of WP #5766 (fork length = 475 mm) captured in the Peace River. While the predicted natal is an unknown tributary of Pouce Coupe, the first summer was predicted to be in Pouce/Clear rivers, but the reconstructed life history plot suggests this fish may have spent its entire life in the Peace River, or perhaps at the confluence of Peace River and Pouce Coupe.

4.0 DISCUSSION

The purpose of the Fish Otolith and Fin Ray Microchemistry Study was to determine recruitment sources of six fish species to the Peace River using specific regions in the otoliths and fin rays collected from those fish. Microchemistry of otoliths and fin rays using LA-ICP-MS was a useful technique to fill in data gaps of habitat use by fish in the Peace Region.

Results suggest that use of water chemistry data in the Peace River watershed and capture chemistry in the fish structures provided high predictive power (>80%) for identifying recruitment locations for individual fish. Unlike previous studies, Ba:Ca and Sr:Ca ratios were log10 transformed prior to modeling, which increased the differentiation among sampling locations and met statistical assumptions of the DFA model. Additionally, to increase the accuracy and predictive power of the model, some water samples with similar chemistry and/or locations were combined, but this did not change the interpretation of the results or the ability to meet the objectives of the study.

Incorporation coefficients are calculations that represent the proportion of Sr and Ba (Sr:Ca and Ba:Ca) uptake into the fin ray or otolith structure from the water. The incorporation coefficients were calculated for each fish species based on average capture location water chemistry and the chemistry at the edge of the structure. These coefficients were used to correct the other portions of the fin ray or otolith structure analyzed to predict the natal and first summer habitats. Despite only three Arctic Grayling sampled, incorporation coefficients of 0.371 and 0.035 for Sr:Ca and Ba:Ca, respectively, were very similar to previous reporting by Earthtone and Mainstream (2013) with 0.4 and 0.04, as well as in Clarke et al. (2007a,b), with 0.37 and 0.05. While the Ba:Ca incorporation coefficient was similar (0.01) in the current study with that of Earthtone and Mainstem (2013) with 0.014 for Bull Trout, our Sr:Ca incorporation coefficient was lower at 0.168 compared to 0.29 from Earthtone and Mainstream (2013) and Clarke and Telmer (2008). While different than previously reported, our Sr:Ca incorporation coefficient for Bull Trout otoliths were well correlated between capture location water chemistry and edge chemistry of the otolith. If the higher Sr:Ca incorporation coefficient of 0.29 from previous reports was used, then the otolith chemistry would place all Bull Trout into the Peace River as their capture location. Of course this is not possible since the fish were captured from the Chowade River, Cypress Creek, and Fiddes Creek in the Halfway River watershed. Mountain Whitefish incorporation coefficient ratios for both Sr:Ca and Ba:Ca were similar between studies (this report: 0.245 and 0.014, respectively; and 0.26 and 0.021, respectively, in Earthtone and Mainstream 2013). Rainbow Trout otolith incorporation coefficient ratios were slightly different where we report 0.180 and 0.012, for Sr:Ca and Ba:Ca, respectively, while Earthtone and Mainstream (2013) report 0.25 and 0.026, respectively. Like Bull

Trout, our incorporation coefficients were well correlated between capture location water chemistry and otolith edge chemistry, which resulted in accurate predictability. Applying previous coefficients significantly altered the predicted capture locations and only a few recalculated capture chemistries then matched with the water chemistry. The Sr:Ca ratios were similar between otoliths and fin rays, where structures from the same fish were available for comparison (i.e., Bull Trout and Mountain Whitefish). However, Ba:Ca incorporation coefficient ratios were considerably higher in fin rays compared to otoliths, which may be linked with chemical/structural differences, thus favoring increased accumulation of Ba over Sr.

From the three Arctic Grayling sampled, all were predicted to have recruited from upstream of the Project, specifically the Moberly River, and remained in their natal habitat throughout the first summer. Arctic Grayling were found to migrate to other locations in subsequent years, such as the Peace River, where two Arctic Grayling were captured upstream of the Project. Our results suggest that captured Arctic Grayling were recruited from and remained within the LAA. In previous studies, Moberly River was also determined to be the most important recruitment source of Arctic Grayling to the Peace River using otolith chemistry, with smaller recruitment sources from the Halfway River watershed, Pine, and Beatton rivers (Earthtone and Mainstream 2013). Earthtone and Mainstream (2013) also concluded that Arctic Grayling remained in their natal streams during their first summer. Previous reports suggest that major recruitment areas of the Moberly River for Arctic Grayling included the mainstem and a side channel off the mainstem (Earthtone and Mainstream 2013).

In total, 139 Bull Trout were analyzed and modeled. Both otoliths and fin rays were provided for 10 individuals with structures showing well correlated chemistry ratios and predicted the same recruitment sources. Individuals captured in Halfway River tributaries (Chowade River, and Cypress and Fiddes creeks) remained there until capture, but these individuals were typically smaller (i.e., juveniles fork length ranged from 38 to 205 mm) than the Bull Trout captured in the Peace River (fork length ranged from 171 to 690 mm). From the 129 Bull Trout (fin rays) captured in the Peace River at various sections, most were recruited from the Halfway River watershed within the Chowade River, Cypress and Fiddes creeks, and/or Halfway River mainstem. Other recruitment sources to the Peace River included the Moberly and Pine rivers. Earthtone and Mainstream (2013) and Mainstream (2012) also reported that the Halfway River watershed was the main recruitment source of Bull Trout to the Peace River. Diversified and Mainstream (2011) found similar recruitment of Bull Trout from Chowade River, and Cypress and Fiddes creeks; they also determined that some recruitment originated from the Pine River watershed and unknown locations, although they did not have any recruitment predicted from the

Moberly River (Earthtone and Mainstream 2013). Overall, we predicted that most Bull Trout were recruited from within the LAA, with recruitment sources upstream of the Project.

Goldeye captured from the Peace River had predicted recruitment from the Smoky River, although there was not a strong correlation between the natal/first summer fin ray elemental chemistry and the Smoky River water chemistry. This suggests that the natal/first summer habitat may be a tributary of the Smoky River, characterized by both higher Ba:Ca and Sr:Ca signatures. While Goldeye were captured in the LAA (all downstream of the Project), all fish were recruited from outside of the LAA, which was similar to the results reported by Mainstream (2012). Earthtone and Mainstream (2013) predicted that most Goldeye recruited from an unknown location, with about one third of the Goldeye from the Smoky River and Little Smoky River, and less than one third from the Peace River. Our results suggest no recruitment occurred from the Peace River.

Mountain Whitefish were captured in the Peace (91.6%), Pine (6.3%), and Halfway (2.1%) rivers. Natal recruitment mainly occurred from the Beatton and Peace rivers. The remaining fish had natal habitat in Halfway River watershed, Moberly and Pine rivers, and an unknown location. Conversely, Earthtone and Mainstream (2013) reported most recruitment from the Halfway River watershed, and Peace and Pine rivers, with less recruitment from Moberly and Beatton rivers. However, despite some variability in recruitment proportions from various river systems between reports, overall the same five predicted recruitment sources were determined using microchemistry (Mainstream 2012). Earthtone and Mainstream (2013), Mainstream (2012) and the current study determined that Mountain Whitefish do not typically remain in their natal habitat during the first summer, but rather move to larger river habitats, such as the mainstem of tributaries or the Peace River. Most of the Mountain Whitefish were recruited from within the LAA, however a large proportion of recruitment occurred from the Peace River, which can extend beyond the LAA. Of the fish recruiting from within the LAA, most of the sources were downstream of the Project, but there was some recruitment from the Moberly and Halfway rivers.

Rainbow Trout captured in the Halfway River watershed were also recruited from a Halfway River tributary, specifically Cypress, Colt, or Kobes creeks, where they remained in their natal habitats for their first summer. Rainbow Trout captured in the Peace River were also predicted to have been recruited from the Halfway River watershed. One Rainbow Trout was captured in Farrell Creek with an unknown recruitment source. Earthtone and Mainstream (2013) also identified the Halfway River watershed as an important recruitment source, in addition to Dinosaur Lake, and Maurice and Farrell creeks within the Halfway watershed. Earthtone and Mainstream (2013) identified an unknown recruitment source with a lower Ba:Ca water chemistry ratio than Moberly River, which is a comparative chemistry to what is reported in this report for Colt Creek. It is, therefore, possible that the unknown recruitment source

reported in Earthtone and Mainstream (2013) was Colt Creek for those Rainbow Trout. Most Rainbow Trout captured in this study were recruited from within the LAA, upstream of the Project, with one fish captured downstream of the Project. This finding is similar to what was reported in Mainstream (2012) where all recruitment sources were upstream of the Project.

Walleye were captured in the Peace River from various sections. The fin rays used in the analysis suggest there are four major sources of recruitment including, most from the Peace River, followed by Pouce Coupe and/or Clear rivers, as well as the Smoky River watershed. There was also a smaller proportion of Walleye recruited from the Beatton River. While Walleye from Pouce Coupe/Clear and Smoky rivers remained in their natal habitats for their first summer, almost all Beatton River Walleye migrated to the Peace River for their first summer. Major recruitment sources of Walleye from the Peace River reported by Earthtone and Mainstream (2013) had the same sources as in this report, but their results suggest an additional recruitment source from the Pine River. Mainstream (2012) reported most recruitment occurred from the Beatton River, but also had recruitment from the Pine, Pouce Coupe, Smoky, and Peace rivers. For Walleye captured upstream of the Project, most were recruited from within the LAA, but downstream of the Project. For the Walleye captured downstream of the Project, most were recruited from within the LAA (downstream of the Project), with at least 25% recruitment from downstream of the LAA in the Smoky River.

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APPENDIX A - 2014 to 2018 Fish Data and Chemistry Ratios

Appendix A - Summary of 2014 to 2018 Fish Data and Strontium and Barium Chemistry Ratios

Sample ID	Year	Capture Location	Section	UTMs		US/DS Site C Dam	Species	Fork Length (mm)	O/FR	Capture		Natal		First Summer	
				Easting	Northing					Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca
18	2017	Peace R.	6	643238	6224330	DS	BT	233	FR	364.9	8.6	380.0	26.6	366.5	18.0
32	2017	Peace R.	6	644567	6223590	DS	BT	376	FR	276.5	7.2	408.8	20.9	381.6	10.8
66	2018	Peace R.	1	566453	6207858	US	BT	254	FR	294.7	11.6	337.8	37.0	292.6	32.2
119	2016	Peace R.	1	569260	6210478	US	BT	555	FR	253.7	9.5	288.5	14.6	255.4	9.3
155	2018	Peace R.	6	644567	6223590	DS	BT	409	FR	229.5	9.4	642.6	20.8	376.9	9.8
158	2017	Peace R.	1	568372	6210050	US	BT	375	FR	257.7	6.5	454.5	19.0	473.1	16.3
196	2017	Peace R.	6	647888	6222979	DS	BT	272	FR	320.2	5.2	350.3	8.7	373.0	10.7
263	2016	Peace R.	3	599753	6233307	US	BT	250	FR	327.7	8.8	633.4	31.1	342.5	28.3
375	2016	Peace R.	6	651250	6222649	DS	BT	249	FR	274.8	23.0	386.4	66.1	269.9	45.9
484	2016	Peace R.	5	631539	6229590	DS	BT	312	FR	271.1	7.2	528.7	23.6	421.7	17.6
486	2018	Peace R.	6	649302	6223371	DS	BT	352	FR	246.0	8.0	346.0	13.0	352.1	14.1
493	2018	Peace R.	1	566302	6207742	US	BT	384	FR	265.6	6.8	619.5	24.6	495.9	17.9
539	2017	Cypress Cr.	-	499384	6303834	US	BT	205	FR	277.8	7.3	354.2	36.2	360.2	20.1
539	2016	Peace R.	5	632785	6229686	DS	BT	354	FR	161.8	40.4	235.9	45.8	185.7	32.2
540	2017	Cypress Cr.	-	499384	6303834	US	BT	93	FR	425.6	13.2	405.2	27.8	383.7	27.5
541	2017	Cypress Cr.	-	499384	6303834	US	BT	84	FR	458.0	34.9	478.9	24.7	488.6	31.5
542	2017	Cypress Cr.	-	499384	6303834	US	BT	96	FR	415.3	12.9	437.9	28.4	488.0	36.4
543	2017	Cypress Cr.	-	499384	6303834	US	BT	89	FR	375.2	15.0	461.1	29.6	487.9	30.6
544	2017	Cypress Cr.	-	499384	6303834	US	BT	152	FR	368.3	9.9	389.1	20.8	373.3	26.7
545	2017	Cypress Cr.	-	499384	6303834	US	BT	96	FR	428.3	15.2	396.1	35.6	521.1	47.9
546	2017	Cypress Cr.	-	499384	6303834	US	BT	134	FR	497.3	35.5	530.2	45.5	493.5	47.8
547	2017	Cypress Cr.	-	499384	6303834	US	BT	112	FR	412.2	14.0	407.2	29.4	489.2	40.5
623	2016	Peace R.	3	605976	6233878	US	BT	247	FR	278.7	6.2	693.0	25.8	570.3	17.0
638	2016	Peace R.	5	637376	6229072	DS	BT	330	FR	323.5	8.2	817.3	27.4	689.1	22.9
651	2018	Peace R.	3	602583	6233193	US	BT	251	FR	287.5	8.1	799.0	24.0	645.0	18.8
652	2018	Peace R.	3	602583	6233193	US	BT	234	FR	269.4	6.0	696.9	17.7	778.5	20.1
828	2017	Peace R.	7	667571	6220294	DS	BT	390	FR	244.1	9.3	709.6	19.0	585.5	15.1
869	2017	Peace R.	3	605400	6233320	US	BT	476	FR	254.6	8.5	375.4	17.5	282.2	8.0
874	2017	Fiddes Cr.	-	479624	6310882	US	BT	127	FR	312.8	31.8	351.4	47.5	415.6	64.2
877	2017	Peace R.	5	630553	6229765	DS	BT	371	FR	392.4	58.5	727.3	15.0	522.7	10.9
929	2016	Peace R.	3	606662	6234395	US	BT	489	FR	267.7	9.0	401.5	28.2	382.2	18.7
939	2018	Peace R.	6	645301	6223722	DS	BT	366	FR	255.6	6.8	425.9	26.8	359.4	21.4
1041	2018	Peace R.	3	604468	6233079	US	BT	278	FR	260.4	6.8	327.7	43.4	272.7	22.9
1097	2017	Peace R.	5	637376	6229072	DS	BT	360	FR	263.3	8.1	439.5	23.3	401.0	10.6
1139	2016	Peace R.	9	367347	6241966	DS	BT	449	FR	232.9	7.3	391.1	24.1	312.4	13.8
1154	2018	Chowade R.	-	501912	6282488	US	BT	157	FR	-	-	-	-	-	-
1223	2018	Peace R.	3	606956	6233951	US	BT	184	FR	310.5	12.8	851.4	20.0	676.3	18.6
1377	2018	Peace R.	6	652136	6222141	DS	BT	416	FR	253.4	5.3	312.2	9.2	326.2	12.7
1560	2016	Peace R.	7	660554	6220625	DS	BT	388	FR	319.3	9.3	660.1	25.1	569.4	23.1
1746	2016	Peace R.	7	666641	6220828	DS	BT	355	FR	293.7	13.9	654.8	26.9	728.7	31.5
1750	2016	Peace R.	1	568372	6210050	US	BT	425	FR	272.6	5.9	483.9	22.8	475.5	16.1
1870	2018	Peace R.	5	631539	6229590	DS	BT	257	FR	353.5	4.4	646.4	20.6	495.6	12.9
1892	2017	Peace R.	7	669781	6220712	DS	BT	275	FR	300.4	10.7	294.1	53.4	266.5	39.2

Appendix A - Summary of 2014 to 2018 Fish Data and Strontium and Barium Chemistry Ratios

Sample ID	Year	Capture Location	Section	UTMs		US/DS Site C Dam	Species	Fork Length (mm)	O/FR	Capture		Natal		First Summer	
				Easting	Northing					Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca
1903	2016	Peace R.	1	569302	6211053	US	BT	380	FR	233.1	6.8	162.9	74.2	267.3	14.9
1975	2018	Peace R.	5	634513	6230626	DS	BT	332	FR	270.6	5.9	893.4	18.8	824.5	14.4
2221	2016	Peace R.	6	642639	6224071	DS	BT	508	FR	235.9	9.6	324.7	17.7	332.0	17.3
2262	2018	Peace R.	5	637376	6229072	DS	BT	445	FR	251.9	8.1	395.0	27.9	363.4	17.4
2336	2017	Peace R.	3	606956	6233951	US	BT	588	FR	292.1	12.0	650.9	21.0	474.5	13.4
2444	2018	Peace R.	6	644567	6223590	DS	BT	353	FR	239.9	10.1	662.3	20.6	565.7	15.0
2615	2017	Peace R.	3	599753	6233307	US	BT	374	FR	299.8	8.1	317.4	17.9	272.4	10.0
2672	2016	Peace R.	6	652136	6222141	DS	BT	340	FR	273.3	10.7	435.2	34.9	401.6	23.4
2710	2017	Peace R.	6	652136	6222141	DS	BT	378	FR	262.4	7.0	408.3	18.5	320.5	8.5
2765	2017	Peace R.	3	603204	6233827	US	BT	290	FR	366.9	24.0	305.3	6.2	364.5	8.1
2792	2016	Peace R.	1	568798	6210403	US	BT	423	FR	306.2	11.2	266.8	10.6	272.7	10.3
3052	2016	Peace R.	7	676792	6220831	DS	BT	415	FR	260.0	10.0	401.9	28.7	343.9	25.2
3074	2017	Peace R.	9	365837	6243458	DS	BT	416	FR	247.9	9.4	527.5	22.3	376.8	17.1
3148	2016	Peace R.	5	633861	6229939	DS	BT	352	FR	297.6	9.2	440.5	17.8	481.0	19.2
3159	2018	Peace R.	1	570686	6212474	US	BT	402	FR	269.4	8.6	672.6	20.0	562.3	13.4
3236	2017	Peace R.	5	634530	6229634	DS	BT	531	FR	252.6	10.9	309.2	24.5	299.4	22.9
3334	2018	Peace R.	1	569260	6210478	US	BT	316	FR	261.2	4.9	445.2	27.7	378.5	25.0
3377	2017	Peace R.	1	567516	6209096	US	BT	499	FR	251.1	5.2	608.3	12.4	428.3	13.4
3386	2017	Peace R.	5	630016	6229305	DS	BT	387	FR	248.2	9.6	351.8	24.4	407.5	25.5
3471	2018	Peace R.	7	669781	6220712	DS	BT	189	FR	392.0	9.6	684.6	29.1	588.5	22.5
3639	2017	Peace R.	1	569994	6211528	US	BT	350	FR	278.9	5.5	287.6	8.7	300.7	6.1
3759	2017	Peace R.	6	646156	6223144	DS	BT	455	FR	224.5	10.3	230.1	10.6	255.8	7.6
3765	2018	Peace R.	3	599753	6233307	US	BT	452	FR	270.3	8.2	363.8	20.3	323.1	14.4
3785	2016	Peace R.	3	604468	6233079	US	BT	397	FR	255.1	4.7	326.5	49.0	324.9	14.5
3823	2016	Peace R.	3	605400	6233320	US	BT	337	FR	226.7	5.7	178.1	43.4	179.5	39.8
4520	2017	Peace R.	7	669781	6220712	DS	BT	308	FR	243.2	10.4	684.0	23.0	651.0	16.9
4637	2017	Peace R.	5	631539	6229590	DS	BT	442	FR	254.0	4.9	343.1	18.3	276.6	9.0
4657	2016	Peace R.	9	366799	6243728	DS	BT	588	FR	334.4	15.6	491.3	19.3	516.6	18.3
4687	2016	Peace R.	5	632339	6229356	DS	BT	344	FR	260.1	10.9	580.0	35.9	676.2	18.5
4785	2017	Peace R.	1	567402	6208074	US	BT	359	FR	229.1	4.7	259.2	11.8	265.0	8.2
4794	2018	Peace R.	6	642639	6224071	DS	BT	389	FR	225.5	15.4	651.8	19.6	556.2	16.0
4812	2017	Peace R.	1	566302	6207742	US	BT	200	FR	351.5	26.9	349.5	23.3	361.6	18.2
4833	2018	Peace R.	3	606662	6234395	US	BT	317	FR	237.5	7.0	318.0	31.7	268.8	31.5
4846	2018	Peace R.	6	645301	6223722	DS	BT	790	FR	295.4	15.1	307.9	19.8	315.0	14.9
4890	2016	Peace R.	5	637113	6228814	DS	BT	518	FR	228.4	6.9	269.2	66.2	264.1	30.7
4951	2016	Peace R.	1	566302	6207742	US	BT	341	FR	258.3	6.1	330.8	14.2	301.3	13.8
4983	2016	Peace R.	6	647888	6222979	DS	BT	400	FR	279.3	10.8	684.3	26.1	582.5	18.1
5133	2017	Peace R.	1	569260	6219478	US	BT	271	FR	309.8	7.6	828.0	16.1	747.2	17.0
5172	2018	Peace R.	9	364583	6242344	DS	BT	300	FR	321.7	8.0	857.2	14.8	532.8	11.4
5192	2016	Peace R.	5	637926	6227901	DS	BT	257	FR	286.0	12.0	629.2	30.5	367.6	31.9
5202	2017	Peace R.	6	647711	6222699	DS	BT	316	FR	225.2	5.9	371.7	25.5	389.4	16.7
5215	2016	Peace R.	6	642639	6224071	DS	BT	228	FR	350.2	7.1	363.3	19.5	348.0	18.4
5222	2017	Peace R.	6	649302	6223371	DS	BT	231	FR	481.2	16.4	1045.3	14.3	929.1	10.7

Appendix A - Summary of 2014 to 2018 Fish Data and Strontium and Barium Chemistry Ratios

Sample ID	Year	Capture Location	Section	UTMs		US/DS Site C Dam	Species	Fork Length (mm)	O/FR	Capture		Natal		First Summer	
				Easting	Northing					Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca
5224	2016	Peace R.	6	644567	6223590	DS	BT	414	FR	270.8	7.6	470.6	23.1	392.7	9.9
5237	2016	Peace R.	6	645301	6223722	DS	BT	360	FR	260.7	7.4	289.2	15.9	317.6	18.7
5256	2016	Peace R.	6	647711	6222699	DS	BT	243	FR	248.7	10.8	491.9	21.8	542.6	20.1
5278	2016	Peace R.	6	649302	6223371	DS	BT	171	FR	564.2	13.6	934.4	19.5	804.2	14.3
5358	2017	Peace R.	7	667571	6220294	DS	BT	331	FR	244.4	7.0	406.4	14.6	408.8	14.0
5373	2016	Peace R.	7	667149	6220752	DS	BT	336	FR	269.4	10.4	352.2	14.9	307.5	15.1
5409	2017	Peace R.	5	630553	6229765	DS	BT	255	FR	279.9	10.1	411.5	8.1	450.1	8.2
5418	2018	Peace R.	1	569260	6210478	US	BT	604	FR	281.1	8.9	283.7	31.4	192.7	28.4
5532	2017	Peace R.	3	599753	6233307	US	BT	277	FR	471.0	7.3	788.4	12.8	871.3	12.4
5595	2017	Peace R.	7	665176	6220191	DS	BT	475	FR	250.4	15.2	407.5	22.9	374.1	15.0
5632	2017	Peace R.	7	662099	6220280	DS	BT	242	FR	544.6	19.5	597.7	25.2	627.1	32.5
5692	2017	Peace R.	5	632339	6229356	DS	BT	249	FR	363.1	15.4	631.7	33.9	602.9	27.5
5737	2017	Peace R.	6	643238	6224330	DS	BT	320	FR	296.7	6.1	588.6	19.6	614.0	16.8
5764	2016	Peace R.	3	600824	6232860	US	BT	240	FR	180.1	16.4	423.5	20.4	382.1	14.7
5836	2018	Peace R.	5	630016	6229305	DS	BT	449	FR	277.6	7.6	595.4	20.6	368.8	20.6
6191	2018	Peace R.	5	637427	6228123	DS	BT	252	FR	310.7	13.9	249.1	21.9	559.9	17.3
6202	2017	Peace R.	9	358391	6239968	DS	BT	367	FR	295.3	4.9	331.3	14.7	372.6	11.1
6315	2018	Peace R.	7	667571	6220294	DS	BT	505	FR	213.3	9.9	401.7	33.9	332.3	24.8
6324	2018	Peace R.	7	668109	6220743	DS	BT	250	FR	518.9	8.3	746.2	24.6	767.7	29.0
6342	2018	Peace R.	7	669735	6220916	DS	BT	434	FR	264.3	9.2	280.8	28.6	204.2	29.7
6400	2018	Peace R.	7	669781	6220712	DS	BT	325	FR	225.2	8.5	393.5	13.5	325.9	12.7
6586	2017	Peace R.	3	606935	6234158	US	BT	295	FR	293.8	7.2	362.4	11.6	337.1	7.1
6602	2017	Peace R.	3	600824	6232860	US	BT	267	FR	238.9	8.9	861.3	22.8	246.9	16.9
6648	2018	Peace R.	6	641497	6223588	DS	BT	296	FR	313.7	8.5	416.3	19.8	389.5	15.1
6681	2017	Peace R.	9	366861	6242408	DS	BT	262	FR	308.5	11.6	332.2	35.7	314.8	31.1
6687	2016	Peace R.	9	357843	6239030	DS	BT	690	FR	289.0	7.1	245.4	35.7	209.5	15.1
6701	2016	Peace R.	9	358363	6239289	DS	BT	372	FR	299.1	9.2	618.6	18.9	437.3	10.9
6706	2018	Peace R.	6	646546	6222599	DS	BT	271	FR	377.7	9.0	510.5	30.4	420.5	27.2
6813	2017	Peace R.	1	568798	6210403	US	BT	354	FR	258.4	5.5	362.0	33.2	377.2	19.0
6839	2018	Peace R.	3	607058	6234840	US	BT	253	FR	370.4	6.6	563.2	11.2	612.2	11.1
6854	2017	Peace R.	3	599753	6233307	US	BT	234	FR	384.6	10.1	357.0	18.1	344.0	13.0
6863	2016	Peace R.	9	364583	6242344	DS	BT	350	FR	277.2	8.8	599.4	15.5	599.4	17.2
6884	2017	Peace R.	3	602583	6233193	US	BT	410	FR	270.0	14.7	290.5	11.9	295.9	7.6
6891	2018	Peace R.	7	667149	6220752	DS	BT	275	FR	381.1	7.7	381.8	29.2	366.0	14.3
6898	2018	Peace R.	7	667571	6220294	DS	BT	346	FR	260.4	6.6	689.8	12.0	449.5	10.7
6975	2018	Peace R.	5	630553	6229765	DS	BT	291	FR	231.6	5.3	316.0	10.8	251.9	6.5
6996	2016	Peace R.	9	365837	6243458	DS	BT	380	FR	246.1	8.9	629.6	24.3	585.0	14.6
7017	2017	Peace R.	9	358391	6239968	DS	BT	247	FR	456.8	9.2	557.2	29.6	621.8	13.9
7022	2017	Peace R.	9	358363	6239289	DS	BT	265	FR	310.0	6.6	323.8	12.5	340.2	12.7
7031	2017	Peace R.	9	361692	6240512	DS	BT	278	FR	369.0	13.8	452.3	18.8	422.2	19.0
7146	2016	Peace R.	1	568798	6210403	US	BT	294	FR	266.8	14.4	293.7	9.2	295.8	9.8
7186	2016	Peace R.	1	570511	6212043	US	BT	313	FR	294.3	7.6	368.1	32.8	309.8	24.9
7213	2018	Peace R.	1	568372	6210050	US	BT	472	FR	254.8	6.1	387.8	16.6	321.7	12.4

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Sample ID	Year	Capture Location	Section	UTMs		US/DS Site C Dam	Species	Fork Length (mm)	O/FR	Capture		Natal		First Summer	
				Easting	Northing					Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca
7243	2018	Peace R.	1	569260	6210478	US	BT	454	FR	229.7	5.8	618.3	19.6	420.6	12.2
7394	2018	Peace R.	1	569994	6211528	US	BT	642	FR	249.2	4.9	304.5	10.4	273.8	10.5
7450	2016	Peace R.	3	607058	6234840	US	BT	260	FR	297.1	4.3	450.9	33.6	258.6	22.5
7496	2016	Peace R.	9	357843	6239030	DS	BT	189	FR	325.7	10.0	381.2	32.9	396.5	23.8
7531	2016	Peace R.	9	364583	6242344	DS	BT	384	FR	267.3	11.8	428.8	24.6	373.6	21.6
7790	2016	Peace R.	3	606956	6233951	US	BT	432	FR	266.8	5.9	381.8	26.6	315.3	12.8
8898	2018	Peace R.	9	359520	6240016	DS	BT	225	FR	352.3	12.7	440.3	21.1	458.8	23.0
8973	2018	Peace R.	9	365837	6243458	DS	BT	324	FR	254.4	3.4	280.9	14.5	309.5	17.9
9062	2018	Peace R.	1	569260	6210478	US	BT	621	FR	255.7	8.0	360.4	12.1	345.7	8.9
9270	2018	Peace R.	3	605976	6233878	US	BT	501	FR	325.8	17.1	299.0	16.7	248.9	12.1
9374	2018	Peace R.	1	567402	6208074	US	BT	636	FR	245.1	8.3	292.9	9.9	320.3	9.8
2	2018	Peace R.	7	662969	6220383	DS	GE	375	FR	272.3	12.3	452.0	26.5	509.9	29.7
58	2018	Peace R.	8	318808	6224656	DS	GE	385	FR	275.0	12.4	619.4	18.9	667.3	20.1
1028	2016	Peace R.	9	361692	6240512	DS	GE	388	FR	336.0	9.9	458.2	19.3	458.8	25.1
1369	2016	Peace R.	7	665724	6220631	DS	GE	401	FR	221.7	8.9	459.1	23.4	480.2	26.9
2430	2016	Peace R.	6	646546	6222599	DS	GE	398	FR	182.7	11.1	566.3	16.2	684.9	19.6
2498	2016	Peace R.	7	668544	6220498	DS	GE	379	FR	279.4	19.3	475.9	32.4	492.5	34.6
2901	2017	Peace R.	9	358391	6239968	DS	GE	384	FR	200.3	9.0	603.7	16.6	600.1	15.5
4553	2016	Peace R.	9	363258	6240685	DS	GE	400	FR	206.6	8.5	375.6	10.8	448.4	10.2
4562	2017	Peace R.	9	358391	6239968	DS	GE	430	FR	188.8	8.3	438.3	14.1	430.2	16.5
4617	2017	Peace R.	9	361692	6240512	DS	GE	393	FR	222.8	8.7	453.6	35.0	506.7	46.5
5035	2016	Peace R.	7	665724	6220631	DS	GE	374	FR	249.9	9.8	652.6	21.9	671.0	16.5
6670	2016	Peace R.	9	358391	6239968	DS	GE	422	FR	254.3	10.1	445.8	19.5	496.8	22.0
6671	2016	Peace R.	9	358391	6239968	DS	GE	402	FR	265.7	11.0	398.8	20.0	450.9	24.2
5324	2018	Peace R.	1	566453	6207858	US	MW	266	FR	376.2	3.0	431.1	10.3	377.4	4.9
5702	2018	Peace R.	3	599753	6233307	US	MW	319	FR	582.1	18.1	438.7	11.4	374.3	4.4
6316	2018	Peace R.	7	667571	6220294	DS	MW	91	FR	355.6	4.2	375.5	8.8	334.7	8.1
124	2018	Peace R.	6	642639	6224071	DS	WP	399	FR	329.0	42.6	320.3	36.1	280.3	16.6
377	2016	Peace R.	6	651250	6222649	DS	WP	353	FR	233.5	20.0	420.9	27.7	414.1	17.9
479	2016	Peace R.	3	604655	6233435	US	WP	457	FR	231.8	19.4	296.9	10.6	238.1	15.3
535	2018	Peace R.	6	650309	6222738	DS	WP	367	FR	289.1	11.9	376.9	14.5	359.2	17.0
540	2018	Peace R.	3	601597	6233232	US	WP	406	FR	265.0	36.1	263.0	18.2	320.6	14.7
696	2018	Peace R.	6	653270	6221438	DS	WP	315	FR	204.1	13.3	236.6	26.0	228.0	17.7
718	2017	Peace R.	7	665176	6220191	DS	WP	415	FR	223.0	44.7	272.4	24.0	249.0	25.1
787	2018	Peace R.	5	630553	6229765	DS	WP	452	FR	210.6	43.6	279.1	28.1	265.6	23.7
806	2018	Peace R.	5	631539	6229590	DS	WP	640	FR	228.2	22.2	256.2	35.2	244.7	23.8
870	2017	Peace R.	3	605400	6233320	US	WP	584	FR	191.5	19.1	253.2	20.8	244.6	18.6
882	2017	Peace R.	5	630553	6229765	DS	WP	371	FR	281.8	36.8	460.0	24.1	486.0	23.4
969	2017	Peace R.	5	633855	6229835	DS	WP	425	FR	208.0	23.9	270.1	17.1	249.4	12.9
994	2016	Peace R.	9	359520	6240016	DS	WP	316	FR	252.6	12.2	389.8	18.6	325.8	14.7
999	2018	Peace R.	3	605400	6233320	US	WP	438	FR	243.6	23.7	283.2	11.0	264.1	16.2
1016	2016	Peace R.	9	360795	6239970	DS	WP	421	FR	246.8	24.7	879.0	35.1	482.3	23.5
1020	2016	Peace R.	9	360795	6239970	DS	WP	206	FR	222.5	17.6	306.9	54.8	259.8	20.0

Appendix A - Summary of 2014 to 2018 Fish Data and Strontium and Barium Chemistry Ratios

Sample ID	Year	Capture Location	Section	UTMs		US/DS Site C Dam	Species	Fork Length (mm)	O/FR	Capture		Natal		First Summer	
				Easting	Northing					Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca
1079	2016	Peace R.	9	364583	6242344	DS	WP	341	FR	267.5	15.5	289.1	12.2	282.0	9.5
1096	2016	Peace R.	9	366849	6243231	DS	WP	375	FR	291.6	29.3	324.6	25.1	281.6	24.7
1267	2017	Peace R.	6	644567	6223590	DS	WP	411	FR	213.6	24.8	253.4	17.2	236.2	15.1
1292	2018	Peace R.	3	605585	6233743	US	WP	381	FR	246.7	25.3	279.5	8.3	257.1	9.4
1392	2016	Peace R.	6	651070	6222442	DS	WP	305	FR	199.9	11.0	302.0	45.8	279.4	20.4
1394	2018	Peace R.	7	662969	6220383	DS	WP	342	FR	218.4	14.7	284.4	44.0	268.3	23.8
1494	2017	Peace R.	9	360795	6239970	DS	WP	324	FR	258.2	24.6	314.4	11.0	263.4	16.3
1512	2017	Peace R.	6	651070	6222442	DS	WP	390	FR	268.6	35.9	246.8	14.7	259.5	14.6
1540	2018	Peace R.	7	666832	6219962	DS	WP	192	FR	220.0	12.1	264.1	34.5	233.3	28.2
1561	2016	Peace R.	7	660554	6220625	DS	WP	268	FR	209.8	12.0	306.3	27.7	277.1	25.1
1608	2018	Peace R.	9	366849	6243231	DS	WP	331	FR	247.3	21.6	349.9	18.1	349.2	16.6
1652	2017	Peace R.	6	654048	6222162	DS	WP	485	FR	228.1	57.0	238.1	9.5	236.6	14.4
1667	2017	Peace R.	7	662969	6220383	DS	WP	387	FR	245.7	21.8	431.4	20.1	413.6	23.6
1670	2017	Peace R.	7	663146	6220001	DS	WP	512	FR	234.1	19.3	243.2	16.2	251.6	14.0
1694	2017	Peace R.	7	663908	6220160	DS	WP	661	FR	230.5	25.3	266.7	26.3	262.8	29.7
1700	2018	Peace R.	9	358391	6239968	DS	WP	326	FR	234.7	24.0	267.0	26.7	245.6	26.8
1737	2016	Peace R.	7	666094	6220512	DS	WP	262	FR	237.9	22.9	321.2	64.3	258.0	11.2
1776	2018	Peace R.	7	676794	6219192	DS	WP	338	FR	221.1	19.3	482.0	27.7	537.8	21.2
1834	2016	Peace R.	5	634530	6229634	DS	WP	525	FR	207.5	24.1	330.9	31.2	256.1	29.5
1949	2017	Peace R.	7	673481	6220112	DS	WP	320	FR	512.2	30.0	492.6	22.2	519.4	29.2
1956	2018	Peace R.	5	632785	6229686	DS	WP	403	FR	238.0	31.1	295.6	31.2	216.2	23.6
2140	2017	Peace R.	5	634530	6229634	DS	WP	470	FR	233.5	39.5	232.8	26.2	259.2	25.0
2179	2016	Peace R.	5	637926	6227901	DS	WP	436	FR	200.4	17.1	379.6	22.5	390.6	23.3
2230	2016	Peace R.	6	642639	6224071	DS	WP	342	FR	216.5	14.8	344.3	21.1	357.7	20.3
2261	2018	Peace R.	5	637376	6229072	DS	WP	396	FR	202.9	28.9	299.3	19.6	293.8	20.7
2476	2017	Peace R.	3	607058	6234840	US	WP	358	FR	222.4	23.7	366.1	15.5	395.9	18.0
2576	2018	Peace R.	6	646546	6222599	DS	WP	407	FR	244.5	34.0	320.0	41.4	303.8	28.1
2896	2018	Peace R.	6	649302	6223371	DS	WP	384	FR	251.9	17.6	251.8	15.0	230.2	16.8
2949	2017	Peace R.	9	358363	6239289	DS	WP	343	FR	275.5	24.6	220.2	9.8	223.8	14.0
3013	2017	Peace R.	9	363258	6240685	DS	WP	382	FR	300.0	18.6	261.5	8.1	250.9	8.7
3086	2017	Peace R.	9	366799	6243728	DS	WP	351	FR	224.6	34.3	294.0	22.8	261.2	19.2
3142	2017	Peace R.	9	366861	6242408	DS	WP	494	FR	199.7	25.0	273.7	25.7	265.1	22.5
3223	2016	Peace R.	5	633855	6229835	DS	WP	356	FR	205.7	14.0	295.6	9.7	286.3	8.3
3286	2018	Peace R.	7	665176	6220191	DS	WP	399	FR	227.7	33.2	280.3	19.9	289.6	12.8
3578	2018	Peace R.	5	630553	6229765	DS	WP	454	FR	251.6	25.8	300.5	24.3	308.9	25.1
3620	2018	Peace R.	5	631539	6229590	DS	WP	471	FR	248.0	21.7	294.8	18.3	312.3	15.6
3672	2018	Peace R.	5	632458	6229481	DS	WP	462	FR	254.0	36.5	240.3	30.4	250.8	28.6
3898	2018	Peace R.	3	601597	6233232	US	WP	446	FR	239.2	29.8	321.4	12.4	319.4	11.3
3998	2017	Peace R.	3	605585	6233743	US	WP	356	FR	226.8	18.5	278.8	18.3	254.1	14.2
4034	2016	Peace R.	6	652136	6222141	DS	WP	298	FR	195.1	14.2	283.6	9.0	272.5	7.6
4170	2018	Peace R.	3	602583	6233193	US	WP	432	FR	188.4	41.6	261.1	15.8	235.2	18.0
4172	2018	Peace R.	3	602583	6233193	US	WP	436	FR	237.5	19.9	270.0	25.2	251.5	21.5
4202	2016	Peace R.	7	666832	6219962	DS	WP	291	FR	275.3	25.3	513.2	27.8	520.8	29.0

Appendix A - Summary of 2014 to 2018 Fish Data and Strontium and Barium Chemistry Ratios

Sample ID	Year	Capture Location	Section	UTMs		US/DS Site C Dam	Species	Fork Length (mm)	O/FR	Capture		Natal		First Summer	
				Easting	Northing					Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca
4328	2016	Peace R.	7	665176	6220191	DS	WP	298	FR	299.9	31.9	485.0	32.2	500.8	28.6
4376	2017	Peace R.	7	676579	6220730	DS	WP	314	FR	212.3	21.5	270.5	11.9	225.6	14.2
4410	2017	Peace R.	3	600824	6232860	US	WP	456	FR	246.4	27.3	280.3	15.5	261.3	18.3
4491	2017	Peace R.	3	602583	6233193	US	WP	459	FR	303.1	42.7	290.9	12.0	259.6	16.4
4501	2016	Peace R.	9	358363	6239289	DS	WP	271	FR	621.4	64.5	501.2	27.5	522.2	22.3
4535	2016	Peace R.	5	637376	6229072	DS	WP	457	FR	224.1	22.4	282.2	15.4	293.3	27.2
4579	2016	Peace R.	9	363235	6241089	DS	WP	334	FR	245.4	18.7	343.2	54.8	302.6	11.7
4608	2016	Peace R.	9	364583	6242344	DS	WP	375	FR	262.1	16.0	310.4	21.2	291.0	16.3
4683	2016	Peace R.	9	366861	6242408	DS	WP	270	FR	273.0	22.2	638.3	40.7	516.3	26.6
4766	2017	Peace R.	5	637427	6228123	DS	WP	461	FR	190.8	23.5	236.6	7.7	200.6	12.6
4844	2016	Peace R.	5	634530	6229634	DS	WP	280	FR	255.6	14.9	306.8	39.5	242.9	14.2
4867	2018	Peace R.	6	645301	6223722	DS	WP	372	FR	288.2	15.1	278.3	16.7	273.6	19.8
4883	2018	Peace R.	6	645301	6223722	DS	WP	368	FR	192.4	12.4	208.2	9.6	187.3	13.9
4954	2016	Peace R.	6	645301	6223722	DS	WP	412	FR	232.0	17.8	273.4	20.4	255.5	13.1
4966	2016	Peace R.	6	646156	6223144	DS	WP	402	FR	239.3	17.7	279.9	18.0	272.2	17.4
5018	2018	Peace R.	6	646546	6222599	DS	WP	382	FR	218.0	23.4	495.3	29.2	464.7	27.4
5064	2017	Peace R.	5	633855	6229835	DS	WP	320	FR	285.5	24.1	269.2	12.3	267.6	11.2
5140	2016	Peace R.	5	634513	6230626	DS	WP	442	FR	274.6	25.5	312.5	21.3	287.2	15.2
5150	2016	Peace R.	5	633855	6229835	DS	WP	518	FR	280.3	18.9	325.3	11.2	393.0	17.2
5160	2018	Peace R.	9	364583	6242344	DS	WP	412	FR	213.1	39.4	265.5	20.3	258.6	23.4
5175	2018	Peace R.	9	366799	6243728	DS	WP	427	FR	217.3	26.1	297.1	10.7	318.7	12.4
5235	2018	Peace R.	9	366861	6242408	DS	WP	334	FR	208.7	19.5	265.5	9.7	241.2	15.0
5256	2017	Peace R.	6	651250	6222649	DS	WP	455	FR	233.3	23.5	237.0	16.6	299.3	23.9
5289	2016	Peace R.	6	649423	6223115	DS	WP	466	FR	222.2	28.5	277.4	25.7	283.0	21.1
5348	2016	Peace R.	7	664862	6220453	DS	WP	275	FR	309.3	18.6	505.5	29.4	533.1	22.5
5355	2017	Peace R.	7	667571	6220294	DS	WP	295	FR	314.5	14.9	520.5	25.7	456.1	22.6
5361	2016	Peace R.	7	665724	6220631	DS	WP	304	FR	256.3	16.5	329.8	25.5	384.1	23.1
5367	2016	Peace R.	7	666094	6220512	DS	WP	393	FR	209.2	22.6	271.4	25.2	289.8	24.0
5388	2016	Peace R.	7	676792	6220831	DS	WP	275	FR	262.2	15.8	443.2	21.1	540.3	24.0
5452	2017	Peace R.	5	633855	6229835	DS	WP	382	FR	214.8	23.2	266.3	21.1	271.5	16.9
5618	2018	Peace R.	7	662099	6220280	DS	WP	366	FR	223.8	22.2	272.8	13.4	235.6	14.5
5747	2017	Peace R.	6	643238	6224330	DS	WP	315	FR	227.7	23.6	333.8	19.5	321.4	22.2
5766	2017	Peace R.	6	645301	6223722	DS	WP	475	FR	242.0	18.7	305.1	26.3	313.7	16.5
5774	2018	Peace R.	3	600824	6232860	US	WP	396	FR	231.4	28.3	268.2	20.6	273.1	20.1
5834	2017	Peace R.	6	650309	6222738	DS	WP	440	FR	284.7	22.3	265.9	11.1	295.5	10.1
5869	2017	Peace R.	6	652136	6222141	DS	WP	318	FR	201.7	26.7	258.6	8.9	246.5	7.8
5873	2017	Peace R.	3	607058	6234840	US	WP	524	FR	227.1	27.9	277.3	12.7	269.3	17.1
6149	2018	Peace R.	3	604655	6233435	US	WP	484	FR	247.9	34.6	210.9	13.9	211.4	15.7
6191	2017	Peace R.	3	604468	6233079	US	WP	510	FR	260.5	29.5	259.5	15.3	250.1	16.4
6219	2017	Peace R.	9	358363	6239289	DS	WP	389	FR	256.0	22.2	313.3	24.3	309.5	13.5
6267	2017	Peace R.	9	363235	6241089	DS	WP	414	FR	281.7	24.9	287.6	20.7	286.1	14.2
6272	2017	Peace R.	9	363235	6241089	DS	WP	436	FR	242.3	19.5	320.4	22.9	305.9	24.3
6291	2016	Peace R.	3	606935	6234158	US	WP	525	FR	276.6	36.7	449.5	25.1	384.2	25.7

Appendix A - Summary of 2014 to 2018 Fish Data and Strontium and Barium Chemistry Ratios

Sample ID	Year	Capture Location	Section	UTMs		US/DS Site C Dam	Species	Fork Length (mm)	O/FR	Capture		Natal		First Summer	
				Easting	Northing					Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca
6295	2017	Peace R.	9	364583	6242344	DS	WP	384	FR	253.2	35.0	276.7	33.1	273.1	26.9
6428	2017	Peace R.	1	568605	6209966	US	WP	530	FR	277.8	38.2	279.0	20.7	264.9	27.3
6837	2018	Peace R.	7	662099	6220280	DS	WP	439	FR	247.9	21.3	281.4	35.2	251.9	26.2
6875	2017	Peace R.	3	601597	6233232	US	WP	396	FR	281.2	23.8	266.3	19.2	278.7	23.0
6881	2017	Peace R.	3	602583	6233193	US	WP	452	FR	277.4	40.3	313.3	43.7	278.8	42.5
6921	2017	Peace R.	3	604468	6233079	US	WP	384	FR	243.6	21.3	361.7	29.9	294.7	17.9
7016	2018	Peace R.	9	366799	6243728	DS	WP	393	FR	260.5	26.0	311.8	11.3	336.7	11.9
7029	2017	Peace R.	9	361692	6240512	DS	WP	508	FR	282.9	19.9	335.9	20.9	318.8	24.6
7042	2017	Peace R.	9	364583	6242344	DS	WP	326	FR	285.1	19.3	391.5	42.3	406.3	17.5
7070	2016	Peace R.	9	368560	6241724	DS	WP	345	FR	250.5	42.9	545.8	38.0	476.7	32.1
7108	2018	Peace R.	7	655782	6222032	DS	WP	355	FR	215.9	25.5	330.4	28.1	270.4	18.0
7279	2016	Peace R.	3	602583	6233193	US	WP	505	FR	239.9	37.3	253.7	9.3	269.1	14.1
7385	2016	Peace R.	3	604468	6233079	US	WP	332	FR	220.0	16.2	368.3	40.6	404.8	27.5
7455	2016	Peace R.	3	607058	6234840	US	WP	440	FR	256.9	30.4	342.3	26.0	321.9	14.9
7494	2016	Peace R.	9	357843	6239030	DS	WP	247	FR	264.9	23.7	469.2	21.2	593.8	37.0
7540	2016	Peace R.	9	365837	6243458	DS	WP	362	FR	277.3	25.8	225.9	13.7	234.3	11.0
7600	2018	Peace R.	3	600824	6232860	US	WP	436	FR	230.4	17.5	291.0	20.8	292.7	20.6
7666	2016	Peace R.	3	599753	6233307	US	WP	486	FR	324.0	29.6	307.0	25.3	304.1	12.8
7686	2016	Peace R.	3	602583	6233193	US	WP	465	FR	212.9	13.7	356.0	31.3	311.7	15.5
7754	2016	Peace R.	3	605976	6233878	US	WP	451	FR	287.9	48.5	336.6	21.2	332.1	24.0
7755	2016	Peace R.	3	605976	6233878	US	WP	472	FR	247.7	22.8	315.9	14.6	280.3	12.3
8229	2018	Peace R.	3	605585	6233743	US	WP	534	FR	219.6	36.0	237.1	20.9	239.0	22.5
8419	2018	Peace R.	3	604468	6233079	US	WP	504	FR	269.0	29.6	289.4	21.4	258.3	22.1
8809	2018	Peace R.	9	358391	6239968	DS	WP	356	FR	218.9	24.8	320.6	24.9	296.0	15.9
8842	2018	Peace R.	9	358363	6239289	DS	WP	486	FR	214.6	19.9	282.1	25.4	277.8	21.4
8907	2018	Peace R.	9	361692	6240512	DS	WP	344	FR	264.1	19.0	543.4	42.0	543.5	40.1
8939	2018	Peace R.	9	363235	6241089	DS	WP	382	FR	277.3	45.5	248.7	19.4	244.1	16.3
9013	2018	Peace R.	9	367347	6241966	DS	WP	385	FR	246.6	41.7	295.6	13.9	255.5	14.4
9032	2018	Peace R.	9	368560	6241724	DS	WP	437	FR	288.5	32.8	308.3	19.2	298.4	23.9
13	2018	Moberly R.	-	603493	6217946	US	AG	66	O	423.3	63.0	436.0	63.2	420.3	59.0
3335	2018	Peace R.	1	569260	6210478	US	AG	238	O	590.7	17.8	394.1	39.5	402.5	23.1
3884	2016	Peace R.	3	606956	6233951	US	AG	229	O	602.8	10.0	358.8	41.5	323.0	38.3
78	2018	Chowade R.	-	498318	6283907	US	BT	50	O	457.5	8.9	492.3	7.9	465.2	6.4
79	2018	Chowade R.	-	498318	6283907	US	BT	54	O	-	-	-	-	-	-
208	2018	Cypress Cr.	-	503000	6305330	US	BT	38	O	789.7	15.1	491.4	13.1	678.7	13.4
539	2017	Cypress Cr.	-	499384	6303834	US	BT	205	O	333.6	8.4	407.1	12.5	433.0	25.2
540	2017	Cypress Cr.	-	499384	6303834	US	BT	93	O	492.7	5.6	483.1	6.5	581.0	8.3
541	2017	Cypress Cr.	-	499384	6303834	US	BT	84	O	513.8	4.5	455.0	8.5	676.6	5.2
542	2017	Cypress Cr.	-	499384	6303834	US	BT	96	O	572.3	4.4	424.5	8.8	595.0	6.2
543	2017	Cypress Cr.	-	499384	6303834	US	BT	89	O	493.2	5.3	463.4	8.1	666.9	9.0
544	2017	Cypress Cr.	-	499384	6303834	US	BT	152	O	482.6	4.4	518.0	7.7	661.4	6.0
545	2017	Cypress Cr.	-	499384	6303834	US	BT	96	O	552.3	4.1	453.9	10.1	667.2	6.1
546	2017	Cypress Cr.	-	499384	6303834	US	BT	134	O	580.8	6.1	442.3	9.1	690.3	8.3

Appendix A - Summary of 2014 to 2018 Fish Data and Strontium and Barium Chemistry Ratios

Sample ID	Year	Capture Location	Section	UTMs		US/DS Site C Dam	Species	Fork Length (mm)	O/FR	Capture		Natal		First Summer	
				Easting	Northing					Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca
547	2017	Cypress Cr.	-	499384	6303834	US	BT	112	O	524.4	5.4	513.7	8.3	704.3	6.9
874	2017	Fiddes Cr.	-	479624	6310882	US	BT	127	O	353.3	4.8	401.1	13.9	660.9	16.6
1154	2018	Chowade R.	-	501912	6282488	US	BT	157	O	972.9	3.8	774.2	6.3	1066.2	3.7
28	2014	Peace R.	1	566453	6207858	US	MW	282	O	382.5	3.5	380.3	16.9	330.7	3.3
44	2015	Pine R.	-	641497	6223588	DS	MW	332.9	O	398.5	3.1	315.2	6.9	327.3	7.8
45	2015	Pine R.	-	641497	6223588	DS	MW	353.9	O	371.2	5.2	345.1	4.1	373.1	5.7
46	2015	Pine R.	-	641497	6223588	DS	MW	324.5	O	415.6	4.7	391.1	7.1	301.5	3.3
47	2015	Pine R.	-	641497	6223588	DS	MW	314.6	O	452.4	9.9	424.6	12.6	352.2	6.5
48	2015	Pine R.	-	641497	6223588	DS	MW	290.5	O	418.9	7.6	381.2	10.8	333.3	5.5
49	2015	Pine R.	-	641497	6223588	DS	MW	285.9	O	341.8	2.5	448.3	16.3	320.1	7.4
117	2014	Peace R.	1	568798	6210403	US	MW	285	O	503.6	10.3	466.7	11.2	340.4	3.9
182	2014	Peace R.	1	569994	6211528	US	MW	296	O	426.2	9.2	459.0	9.5	350.3	4.5
183	2014	Peace R.	1	569994	6211528	US	MW	206	O	322.3	2.7	395.3	6.3	323.2	3.4
229	2014	Peace R.	1	570511	6212043	US	MW	303	O	420.3	3.8	386.0	3.2	314.3	3.2
352	2018	Peace R.	6	647711	6222699	DS	MW	400	O	449.9	9.1	450.9	6.7	362.8	6.6
470	2018	Colt Cr.	-	538252	6258617	US	MW	59	O	325.5	8.1	472.3	8.3	462.2	4.1
494	2018	Peace R.	6	649302	6223371	DS	MW	435	O	414.2	4.0	424.5	11.1	370.4	6.3
507	2018	Peace R.	6	649423	6223115	DS	MW	68	O	390.4	6.1	396.5	29.1	432.8	10.1
551	2018	Colt Cr.	-	538060	6258666	US	MW	165	O	168.3	10.4	200.8	17.4	161.8	9.2
555	2014	Peace R.	3	606662	6234395	US	MW	304	O	442.0	8.7	481.3	9.2	356.1	4.0
964	2018	Peace R.	6	646156	6223144	DS	MW	73	O	409.8	5.5	420.4	13.3	382.5	13.3
989	2014	Peace R.	3	603204	6233827	US	MW	404	O	453.7	6.5	409.0	15.7	379.6	9.7
996	2017	Peace R.	3	605585	6233743	US	MW	320	O	546.4	7.9	362.3	13.0	340.8	5.0
997	2017	Peace R.	3	605585	6233743	US	MW	349	O	446.2	5.0	463.6	6.7	365.6	4.2
998	2017	Peace R.	3	605585	6233743	US	MW	283	O	364.8	6.3	351.6	13.4	301.2	8.0
999	2017	Peace R.	3	605585	6233743	US	MW	309	O	445.9	5.5	456.3	9.2	395.0	5.3
999	2017	Peace R.	3	605585	6233743	US	MW	309	O	364.1	3.7	401.7	8.6	438.7	6.2
1000	2018	Peace R.	6	646156	6223144	DS	MW	89	O	352.6	3.7	277.8	19.6	274.6	20.2
1001	2018	Peace R.	6	646156	6223144	DS	MW	84	O	355.6	4.9	392.4	27.2	270.4	13.4
1032	2017	Peace R.	3	604655	6233435	US	MW	243	O	395.9	7.3	339.2	5.0	331.1	3.9
1033	2017	Peace R.	3	604655	6233435	US	MW	299	O	462.5	8.9	392.8	7.5	360.0	5.8
1241	2015	Peace R.	6	651250	6222649	DS	MW	381	O	358.4	7.9	454.2	10.6	326.4	4.2
1328	2014	Peace R.	5	632785	6229686	DS	MW	218	O	370.7	4.5	422.7	11.6	411.4	9.1
1493	2016	Peace R.	6	651250	6222649	DS	MW	326	O	462.1	8.7	411.4	16.7	316.2	7.1
1540	2015	Peace R.	1	567516	6209096	US	MW	274	O	420.4	4.2	493.4	8.2	459.9	7.0
1678	2018	Peace R.	9	368560	6241724	DS	MW	170	O	347.0	8.3	332.1	3.5	337.6	3.5
1718	2014	Peace R.	1	566453	6207858	US	MW	306	O	369.3	5.4	381.9	7.9	353.5	6.5
1719	2014	Peace R.	1	566453	6207858	US	MW	277	O	356.0	2.9	425.4	6.6	352.0	3.7
1721	2018	Peace R.	9	357843	6239030	DS	MW	298	O	430.0	7.0	429.0	10.4	389.3	4.5
1726	2018	Peace R.	9	357843	6239030	DS	MW	171	O	324.1	8.3	393.5	5.4	332.6	4.0
1727	2018	Peace R.	9	357843	6239030	DS	MW	292	O	346.5	6.1	361.3	6.0	339.0	4.6
1751	2017	Peace R.	9	368560	6241724	DS	MW	182	O	415.9	4.7	436.2	7.8	436.5	5.9
1765	2018	Peace R.	9	359520	6240016	DS	MW	247	O	393.6	12.9	372.8	6.5	348.2	3.8

Appendix A - Summary of 2014 to 2018 Fish Data and Strontium and Barium Chemistry Ratios

Sample ID	Year	Capture Location	Section	UTMs		US/DS Site C Dam	Species	Fork Length (mm)	O/FR	Capture		Natal		First Summer	
				Easting	Northing					Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca
1766	2018	Peace R.	9	359520	6240016	DS	MW	238	O	381.9	9.6	439.5	14.1	421.7	11.7
1767	2018	Peace R.	9	359520	6240016	DS	MW	233	O	400.8	7.3	448.3	10.2	378.5	4.3
1769	2018	Peace R.	9	359520	6240016	DS	MW	169	O	380.8	4.8	372.5	5.0	345.9	3.7
1906	2014	Peace R.	1	570686	6212474	US	MW	283	O	435.1	3.5	448.8	6.7	438.6	7.4
1907	2014	Peace R.	1	570686	6212474	US	MW	285	O	377.2	3.9	504.8	24.0	368.9	5.8
2124	2016	Peace R.	3	604468	6233079	US	MW	129	O	393.2	4.7	429.5	6.9	380.7	5.1
2130	2016	Peace R.	3	605400	6233320	US	MW	401	O	451.4	6.2	458.0	4.8	402.2	5.5
2166	2016	Peace R.	3	605400	6233320	US	MW	275	O	434.7	7.3	423.1	16.6	357.1	5.5
2167	2016	Peace R.	3	605400	6233320	US	MW	430	O	350.1	4.7	371.0	4.1	372.2	4.5
2168	2016	Peace R.	3	605400	6233320	US	MW	223	O	390.1	7.8	387.3	6.0	382.3	5.7
2169	2016	Peace R.	3	605400	6233320	US	MW	300	O	500.2	6.1	427.5	6.1	409.7	5.9
2171	2016	Peace R.	3	605400	6233320	US	MW	337	O	435.8	9.6	359.8	15.3	324.5	4.3
2173	2016	Peace R.	3	605400	6233320	US	MW	168	O	343.6	3.4	379.4	11.7	356.4	5.6
2432	2017	Peace R.	3	606935	6234158	US	MW	338	O	561.5	6.7	409.7	7.9	402.7	4.1
2633	2016	Peace R.	1	566936	6208240	US	MW	334	O	417.2	4.5	417.5	9.0	338.2	7.3
2693	2016	Peace R.	1	567516	6209096	US	MW	307	O	415.6	3.2	505.6	15.1	427.3	17.8
2709	2017	Peace R.	6	651250	6222649	DS	MW	195	O	378.9	7.1	422.3	15.6	352.4	4.0
2904	2017	Peace R.	9	358391	6239968	DS	MW	236	O	415.8	4.6	403.5	10.6	371.5	6.5
2942	2017	Peace R.	9	359520	6240016	DS	MW	153	O	367.6	4.8	392.5	9.1	378.8	4.7
3035	2017	Peace R.	9	364583	6242344	DS	MW	226	O	438.9	4.6	451.4	4.7	433.3	8.3
3176	2017	Peace R.	9	368560	6241724	DS	MW	156	O	359.9	4.7	436.7	8.5	397.2	5.2
3300	2018	Peace R.	1	569260	6210478	US	MW	245	O	323.8	2.3	463.9	9.3	369.3	11.3
3301	2018	Peace R.	1	569260	6210478	US	MW	178	O	329.7	4.3	502.1	25.8	345.2	4.1
3384	2014	Peace R.	1	566302	6207742	US	MW	302	O	401.2	5.5	355.6	37.9	347.3	6.0
3468	2017	Peace R.	1	568605	6209966	US	MW	190	O	360.9	4.3	387.1	4.8	393.5	6.9
3646	2014	Peace R.	1	569260	6210478	US	MW	310	O	401.6	3.8	416.5	9.3	334.4	5.7
3653	2016	Peace R.	6	646156	6223144	DS	MW	154	O	407.4	9.1	505.9	7.4	435.3	5.4
3733	2014	Peace R.	1	569824	6211868	US	MW	279	O	345.2	2.4	423.8	9.6	368.1	3.6
4009	2018	Peace R.	1	566302	6207742	US	MW	220	O	331.0	2.9	382.5	5.1	362.8	4.3
4250	2014	Peace R.	3	604468	6233079	US	MW	314	O	418.0	7.4	386.2	5.2	336.8	4.2
4505	2018	Peace R.	9	357843	6239030	DS	MW	173	O	361.6	5.3	400.7	8.3	339.7	3.6
4506	2018	Peace R.	9	357843	6239030	DS	MW	175	O	348.4	9.4	343.5	4.0	337.6	4.0
4507	2018	Peace R.	9	357843	6239030	DS	MW	173	O	345.2	5.7	338.8	3.6	328.1	3.7
4555	2015	Peace R.	1	569994	6211528	US	MW	312	O	335.1	2.4	429.5	6.6	369.9	5.1
4560	2017	Peace R.	9	365837	6243458	DS	MW	160	O	319.5	4.5	399.8	17.6	376.6	7.8
4603	2017	Peace R.	9	358363	6239289	DS	MW	145	O	346.3	4.0	405.0	17.3	371.3	6.2
4616	2016	Peace R.	5	637376	6229072	DS	MW	135	O	344.1	4.5	367.9	10.0	352.6	5.9
4693	2017	Peace R.	9	364583	6242344	DS	MW	152	O	360.2	4.1	414.1	19.5	364.7	5.7
4694	2017	Peace R.	9	364583	6242344	DS	MW	160	O	337.4	3.6	391.3	9.3	411.1	8.5
4705	2018	Peace R.	3	605400	6233320	US	MW	272	O	412.2	4.8	431.7	6.0	351.0	5.1
4732	2017	Peace R.	9	366799	6243728	DS	MW	162	O	360.4	4.5	390.4	13.0	418.2	6.6
4735	2017	Peace R.	9	367347	6241966	DS	MW	242	O	360.0	5.1	420.9	12.3	373.2	5.6
5072	2018	Peace R.	9	358363	6239289	DS	MW	202	O	402.7	6.5	474.2	15.2	398.8	8.0

Appendix A - Summary of 2014 to 2018 Fish Data and Strontium and Barium Chemistry Ratios

Sample ID	Year	Capture Location	Section	UTMs		US/DS Site C Dam	Species	Fork Length (mm)	O/FR	Capture		Natal		First Summer	
				Easting	Northing					Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca	Sr:Ca	Ba:Ca
5095	2018	Peace R.	9	359520	6240016	DS	MW	176	O	375.3	7.5	478.0	12.8	379.8	4.4
5096	2018	Peace R.	9	359520	6240016	DS	MW	240	O	381.7	7.7	442.3	12.1	376.1	4.2
5165	2017	Peace R.	1	568798	6210403	US	MW	278	O	431.9	6.3	370.5	10.0	331.2	4.3
5293	2015	Peace R.	7	666641	6220828	DS	MW	274	O	384.7	6.2	398.0	14.6	367.9	8.0
5324	2018	Peace R.	1	566453	6207858	US	MW	266	O	376.2	3.0	431.1	10.3	377.4	4.9
5353	2014	Peace R.	1	568372	6210050	US	MW	311	O	379.3	4.1	417.9	5.3	349.6	4.3
5702	2018	Peace R.	3	599753	6233307	US	MW	319	O	582.1	18.1	438.7	11.4	374.3	4.4
6010	2018	Peace R.	5	632785	6229686	DS	MW	266	O	353.2	5.8	349.3	4.6	344.7	5.5
6011	2018	Peace R.	5	632785	6229686	DS	MW	270	O	400.8	6.4	428.8	11.7	353.6	5.3
6178	2014	Peace R.	5	629023	6230250	DS	MW	235	O	383.5	7.4	244.5	10.1	318.7	3.7
6316	2018	Peace R.	7	667571	6220294	DS	MW	91	O	355.6	4.2	375.5	8.8	334.7	8.1
6708	2014	Peace R.	5	637926	6227901	DS	MW	296	O	385.5	5.6	399.9	8.3	355.5	4.0
548	2017	Cypress Cr.	-	499384	6303834	US	RB	320	O	505.1	8.9	309.2	20.1	209.2	15.8
788	2017	Cypress Cr.	-	503784	6305426	US	RB	223	O	481.2	6.8	467.7	11.5	515.9	10.0
877	2018	Farrell Cr.	-	560892	6238244	US	RB	85	O	254.0	17.7	300.7	11.8	251.4	11.1
1430	2014	Peace R.	5	635651	6230419	DS	RB	193	O	422.5	8.8	320.5	11.8	363.1	7.1
1491	2017	Colt Cr.	-	537999	6258632	US	RB	74	O	245.7	30.7	289.8	14.7	261.6	17.7
1654	2018	Kobes Cr.	-	543215	6248252	US	RB	105	O	228.5	21.1	249.9	26.7	238.4	23.5
1663	2017	Colt Cr.	-	522305	6259042	US	RB	159	O	139.1	17.7	297.6	14.2	316.7	17.1
1712	2018	Kobes Cr.	-	544250	6243194	US	RB	112	O	241.5	18.7	256.3	28.9	227.5	24.9
1717	2017	Colt Cr.	-	537999	6258632	US	RB	80	O	175.6	40.3	161.8	23.1	223.5	22.5
1736	2017	Colt Cr.	-	538252	6258617	US	RB	120	O	215.9	24.4	212.0	19.2	211.0	19.9
1787	2017	Kobes Cr.	-	544124	6252323	US	RB	106	O	175.4	39.7	166.5	25.2	167.5	24.3
1920	2017	Kobes Cr.	-	544122	6252301	US	RB	111	O	164.1	36.2	250.0	33.3	201.8	33.9
1921	2017	Kobes Cr.	-	544122	6252301	US	RB	77	O	137.3	15.4	360.1	21.0	135.3	18.2
1996	2017	Kobes Cr.	-	543215	6248252	US	RB	125	O	257.5	34.3	289.6	28.2	275.1	35.9
3870	2016	Peace R.	3	605400	6233320	US	RB	147	O	298.0	4.8	212.1	17.9	202.8	22.5

Notes:

O = Otolith

FR = Fin Ray

n/a indicates data not available

DS = Downstream

US = Upstream

Fish Species:

Arctic Grayling (AG)

Bull Trout (BT)

Goldeye (GE)

Mountain Whitefish (MW)

Rainbow Trout (RB)

Walleye (WP)

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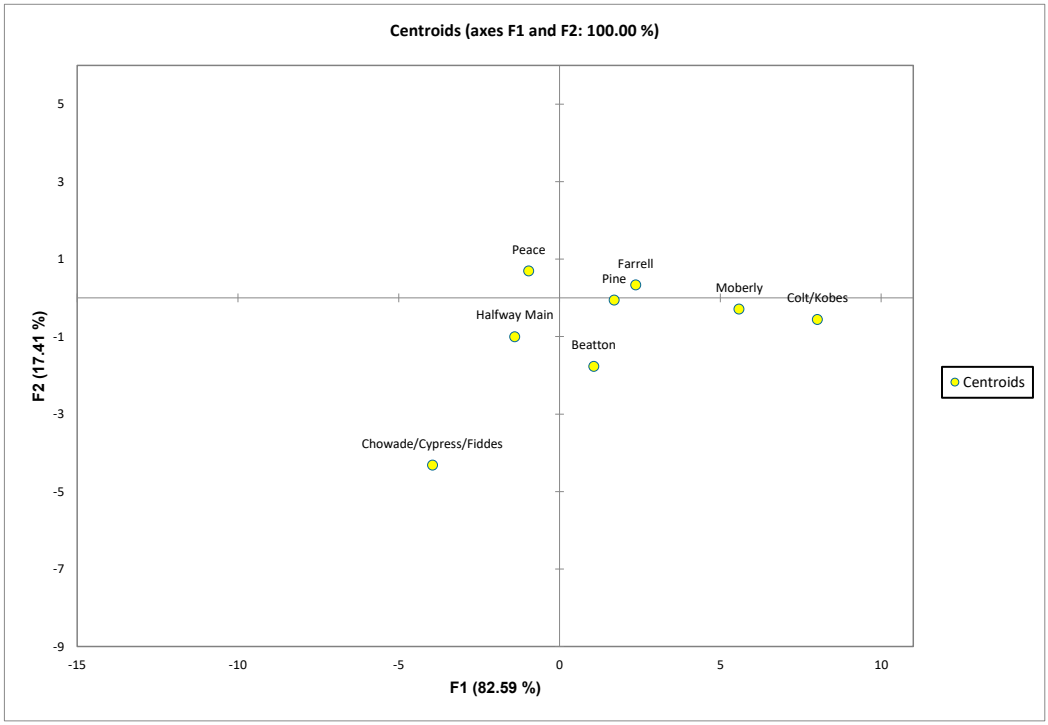
APPENDIX B - Habitat Model Statistics

XLSTAT 2019.3.2.61545 - Discriminant Analysis (DA)
Prior probabilities are taken into account
Significance level (%): 5



Confusion matrix for the training sample:

from \ to	Beatton	Chowade/ Cypress/ Fiddes	Colt/Kobes	Farrell	Halfway Main	Moberly	Peace	Pine	Total	% correct
Beatton	12	0	0	0	2	0	4	1	19	63.16%
Chowade/ Cypress/ Fiddes	1	6	0	0	3	0	0	0	10	60.00%
Colt/Kobes	0	0	2	0	0	2	0	0	4	50.00%
Farrell	0	0	0	0	0	1	2	2	5	0.00%
Halfway Main	1	2	0	0	20	0	21	1	45	44.44%
Moberly	0	0	0	0	0	34	0	0	34	100.00%
Peace	0	0	0	0	1	0	191	0	192	99.48%
Pine	3	0	0	0	1	0	2	13	19	68.42%
Total	17	8	2	0	27	37	220	17	328	84.76%

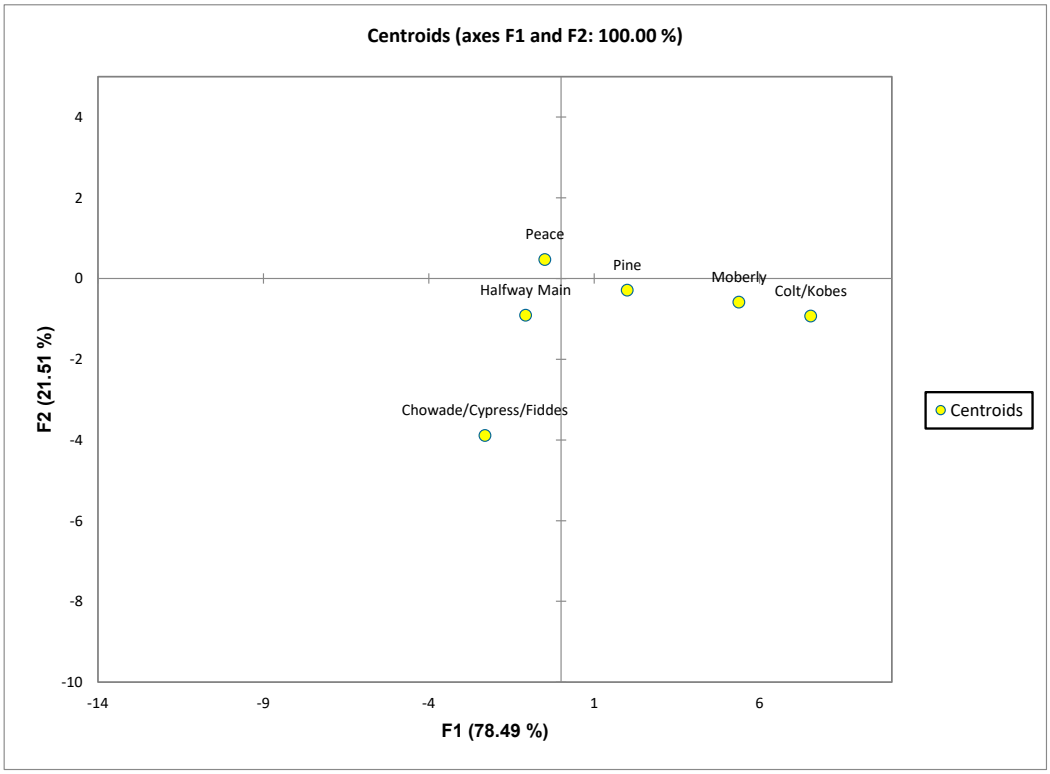
Results for the natal prediction sample:

	Predicted class	Pr(Beatton)	Pr(Chowade/ Cypress/Fiddes)	Pr(Colt/ Kobes)	Pr(Farrell)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
3335	Moberly	0.000	0.000	0.006	0.001	0.000	0.993	0.000	0.000	5.599	-0.486
3884	Moberly	0.000	0.000	0.028	0.000	0.000	0.972	0.000	0.000	6.264	-0.064
13	Moberly	0.000	0.000	0.211	0.000	0.000	0.789	0.000	0.000	6.888	-2.691

Results for the first summer prediction sample:

	Predicted class	Pr(Beatton)	Pr(Chowade/ Cypress/Fiddes)	Pr(Colt/ Kobes)	Pr(Farrell)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
3335	Farrell	0.003	0.000	0.000	0.390	0.000	0.215	0.002	0.390	3.420	1.193
3884	Moberly	0.000	0.000	0.037	0.000	0.000	0.963	0.000	0.000	6.487	0.864
13	Moberly	0.000	0.000	0.165	0.000	0.000	0.835	0.000	0.000	6.813	-2.233

XLSTAT 2019.3.2.61545 - Discriminant Analysis (DA)
Prior probabilities are taken into account
Significance level (%): 5



Confusion matrix for the training sample:

from \ to	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Total	% correct
Chowade/ Cypress/Fiddes	14	0	4	0	0	1	19	73.68%
Colt/Kobes	0	3	0	1	0	0	4	75.00%
Halfway Main	2	0	10	0	33	0	45	22.22%
Moberly	0	0	0	34	0	0	34	100.00%
Peace	0	0	10	0	293	2	305	96.07%
Pine	0	0	0	0	6	8	14	57.14%
Total	16	3	24	35	332	11	421	85.99%

OTOLITH: Results for the natal prediction sample:

	Predicted class	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/K obes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
78	Chowade/Cypress/Fic	0.998	0.000	0.002	0.000	0.000	0.000	-1.413	-4.920
208	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	0.105	-6.484
539	Chowade/Cypress/Fic	0.989	0.000	0.010	0.000	0.000	0.001	1.023	-5.359
540	Chowade/Cypress/Fic	0.991	0.000	0.009	0.000	0.000	0.000	-1.904	-4.198
541	Chowade/Cypress/Fic	0.993	0.000	0.007	0.000	0.000	0.000	-0.737	-4.752
542	Chowade/Cypress/Fic	0.971	0.000	0.028	0.000	0.001	0.000	-0.273	-4.469
543	Chowade/Cypress/Fic	0.994	0.000	0.006	0.000	0.000	0.000	-1.004	-4.676
544	Chowade/Cypress/Fic	0.999	0.000	0.001	0.000	0.000	0.000	-1.759	-5.121
545	Chowade/Cypress/Fic	0.997	0.000	0.003	0.000	0.000	0.000	-0.234	-5.252
546	Chowade/Cypress/Fic	0.991	0.000	0.009	0.000	0.000	0.000	-0.381	-4.811
547	Chowade/Cypress/Fic	0.999	0.000	0.001	0.000	0.000	0.000	-1.520	-5.280
874	Chowade/Cypress/Fic	0.990	0.000	0.008	0.000	0.000	0.002	1.417	-5.606
1154	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-4.638	-6.567

OTOLITH: Results for the first summer prediction sample:

	Predicted class	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/K obes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
78	Chowade/Cypress/Fic	0.979	0.000	0.020	0.000	0.000	0.000	-1.701	-3.990
208	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.651	-8.230
539	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	2.751	-7.847
540	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.202	-5.930
541	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-4.442	-5.279
542	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.179	-5.175
543	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.728	-6.910
544	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.884	-5.611
545	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.903	-5.688
546	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.149	-6.852
547	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.838	-6.356
874	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-0.857	-8.764
1154	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-8.009	-6.591

FIN RAY: Results for the natal prediction sample:

	Predicted class	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/K obes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
539	Chowade/Cypress/Fic	0.845	0.000	0.026	0.012	0.001	0.116	2.322	-5.515
540	Chowade/Cypress/Fic	0.993	0.000	0.006	0.000	0.000	0.000	0.784	-5.402
544	Chowade/Cypress/Fic	0.921	0.000	0.075	0.000	0.003	0.001	0.153	-4.293
545	Chowade/Cypress/Fic	0.996	0.000	0.003	0.000	0.000	0.001	1.650	-6.054
541	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-0.494	-5.917
542	Chowade/Cypress/Fic	0.999	0.000	0.001	0.000	0.000	0.000	0.419	-5.881
543	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	0.246	-6.271
546	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	0.742	-8.336
547	Chowade/Cypress/Fic	0.995	0.000	0.004	0.000	0.000	0.000	0.930	-5.608
874	Chowade/Cypress/Fic	0.495	0.000	0.004	0.354	0.000	0.147	3.174	-6.320

	Predicted class	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/K obes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
3052	Chowade/Cypress/Fic	0.993	0.000	0.007	0.000	0.000	0.000	0.924	-5.457
1560	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.251	-7.638
6648	Chowade/Cypress/Fic	0.976	0.000	0.023	0.000	0.001	0.000	-0.370	-4.494
539	Moberly	0.000	0.029	0.000	0.970	0.000	0.001	5.301	-4.125
2262	Chowade/Cypress/Fic	0.988	0.000	0.011	0.000	0.000	0.001	0.944	-5.286
3236	Pine	0.030	0.000	0.169	0.012	0.052	0.737	1.927	-3.599
5192	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.402	-7.994
5836	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.262	-6.483
4890	Moberly	0.000	0.107	0.000	0.893	0.000	0.000	5.653	-5.955
18	Chowade/Cypress/Fic	0.961	0.000	0.034	0.000	0.001	0.004	1.015	-4.931
2221	Halfway Main	0.051	0.000	0.602	0.000	0.256	0.091	0.683	-2.840
4846	Pine	0.018	0.000	0.382	0.001	0.213	0.386	1.313	-2.910
5215	Chowade/Cypress/Fic	0.617	0.000	0.338	0.000	0.034	0.010	0.345	-3.733
5237	Peace	0.001	0.000	0.275	0.000	0.512	0.213	1.027	-1.918
939	Chowade/Cypress/Fic	0.997	0.000	0.003	0.000	0.000	0.000	0.398	-5.551
1892	Moberly	0.000	0.009	0.000	0.985	0.000	0.005	4.522	-5.755
6315	Chowade/Cypress/Fic	0.997	0.000	0.003	0.000	0.000	0.001	1.425	-5.973
5373	Halfway Main	0.139	0.000	0.670	0.000	0.186	0.006	-0.268	-2.748
6681	Pine	0.262	0.000	0.036	0.154	0.002	0.546	2.641	-5.141
7531	Chowade/Cypress/Fic	0.996	0.000	0.004	0.000	0.000	0.000	0.111	-5.324
8973	Peace	0.000	0.000	0.203	0.000	0.653	0.144	0.910	-1.474
3386	Chowade/Cypress/Fic	0.692	0.000	0.224	0.000	0.018	0.066	1.186	-4.256
6191	Pine	0.000	0.000	0.005	0.161	0.020	0.814	2.801	-2.116
484	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.191	-6.285
638	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.187	-9.027
877	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-4.331	-6.539
1870	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.719	-6.917
1975	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-4.811	-8.317
3148	Chowade/Cypress/Fic	0.988	0.000	0.012	0.000	0.000	0.000	-1.007	-4.455
4687	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-0.467	-8.067
5133	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-4.839	-7.446
5692	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.112	-8.340
5409	Halfway Main	0.151	0.000	0.675	0.000	0.174	0.000	-2.953	-1.668
5202	Chowade/Cypress/Fic	0.921	0.000	0.067	0.000	0.003	0.009	1.015	-4.688
2444	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.853	-7.046
2672	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	1.065	-6.486
4794	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.908	-6.811
4983	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.333	-7.951
5222	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-6.497	-8.295
5256	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.026	-5.659
5278	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-4.942	-8.677
5737	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.341	-6.274
6706	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-0.243	-6.887
828	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.481	-7.153
1746	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.004	-7.807
3471	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.018	-8.285
4520	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.705	-7.558
5358	Chowade/Cypress/Fic	0.807	0.000	0.181	0.000	0.012	0.000	-1.141	-3.421

	Predicted class	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/K obes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
5632	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.682	-7.133
6324	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.001	-8.213
6898	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-4.683	-5.585
7496	Chowade/Cypress/Fic	0.985	0.000	0.010	0.000	0.000	0.005	1.631	-5.609
3074	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.341	-6.103
4657	Chowade/Cypress/Fic	0.999	0.000	0.001	0.000	0.000	0.000	-1.367	-5.287
5172	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-5.284	-7.364
6701	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.722	-6.426
6863	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.146	-5.634
6996	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.080	-7.292
7017	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-0.817	-7.258
7031	Chowade/Cypress/Fic	0.995	0.000	0.005	0.000	0.000	0.000	-0.984	-4.772
8898	Chowade/Cypress/Fic	0.995	0.000	0.005	0.000	0.000	0.000	-0.503	-4.978
1097	Chowade/Cypress/Fic	0.997	0.000	0.003	0.000	0.000	0.000	-0.186	-5.286
32	Chowade/Cypress/Fic	0.973	0.000	0.026	0.000	0.001	0.000	-0.112	-4.562
155	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.652	-6.920
5224	Chowade/Cypress/Fic	0.999	0.000	0.001	0.000	0.000	0.000	-0.597	-5.616
486	Halfway Main	0.041	0.000	0.647	0.000	0.310	0.003	-0.588	-2.218
196	Peace	0.004	0.000	0.458	0.000	0.538	0.000	-1.843	-1.041
1377	Peace	0.000	0.000	0.229	0.000	0.770	0.001	-1.015	-0.631
6891	Chowade/Cypress/Fic	0.978	0.000	0.018	0.000	0.000	0.004	1.271	-5.249
5595	Chowade/Cypress/Fic	0.983	0.000	0.017	0.000	0.000	0.000	0.174	-4.826
6400	Chowade/Cypress/Fic	0.564	0.000	0.392	0.000	0.044	0.000	-1.182	-3.023
6202	Halfway Main	0.029	0.000	0.615	0.000	0.340	0.016	0.019	-2.371
7022	Peace	0.005	0.000	0.479	0.000	0.509	0.006	-0.334	-1.749
375	Chowade/Cypress/Fic	0.863	0.000	0.000	0.129	0.000	0.008	3.624	-7.841
6342	Pine	0.000	0.000	0.007	0.315	0.004	0.674	2.929	-3.577
4637	Halfway Main	0.219	0.000	0.610	0.000	0.132	0.039	0.485	-3.243
6975	Peace	0.001	0.000	0.332	0.000	0.665	0.002	-0.631	-1.167
2710	Chowade/Cypress/Fic	0.948	0.000	0.050	0.000	0.002	0.000	-0.462	-4.185
3759	Peace	0.000	0.000	0.016	0.000	0.917	0.067	1.089	0.552
1139	Chowade/Cypress/Fic	0.967	0.000	0.031	0.000	0.001	0.001	0.560	-4.773
6687	Moberly	0.000	0.003	0.000	0.979	0.000	0.018	4.342	-3.561
66	Pine	0.398	0.000	0.031	0.137	0.001	0.433	2.658	-5.342
4812	Chowade/Cypress/Fic	0.610	0.000	0.290	0.000	0.028	0.073	1.098	-4.091
7186	Chowade/Cypress/Fic	0.956	0.000	0.021	0.000	0.000	0.021	1.816	-5.416
3334	Chowade/Cypress/Fic	0.999	0.000	0.001	0.000	0.000	0.000	0.249	-5.886
1041	Moberly	0.046	0.000	0.003	0.714	0.000	0.236	3.299	-5.677
4833	Pine	0.067	0.000	0.048	0.124	0.006	0.755	2.535	-4.544
263	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.382	-8.088
6602	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-4.024	-8.733
7450	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	0.748	-6.549
6813	Chowade/Cypress/Fic	0.927	0.000	0.028	0.001	0.001	0.043	1.949	-5.369
158	Chowade/Cypress/Fic	0.996	0.000	0.004	0.000	0.000	0.000	-0.981	-4.829
493	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.954	-7.245
1750	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-0.790	-5.724
3159	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.029	-7.034
3377	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.884	-5.026

	Predicted class	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/K obes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
7243	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.623	-6.525
623	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.444	-7.975
651	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.449	-8.502
652	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.590	-6.840
929	Chowade/Cypress/Fic	0.992	0.000	0.007	0.000	0.000	0.000	0.880	-5.398
1223	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-4.357	-8.257
2336	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.704	-7.009
5532	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-5.246	-6.477
5764	Chowade/Cypress/Fic	0.986	0.000	0.013	0.000	0.000	0.000	-0.381	-4.674
6839	Chowade/Cypress/Fic	0.999	0.000	0.001	0.000	0.000	0.000	-3.758	-4.304
3765	Chowade/Cypress/Fic	0.678	0.000	0.285	0.000	0.026	0.011	0.461	-3.869
3785	Moberly	0.010	0.002	0.000	0.912	0.000	0.076	3.678	-6.031
6854	Halfway Main	0.412	0.000	0.501	0.000	0.074	0.013	0.227	-3.416
2765	Peace	0.000	0.000	0.077	0.000	0.923	0.000	-2.090	0.739
5418	Moberly	0.000	0.000	0.003	0.519	0.001	0.476	3.149	-3.923
3823	Moberly	0.000	0.268	0.000	0.732	0.000	0.000	6.713	-2.488
7213	Chowade/Cypress/Fic	0.747	0.000	0.234	0.000	0.018	0.001	-0.503	-3.570
1903	Colt/Kobes	0.000	0.981	0.000	0.019	0.000	0.000	8.806	-3.686
4951	Halfway Main	0.023	0.000	0.600	0.000	0.363	0.013	-0.060	-2.271
9062	Halfway Main	0.071	0.000	0.675	0.000	0.253	0.001	-1.026	-2.210
119	Peace	0.001	0.000	0.261	0.000	0.626	0.112	0.778	-1.629
2792	Peace	0.000	0.000	0.073	0.000	0.911	0.016	0.269	-0.230
3639	Peace	0.000	0.000	0.096	0.000	0.903	0.001	-0.751	0.004
4785	Peace	0.000	0.000	0.069	0.000	0.873	0.058	0.753	-0.417
7146	Peace	0.000	0.000	0.134	0.000	0.865	0.001	-0.690	-0.296
7394	Peace	0.000	0.000	0.236	0.000	0.761	0.003	-0.526	-0.867
9374	Peace	0.000	0.000	0.153	0.000	0.844	0.003	-0.458	-0.506
2615	Halfway Main	0.030	0.000	0.542	0.000	0.280	0.147	0.858	-2.772
7790	Chowade/Cypress/Fic	0.965	0.000	0.031	0.000	0.001	0.003	0.988	-4.955
9270	Peace	0.004	0.000	0.368	0.000	0.431	0.198	0.972	-2.230
869	Chowade/Cypress/Fic	0.656	0.000	0.312	0.000	0.029	0.002	-0.155	-3.573
6586	Halfway Main	0.065	0.000	0.672	0.000	0.262	0.001	-1.171	-2.123
6884	Peace	0.000	0.000	0.207	0.000	0.775	0.018	0.136	-1.037

FIN RAY: Results for the first summer prediction sample:

	Predicted class	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/K obes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
539	Chowade/Cypress/Fic	0.606	0.000	0.343	0.000	0.035	0.016	0.480	-3.777
540	Chowade/Cypress/Fic	0.974	0.000	0.023	0.000	0.001	0.003	1.060	-5.086
544	Chowade/Cypress/Fic	0.942	0.000	0.048	0.000	0.002	0.008	1.130	-4.853
545	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	0.993	-8.406
541	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	0.108	-6.768
542	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	0.541	-7.209
543	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	0.034	-6.674
546	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	1.292	-8.118
547	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	0.847	-7.554
874	Chowade/Cypress/Fic	0.998	0.000	0.000	0.001	0.000	0.000	3.128	-8.131

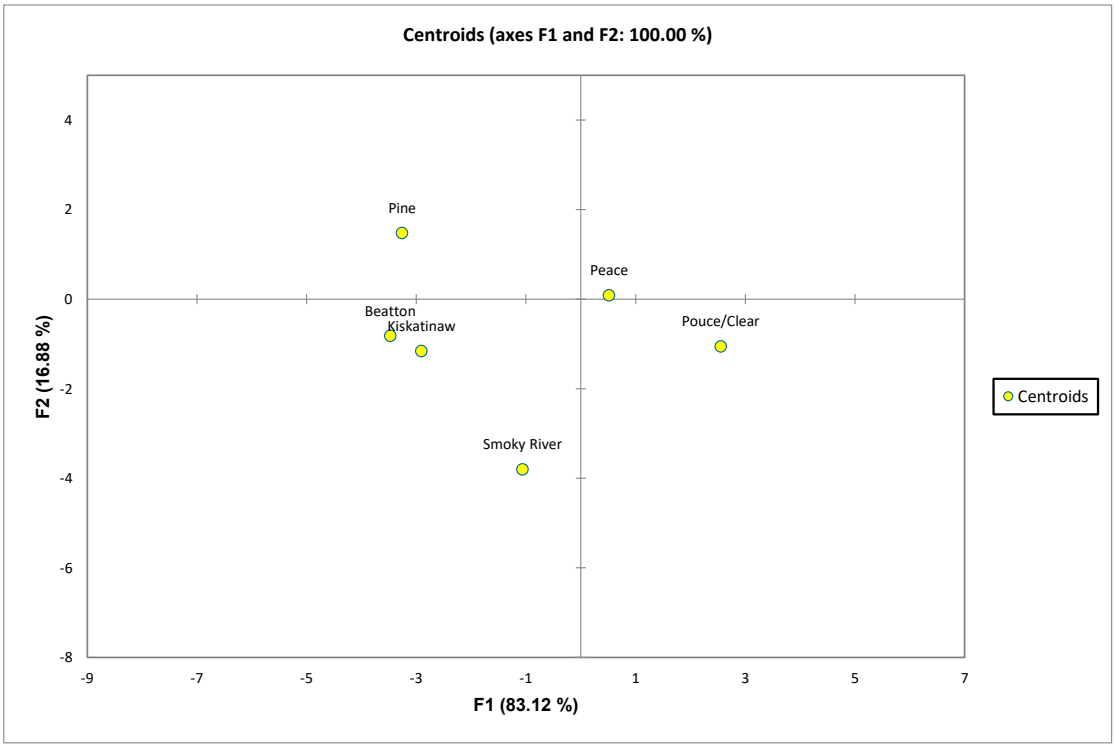
	Predicted class	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/K obes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
3052	Chowade/Cypress/Fic	0.571	0.000	0.251	0.001	0.023	0.154	1.421	-4.249
1560	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.671	-6.606
6648	Chowade/Cypress/Fic	0.660	0.000	0.311	0.000	0.029	0.000	-0.795	-3.313
539	Moberly	0.000	0.025	0.000	0.975	0.000	0.000	5.596	-1.780
2262	Halfway Main	0.456	0.000	0.473	0.000	0.064	0.006	0.002	-3.377
3236	Pine	0.009	0.000	0.145	0.011	0.074	0.762	1.914	-3.229
5192	Chowade/Cypress/Fic	0.952	0.000	0.025	0.000	0.001	0.021	1.742	-5.324
5836	Chowade/Cypress/Fic	0.759	0.000	0.218	0.000	0.016	0.007	0.425	-3.983
4890	Moberly	0.000	0.000	0.000	0.744	0.000	0.254	3.481	-3.474
18	Chowade/Cypress/Fic	0.559	0.000	0.391	0.000	0.044	0.006	0.060	-3.533
2221	Halfway Main	0.080	0.000	0.640	0.000	0.227	0.053	0.499	-2.893
4846	Halfway Main	0.008	0.000	0.499	0.000	0.451	0.041	0.347	-2.153
5215	Halfway Main	0.292	0.000	0.574	0.000	0.106	0.028	0.417	-3.333
5237	Halfway Main	0.038	0.000	0.528	0.000	0.244	0.191	0.978	-2.905
939	Chowade/Cypress/Fic	0.674	0.000	0.280	0.000	0.025	0.021	0.681	-3.964
1892	Moberly	0.000	0.003	0.000	0.970	0.000	0.027	4.153	-4.276
6315	Pine	0.298	0.000	0.314	0.002	0.044	0.343	1.562	-4.015
5373	Peace	0.004	0.000	0.437	0.000	0.494	0.064	0.516	-2.062
6681	Pine	0.046	0.000	0.046	0.126	0.006	0.776	2.539	-4.437
7531	Chowade/Cypress/Fic	0.846	0.000	0.141	0.000	0.008	0.005	0.490	-4.193
8973	Halfway Main	0.014	0.000	0.465	0.000	0.317	0.204	0.985	-2.626
3386	Chowade/Cypress/Fic	0.991	0.000	0.009	0.000	0.000	0.000	0.501	-5.168
6191	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.430	-5.627
484	Chowade/Cypress/Fic	0.966	0.000	0.033	0.000	0.001	0.000	-0.793	-4.197
638	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.768	-7.575
877	Chowade/Cypress/Fic	0.996	0.000	0.004	0.000	0.000	0.000	-3.422	-3.828
1870	Chowade/Cypress/Fic	0.995	0.000	0.005	0.000	0.000	0.000	-2.626	-4.069
1975	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-5.141	-7.083
3148	Chowade/Cypress/Fic	0.999	0.000	0.001	0.000	0.000	0.000	-1.269	-5.157
4687	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.291	-6.817
5133	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-4.107	-7.072
5692	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.470	-7.449
5409	Chowade/Cypress/Fic	0.612	0.000	0.353	0.000	0.035	0.000	-3.436	-2.157
5202	Chowade/Cypress/Fic	0.774	0.000	0.210	0.000	0.015	0.001	-0.499	-3.620
2444	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.921	-5.228
2672	Chowade/Cypress/Fic	0.979	0.000	0.020	0.000	0.000	0.000	0.333	-4.830
4794	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.626	-5.347
4983	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.525	-5.966
5222	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-6.698	-6.780
5256	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.810	-5.926
5278	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-5.021	-6.932
5737	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.043	-6.007
6706	Chowade/Cypress/Fic	0.997	0.000	0.003	0.000	0.000	0.000	0.521	-5.536
828	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.079	-5.443
1746	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.129	-8.861
3471	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.933	-6.697
4520	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.346	-6.340
5358	Chowade/Cypress/Fic	0.791	0.000	0.196	0.000	0.013	0.000	-1.299	-3.322

	Predicted class	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/K obes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
5632	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.201	-8.167
6324	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.669	-8.874
6898	Chowade/Cypress/Fic	0.877	0.000	0.117	0.000	0.006	0.000	-2.632	-2.981
7496	Chowade/Cypress/Fic	0.974	0.000	0.024	0.000	0.001	0.001	0.451	-4.814
3074	Chowade/Cypress/Fic	0.643	0.000	0.323	0.000	0.031	0.002	-0.247	-3.518
4657	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-1.822	-5.369
5172	Chowade/Cypress/Fic	0.998	0.000	0.002	0.000	0.000	0.000	-3.379	-4.086
6701	Chowade/Cypress/Fic	0.814	0.000	0.175	0.000	0.011	0.000	-2.407	-2.912
6863	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.835	-5.958
6996	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.172	-5.337
7017	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.671	-5.491
7031	Chowade/Cypress/Fic	0.978	0.000	0.021	0.000	0.000	0.000	-0.572	-4.439
8898	Chowade/Cypress/Fic	0.999	0.000	0.001	0.000	0.000	0.000	-0.467	-5.469
1097	Halfway Main	0.327	0.000	0.575	0.000	0.097	0.000	-2.003	-2.373
32	Halfway Main	0.140	0.000	0.676	0.000	0.184	0.000	-1.670	-2.171
155	Halfway Main	0.058	0.000	0.670	0.000	0.272	0.000	-1.915	-1.779
5224	Halfway Main	0.164	0.000	0.669	0.000	0.167	0.000	-2.087	-2.055
486	Halfway Main	0.100	0.000	0.677	0.000	0.219	0.004	-0.443	-2.563
196	Halfway Main	0.080	0.000	0.679	0.000	0.241	0.000	-1.571	-2.021
1377	Halfway Main	0.008	0.000	0.508	0.000	0.478	0.007	-0.321	-1.843
6891	Halfway Main	0.238	0.000	0.629	0.000	0.131	0.002	-0.619	-2.807
5595	Halfway Main	0.415	0.000	0.510	0.000	0.074	0.001	-0.595	-3.073
6400	Halfway Main	0.007	0.000	0.506	0.000	0.480	0.007	-0.315	-1.839
6202	Halfway Main	0.094	0.000	0.681	0.000	0.224	0.000	-1.465	-2.120
7022	Halfway Main	0.024	0.000	0.608	0.000	0.365	0.003	-0.546	-2.073
375	Moberly	0.000	0.007	0.000	0.987	0.000	0.006	4.552	-4.832
6342	Moberly	0.000	0.005	0.000	0.989	0.000	0.006	4.821	-2.023
4637	Peace	0.000	0.000	0.072	0.000	0.926	0.002	-0.423	0.093
6975	Peace	0.000	0.000	0.012	0.000	0.987	0.000	-0.865	1.590
2710	Peace	0.000	0.000	0.239	0.000	0.760	0.000	-1.417	-0.501
3759	Peace	0.000	0.000	0.022	0.000	0.977	0.001	-0.483	1.021
1139	Peace	0.004	0.000	0.442	0.000	0.530	0.025	0.166	-1.873
6687	Pine	0.000	0.000	0.002	0.059	0.128	0.811	2.684	-0.075
66	Pine	0.001	0.000	0.006	0.453	0.001	0.538	3.052	-4.162
4812	Chowade/Cypress/Fic	0.496	0.000	0.439	0.000	0.055	0.009	0.175	-3.501
7186	Pine	0.032	0.000	0.158	0.014	0.045	0.751	1.969	-3.665
3334	Chowade/Cypress/Fic	0.943	0.000	0.051	0.000	0.002	0.004	0.851	-4.717
1041	Pine	0.000	0.000	0.025	0.060	0.034	0.880	2.432	-2.733
4833	Moberly	0.000	0.000	0.001	0.736	0.000	0.262	3.454	-3.643
263	Chowade/Cypress/Fic	0.600	0.000	0.154	0.003	0.011	0.232	1.779	-4.577
6602	Pine	0.000	0.000	0.025	0.010	0.211	0.754	2.087	-1.274
7450	Pine	0.000	0.000	0.009	0.123	0.022	0.846	2.684	-2.407
6813	Chowade/Cypress/Fic	0.774	0.000	0.208	0.000	0.015	0.003	0.064	-3.856
158	Chowade/Cypress/Fic	0.996	0.000	0.004	0.000	0.000	0.000	-1.656	-4.567
493	Chowade/Cypress/Fic	0.999	0.000	0.001	0.000	0.000	0.000	-1.657	-5.089
1750	Chowade/Cypress/Fic	0.996	0.000	0.004	0.000	0.000	0.000	-1.737	-4.541
3159	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.209	-4.860
3377	Chowade/Cypress/Fic	0.897	0.000	0.099	0.000	0.005	0.000	-1.684	-3.436

	Predicted class	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/K obes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
7243	Chowade/Cypress/Fic	0.772	0.000	0.213	0.000	0.015	0.000	-1.855	-3.056
623	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.594	-5.659
651	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-2.985	-6.615
652	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.828	-7.818
929	Chowade/Cypress/Fic	0.810	0.000	0.177	0.000	0.012	0.001	-0.054	-3.878
1223	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-3.271	-6.840
2336	Chowade/Cypress/Fic	0.989	0.000	0.011	0.000	0.000	0.000	-2.265	-3.965
5532	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-5.896	-6.906
5764	Chowade/Cypress/Fic	0.514	0.000	0.433	0.000	0.053	0.001	-0.769	-3.128
6839	Chowade/Cypress/Fic	1.000	0.000	0.000	0.000	0.000	0.000	-4.261	-4.703
3765	Halfway Main	0.014	0.000	0.551	0.000	0.414	0.021	0.109	-2.187
3785	Halfway Main	0.016	0.000	0.567	0.000	0.397	0.020	0.089	-2.228
6854	Halfway Main	0.036	0.000	0.639	0.000	0.322	0.003	-0.543	-2.200
2765	Halfway Main	0.007	0.000	0.513	0.000	0.479	0.000	-2.285	-1.021
5418	Moberly	0.000	0.007	0.000	0.990	0.000	0.003	5.021	-1.589
3823	Moberly	0.000	0.150	0.000	0.850	0.000	0.000	6.412	-2.260
7213	Peace	0.004	0.000	0.458	0.000	0.532	0.006	-0.319	-1.691
1903	Peace	0.000	0.000	0.118	0.000	0.598	0.283	1.269	-1.298
4951	Peace	0.001	0.000	0.349	0.000	0.608	0.042	0.375	-1.692
9062	Peace	0.003	0.000	0.441	0.000	0.556	0.000	-1.691	-1.054
119	Peace	0.000	0.000	0.035	0.000	0.957	0.007	0.138	0.390
2792	Peace	0.000	0.000	0.085	0.000	0.906	0.009	0.057	-0.251
3639	Peace	0.000	0.000	0.065	0.000	0.935	0.000	-2.041	0.856
4785	Peace	0.000	0.000	0.038	0.000	0.961	0.001	-0.448	0.592
7146	Peace	0.000	0.000	0.163	0.000	0.835	0.002	-0.546	-0.523
7394	Peace	0.000	0.000	0.092	0.000	0.897	0.010	0.082	-0.326
9374	Peace	0.001	0.000	0.308	0.000	0.691	0.001	-1.001	-0.929
2615	Peace	0.000	0.000	0.079	0.000	0.914	0.007	-0.019	-0.159
7790	Peace	0.003	0.000	0.427	0.000	0.558	0.012	-0.097	-1.699
9270	Peace	0.000	0.000	0.046	0.000	0.850	0.104	1.042	-0.269
869	Peace	0.000	0.000	0.066	0.000	0.933	0.001	-0.888	0.354
6586	Peace	0.000	0.000	0.255	0.000	0.745	0.000	-2.219	-0.225
6884	Peace	0.000	0.000	0.094	0.000	0.906	0.000	-1.281	0.241

Goldeye Habitat Model Statistics

XLSTAT 2019.3.2.61545 - Discriminant Analysis (DA)
Prior probabilities are taken into account
Significance level (%): 5



Confusion matrix for the training sample:

from \ to	Beatton	Kiskatinaw	Peace	Pine	Pouce/Clear	Smoky	Total	% correct
Beatton	12	0	4	1	0	0	17	70.59%
Kiskatinaw	4	0	1	0	0	0	5	0.00%
Peace	1	0	200	1	0	1	203	98.52%
Pine	2	0	1	11	0	0	14	78.57%
Pouce/Clear	0	0	4	0	3	0	7	42.86%
Smoky R.	1	0	0	0	0	2	3	66.67%
Total	20	0	210	13	3	3	249	91.57%

Results for the natal prediction sample:

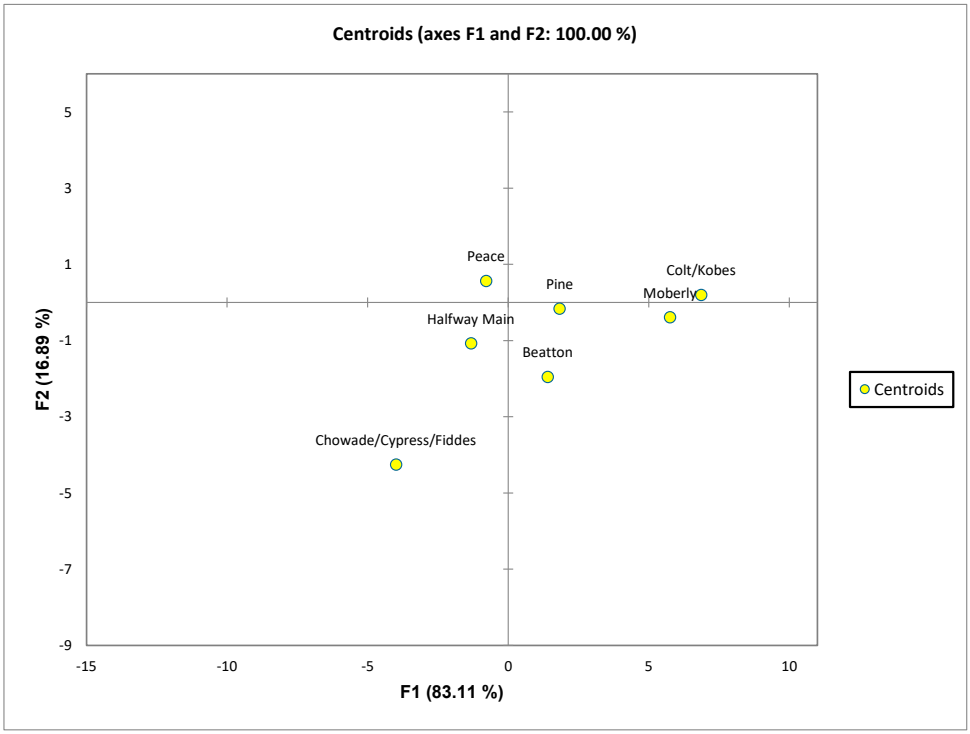
Sample ID	Predicted class	Pr(Beatton)	Pr(Kiskatinaw)	Pr(Peace)	Pr(Pine)	Pr(Pouce/Clear)	Pr(Smoky River)	F1	F2
58	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	0.056	-10.902
2	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-3.298	-7.568
4617	Smoky River	0.000	0.000	0.000	0.000	0.000	0.999	-4.973	-7.771
4562	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	0.387	-6.857
2901	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	0.720	-10.540
2498	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-4.311	-8.263
1028	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-1.333	-7.539
6671	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-2.124	-6.002
6670	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-1.512	-7.236
4553	Smoky River	0.000	0.000	0.004	0.000	0.017	0.979	1.319	-4.975
1369	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-2.499	-7.673
2430	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	0.629	-9.807
5035	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-0.623	-11.571

Results for the first summer prediction sample:

Sample ID	Predicted class	Pr(Beatton)	Pr(Kiskatinaw)	Pr(Peace)	Pr(Pine)	Pr(Pouce/Clear)	Pr(Smoky River)	F1	F2
58	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	0.011	-11.770
2	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-3.495	-8.985
4617	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-6.220	-9.174
4562	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-0.644	-6.741
2901	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	1.131	-10.432
2498	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-4.547	-8.684
1028	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-2.917	-7.704
6671	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-2.775	-7.490
6670	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-1.788	-8.519
4553	Smoky River	0.000	0.000	0.000	0.000	0.005	0.995	2.441	-6.923
1369	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	-3.133	-8.255
2430	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	0.568	-12.826
5035	Smoky River	0.000	0.000	0.000	0.000	0.000	1.000	1.230	-11.717

Mountain Whitefish Habitat Model Statistics

XLSTAT 2019.3.2.61545 - Discriminant Analysis (DA)
Prior probabilities are taken into account
Significance level (%): 5



Confusion matrix for the training sample:

from \ to	Beatton	Chowade/Cypress/Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Total	% correct
Beatton	12	0	0	1	0	4	1	18	66.67%
Chowade/Cypress/Fiddes	1	6	0	3	0	0	0	10	60.00%
Colt/Kobes	0	0	3	0	2	0	1	6	50.00%
Halfway Main	1	2	0	14	0	27	1	45	31.11%
Moberly	0	0	0	0	34	0	0	34	100.00%
Peace	0	0	0	4	0	246	1	251	98.01%
Pine	3	0	0	1	0	2	13	19	68.42%
Total	17	8	3	23	36	279	17	383	85.64%

Results for the natal prediction sample:

	Predicted class	Pr(Beatton)	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/ Kobes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
28	Beatton	0.649	0.000	0.001	0.000	0.292	0.000	0.059	3.897	-2.973
44	Peace	0.008	0.000	0.000	0.004	0.000	0.656	0.333	1.483	1.049
45	Peace	0.000	0.000	0.000	0.003	0.000	0.997	0.000	-1.003	2.209
46	Peace	0.031	0.000	0.000	0.074	0.000	0.822	0.073	0.435	-0.326
47	Beatton	0.929	0.000	0.000	0.002	0.000	0.001	0.067	2.208	-2.694
48	Beatton	0.623	0.000	0.000	0.004	0.002	0.017	0.354	2.182	-1.539
49	Beatton	0.986	0.000	0.000	0.000	0.001	0.000	0.012	2.900	-3.853
117	Beatton	0.936	0.000	0.000	0.025	0.000	0.007	0.032	1.261	-2.884
182	Beatton	0.714	0.000	0.000	0.145	0.000	0.081	0.061	0.722	-2.251
183	Peace	0.005	0.000	0.000	0.065	0.000	0.912	0.018	-0.061	-0.016
229	Peace	0.000	0.000	0.000	0.006	0.000	0.994	0.000	-2.533	2.331
352	Peace	0.016	0.000	0.000	0.306	0.000	0.670	0.008	-0.532	-0.999
470	Halfway M	0.260	0.000	0.000	0.442	0.000	0.271	0.027	0.033	-1.966
494	Beatton	0.870	0.000	0.000	0.012	0.000	0.011	0.108	1.715	-2.274
507	Moberly	0.016	0.000	0.005	0.000	0.978	0.000	0.000	5.747	-4.981
551	Moberly	0.000	0.000	0.492	0.000	0.508	0.000	0.000	7.392	0.766
555	Beatton	0.562	0.000	0.000	0.302	0.000	0.105	0.030	0.315	-2.403
964	Beatton	0.935	0.000	0.000	0.001	0.001	0.001	0.063	2.445	-2.791
989	Beatton	0.938	0.000	0.000	0.000	0.017	0.000	0.045	3.227	-3.168
996	Beatton	0.618	0.000	0.000	0.000	0.063	0.001	0.318	3.144	-1.823
997	Peace	0.015	0.000	0.000	0.382	0.000	0.598	0.005	-0.694	-1.152
998	Beatton	0.482	0.000	0.001	0.000	0.202	0.000	0.315	3.445	-1.763
999	Beatton	0.604	0.000	0.000	0.196	0.000	0.134	0.065	0.602	-2.086
999	Peace	0.326	0.000	0.000	0.081	0.000	0.346	0.247	1.020	-1.102
1000	Moberly	0.000	0.000	0.057	0.000	0.943	0.000	0.000	6.128	-1.570
1001	Moberly	0.024	0.000	0.005	0.000	0.970	0.000	0.000	5.549	-4.702
1032	Peace	0.000	0.000	0.000	0.005	0.000	0.990	0.005	-0.129	1.648
1033	Peace	0.073	0.000	0.000	0.083	0.000	0.717	0.127	0.640	-0.546
1241	Beatton	0.886	0.000	0.000	0.040	0.000	0.018	0.055	1.181	-2.530
1328	Beatton	0.891	0.000	0.000	0.006	0.000	0.005	0.098	1.905	-2.389
1493	Beatton	0.939	0.000	0.000	0.000	0.029	0.000	0.032	3.437	-3.405
1540	Halfway M	0.200	0.000	0.000	0.577	0.000	0.210	0.012	-0.236	-2.197
1678	Peace	0.000	0.000	0.000	0.001	0.000	0.999	0.000	-1.397	2.946
1718	Peace	0.115	0.000	0.000	0.056	0.000	0.590	0.239	0.963	-0.523
1719	Peace	0.013	0.000	0.000	0.169	0.000	0.805	0.014	-0.273	-0.608
1721	Beatton	0.828	0.000	0.000	0.028	0.000	0.027	0.117	1.420	-2.133
1726	Peace	0.000	0.000	0.000	0.039	0.000	0.957	0.003	-0.620	0.505
1727	Peace	0.002	0.000	0.000	0.018	0.000	0.959	0.021	0.194	0.711
1751	Peace	0.148	0.000	0.000	0.263	0.000	0.532	0.056	0.233	-1.300
1765	Peace	0.006	0.000	0.000	0.034	0.000	0.919	0.041	0.336	0.262
1766	Beatton	0.970	0.000	0.000	0.001	0.000	0.000	0.029	2.430	-3.245
1767	Beatton	0.838	0.000	0.000	0.056	0.000	0.033	0.073	1.106	-2.329
1769	Peace	0.000	0.000	0.000	0.016	0.000	0.982	0.002	-0.627	1.089

	Predicted class	Pr(Beatton)	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/ Kobes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
1906	Peace	0.015	0.000	0.000	0.290	0.000	0.687	0.008	-0.528	-0.952
1907	Beatton	0.997	0.000	0.000	0.000	0.003	0.000	0.001	3.733	-5.806
2124	Peace	0.025	0.000	0.000	0.203	0.000	0.753	0.019	-0.167	-0.798
2130	Peace	0.000	0.000	0.000	0.164	0.000	0.836	0.000	-1.845	-0.048
2166	Beatton	0.966	0.000	0.000	0.000	0.011	0.000	0.024	3.254	-3.547
2167	Peace	0.000	0.000	0.000	0.008	0.000	0.992	0.000	-1.375	1.766
2168	Peace	0.002	0.000	0.000	0.044	0.000	0.942	0.012	-0.142	0.266
2169	Peace	0.004	0.000	0.000	0.147	0.000	0.844	0.005	-0.592	-0.388
2171	Beatton	0.461	0.000	0.001	0.000	0.409	0.000	0.129	3.820	-2.325
2173	Beatton	0.687	0.000	0.000	0.002	0.005	0.006	0.301	2.496	-1.759
2432	Peace	0.149	0.000	0.000	0.136	0.000	0.591	0.124	0.593	-0.949
2633	Beatton	0.504	0.000	0.000	0.095	0.000	0.212	0.189	0.997	-1.488
2693	Beatton	0.995	0.000	0.000	0.001	0.000	0.000	0.003	1.970	-4.327
2709	Beatton	0.963	0.000	0.000	0.000	0.006	0.000	0.031	3.047	-3.351
2904	Beatton	0.748	0.000	0.000	0.011	0.000	0.023	0.218	1.814	-1.824
2942	Beatton	0.444	0.000	0.000	0.038	0.000	0.174	0.345	1.390	-1.175
3035	Peace	0.000	0.000	0.000	0.125	0.000	0.875	0.000	-1.919	0.167
3176	Beatton	0.365	0.000	0.000	0.215	0.000	0.325	0.096	0.548	-1.580
3300	Beatton	0.629	0.000	0.000	0.208	0.000	0.111	0.052	0.553	-2.219
3301	Beatton	0.992	0.000	0.000	0.000	0.007	0.000	0.000	4.043	-6.013
3384	Moberly	0.000	0.000	0.027	0.000	0.973	0.000	0.000	7.336	-5.186
3468	Peace	0.000	0.000	0.000	0.022	0.000	0.978	0.001	-1.020	1.018
3646	Beatton	0.579	0.000	0.000	0.072	0.000	0.151	0.198	1.122	-1.570
3653	Halfway M	0.049	0.000	0.000	0.692	0.000	0.256	0.003	-0.760	-2.014
3733	Beatton	0.692	0.000	0.000	0.060	0.000	0.089	0.160	1.180	-1.801
4009	Peace	0.000	0.000	0.000	0.023	0.000	0.975	0.002	-0.682	0.856
4250	Peace	0.000	0.000	0.000	0.028	0.000	0.969	0.002	-0.657	0.733
4505	Peace	0.237	0.000	0.000	0.093	0.000	0.456	0.214	0.896	-0.972
4506	Peace	0.000	0.000	0.000	0.003	0.000	0.997	0.000	-1.029	2.280
4507	Peace	0.000	0.000	0.000	0.002	0.000	0.998	0.000	-1.352	2.699
4555	Peace	0.014	0.000	0.000	0.189	0.000	0.784	0.013	-0.302	-0.684
4560	Beatton	0.848	0.000	0.000	0.000	0.118	0.000	0.034	3.782	-3.399
4603	Beatton	0.900	0.000	0.000	0.000	0.067	0.000	0.033	3.645	-3.420
4616	Pine	0.422	0.000	0.000	0.006	0.001	0.047	0.524	2.078	-1.078
4693	Beatton	0.858	0.000	0.000	0.000	0.127	0.000	0.014	3.994	-3.948
4694	Beatton	0.470	0.000	0.000	0.031	0.000	0.142	0.356	1.469	-1.209
4705	Peace	0.003	0.000	0.000	0.155	0.000	0.838	0.004	-0.714	-0.387
4732	Beatton	0.831	0.000	0.000	0.001	0.008	0.001	0.160	2.757	-2.280
4735	Beatton	0.912	0.000	0.000	0.003	0.000	0.002	0.083	2.145	-2.550
5072	Beatton	0.991	0.000	0.000	0.001	0.000	0.000	0.008	2.321	-3.949
5095	Beatton	0.979	0.000	0.000	0.006	0.000	0.001	0.015	1.615	-3.435
5096	Beatton	0.943	0.000	0.000	0.006	0.000	0.003	0.049	1.814	-2.788
5165	Pine	0.447	0.000	0.000	0.006	0.001	0.046	0.499	2.053	-1.131
5293	Beatton	0.900	0.000	0.000	0.000	0.018	0.000	0.082	3.113	-2.783
5324	Beatton	0.821	0.000	0.000	0.033	0.000	0.032	0.114	1.353	-2.127

	Predicted class	Pr(Beatton)	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/ Kobes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
5353	Peace	0.000	0.000	0.000	0.076	0.000	0.922	0.001	-1.014	0.209
5702	Beatton	0.914	0.000	0.000	0.012	0.000	0.007	0.067	1.629	-2.545
6010	Peace	0.000	0.000	0.000	0.005	0.000	0.994	0.001	-0.645	1.779
6011	Beatton	0.909	0.000	0.000	0.007	0.000	0.004	0.080	1.862	-2.504
6178	Moberly	0.000	0.000	0.037	0.000	0.862	0.000	0.100	4.285	1.337
6316	Pine	0.274	0.000	0.000	0.027	0.000	0.247	0.452	1.469	-0.775
6708	Peace	0.238	0.000	0.000	0.090	0.000	0.452	0.220	0.911	-0.964

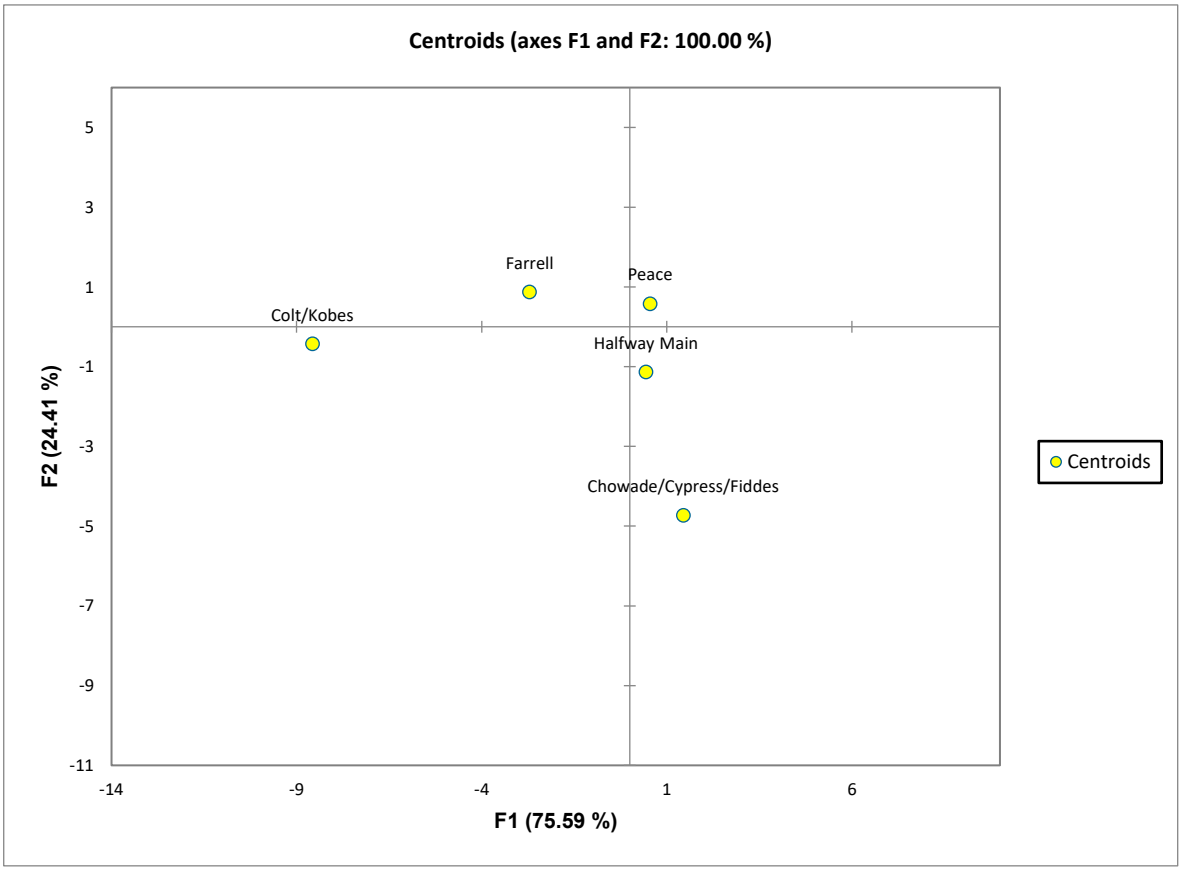
Results for the first summer prediction sample:

	Predicted class	Pr(Beatton)	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/ Kobes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
28	Peace	0.000	0.000	0.000	0.001	0.000	0.999	0.000	-1.547	3.119
44	Pine	0.038	0.000	0.000	0.005	0.000	0.358	0.599	1.764	0.414
45	Peace	0.001	0.000	0.000	0.024	0.000	0.966	0.009	-0.145	0.662
46	Peace	0.000	0.000	0.000	0.000	0.000	1.000	0.000	-1.109	3.717
47	Peace	0.006	0.000	0.000	0.016	0.000	0.902	0.076	0.666	0.579
48	Peace	0.000	0.000	0.000	0.005	0.000	0.978	0.017	0.299	1.469
49	Pine	0.019	0.000	0.000	0.004	0.000	0.465	0.511	1.686	0.715
117	Peace	0.000	0.000	0.000	0.002	0.000	0.998	0.000	-1.141	2.470
182	Peace	0.000	0.000	0.000	0.005	0.000	0.994	0.001	-0.723	1.816
183	Peace	0.000	0.000	0.000	0.001	0.000	0.999	0.000	-1.344	3.187
229	Peace	0.000	0.000	0.000	0.000	0.000	1.000	0.000	-1.459	3.577
352	Peace	0.008	0.000	0.000	0.025	0.000	0.896	0.071	0.576	0.343
470	Peace	0.000	0.000	0.000	0.114	0.000	0.886	0.000	-2.524	0.432
494	Peace	0.004	0.000	0.000	0.029	0.000	0.936	0.032	0.265	0.391
507	Beatton	0.798	0.000	0.000	0.044	0.000	0.043	0.115	1.251	-2.083
551	Colt/Kobes	0.000	0.000	0.625	0.000	0.375	0.000	0.000	6.115	4.118
555	Peace	0.000	0.000	0.000	0.004	0.000	0.995	0.000	-1.229	2.071
964	Beatton	0.800	0.000	0.000	0.000	0.020	0.001	0.179	2.970	-2.246
989	Beatton	0.465	0.000	0.000	0.014	0.000	0.080	0.441	1.785	-1.158
996	Peace	0.000	0.000	0.000	0.005	0.000	0.990	0.005	-0.149	1.615
997	Peace	0.000	0.000	0.000	0.007	0.000	0.992	0.000	-1.170	1.744
998	Pine	0.020	0.000	0.000	0.001	0.003	0.158	0.818	2.309	0.825
999	Peace	0.000	0.000	0.000	0.038	0.000	0.960	0.002	-0.738	0.565
999	Peace	0.005	0.000	0.000	0.200	0.000	0.790	0.005	-0.672	-0.592
1000	Moberly	0.000	0.000	0.068	0.000	0.932	0.000	0.000	6.314	-1.602
1001	Moberly	0.000	0.000	0.031	0.000	0.959	0.000	0.010	4.813	-0.167
1032	Peace	0.000	0.000	0.000	0.002	0.000	0.998	0.000	-0.950	2.600
1033	Peace	0.001	0.000	0.000	0.016	0.000	0.965	0.017	0.136	0.797
1241	Peace	0.000	0.000	0.000	0.002	0.000	0.997	0.001	-0.550	2.409
1328	Beatton	0.530	0.000	0.000	0.069	0.000	0.177	0.224	1.141	-1.456
1493	Peace	0.010	0.000	0.000	0.004	0.000	0.595	0.391	1.556	0.953
1540	Peace	0.029	0.000	0.000	0.384	0.000	0.578	0.009	-0.489	-1.243

	Predicted class	Pr(Beatton)	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/ Kobes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
1678	Peace	0.000	0.000	0.000	0.001	0.000	0.999	0.000	-1.506	2.867
1718	Peace	0.005	0.000	0.000	0.017	0.000	0.909	0.069	0.626	0.574
1719	Peace	0.000	0.000	0.000	0.003	0.000	0.997	0.000	-1.512	2.434
1721	Peace	0.000	0.000	0.000	0.019	0.000	0.980	0.000	-1.276	1.176
1726	Peace	0.000	0.000	0.000	0.002	0.000	0.998	0.000	-0.867	2.483
1727	Peace	0.000	0.000	0.000	0.004	0.000	0.994	0.002	-0.411	1.896
1751	Peace	0.002	0.000	0.000	0.169	0.000	0.825	0.003	-0.819	-0.414
1765	Peace	0.000	0.000	0.000	0.003	0.000	0.997	0.000	-1.365	2.423
1766	Beatton	0.892	0.000	0.000	0.006	0.000	0.005	0.098	1.946	-2.400
1767	Peace	0.000	0.000	0.000	0.012	0.000	0.988	0.000	-1.307	1.498
1769	Peace	0.000	0.000	0.000	0.002	0.000	0.997	0.000	-1.337	2.469
1906	Peace	0.068	0.000	0.000	0.275	0.000	0.627	0.030	-0.019	-1.144
1907	Peace	0.001	0.000	0.000	0.022	0.000	0.965	0.013	-0.021	0.676
2124	Peace	0.000	0.000	0.000	0.022	0.000	0.976	0.002	-0.649	0.878
2130	Peace	0.001	0.000	0.000	0.054	0.000	0.942	0.003	-0.660	0.311
2166	Peace	0.000	0.000	0.000	0.012	0.000	0.979	0.008	-0.075	1.064
2167	Peace	0.000	0.000	0.000	0.011	0.000	0.989	0.000	-1.070	1.471
2168	Peace	0.001	0.000	0.000	0.033	0.000	0.958	0.008	-0.241	0.487
2169	Peace	0.002	0.000	0.000	0.083	0.000	0.909	0.006	-0.488	-0.029
2171	Peace	0.000	0.000	0.000	0.002	0.000	0.997	0.001	-0.477	2.407
2173	Peace	0.001	0.000	0.000	0.013	0.000	0.973	0.013	0.064	0.965
2432	Peace	0.000	0.000	0.000	0.023	0.000	0.977	0.000	-1.756	1.227
2633	Peace	0.023	0.000	0.000	0.010	0.000	0.640	0.327	1.320	0.450
2693	Beatton	0.967	0.000	0.000	0.000	0.018	0.000	0.016	3.471	-3.833
2709	Peace	0.000	0.000	0.000	0.004	0.000	0.996	0.000	-1.161	2.122
2904	Peace	0.007	0.000	0.000	0.033	0.000	0.911	0.048	0.398	0.245
2942	Peace	0.000	0.000	0.000	0.016	0.000	0.984	0.001	-0.967	1.199
3035	Peace	0.279	0.000	0.000	0.223	0.000	0.408	0.091	0.481	-1.442
3176	Peace	0.000	0.000	0.000	0.039	0.000	0.959	0.002	-0.820	0.578
3300	Beatton	0.573	0.000	0.000	0.002	0.006	0.009	0.410	2.517	-1.491
3301	Peace	0.000	0.000	0.000	0.003	0.000	0.997	0.000	-1.012	2.215
3384	Peace	0.001	0.000	0.000	0.011	0.000	0.954	0.033	0.428	0.928
3468	Peace	0.021	0.000	0.000	0.076	0.000	0.851	0.051	0.303	-0.277
3646	Peace	0.001	0.000	0.000	0.006	0.000	0.966	0.027	0.445	1.310
3653	Peace	0.001	0.000	0.000	0.127	0.000	0.871	0.001	-1.163	-0.093
3733	Peace	0.000	0.000	0.000	0.005	0.000	0.995	0.000	-1.824	2.230
4009	Peace	0.000	0.000	0.000	0.007	0.000	0.993	0.000	-1.051	1.725
4250	Peace	0.000	0.000	0.000	0.003	0.000	0.997	0.001	-0.747	2.247
4505	Peace	0.000	0.000	0.000	0.002	0.000	0.998	0.000	-1.444	2.749
4506	Peace	0.000	0.000	0.000	0.002	0.000	0.997	0.000	-0.961	2.404
4507	Peace	0.000	0.000	0.000	0.001	0.000	0.999	0.000	-1.086	2.812
4555	Peace	0.000	0.000	0.000	0.015	0.000	0.982	0.003	-0.501	1.053
4560	Peace	0.092	0.000	0.000	0.047	0.000	0.619	0.243	0.986	-0.396
4603	Peace	0.004	0.000	0.000	0.029	0.000	0.938	0.029	0.236	0.390
4616	Peace	0.001	0.000	0.000	0.013	0.000	0.961	0.024	0.292	0.884

	Predicted class	Pr(Beatton)	Pr(Chowade/ Cypress/ Fiddes)	Pr(Colt/ Kobes)	Pr(Halfway Main)	Pr(Moberly)	Pr(Peace)	Pr(Pine)	F1	F2
4693	Peace	0.001	0.000	0.000	0.018	0.000	0.969	0.012	-0.015	0.792
4694	Peace	0.330	0.000	0.000	0.113	0.000	0.367	0.190	0.866	-1.215
4705	Peace	0.000	0.000	0.000	0.008	0.000	0.988	0.004	-0.265	1.404
4732	Peace	0.013	0.000	0.000	0.140	0.000	0.830	0.017	-0.183	-0.506
4735	Peace	0.001	0.000	0.000	0.023	0.000	0.969	0.007	-0.211	0.716
5072	Peace	0.169	0.000	0.000	0.095	0.000	0.550	0.186	0.805	-0.844
5095	Peace	0.000	0.000	0.000	0.014	0.000	0.986	0.000	-1.179	1.352
5096	Peace	0.000	0.000	0.000	0.010	0.000	0.990	0.000	-1.365	1.613
5165	Peace	0.000	0.000	0.000	0.002	0.000	0.997	0.001	-0.594	2.295
5293	Peace	0.116	0.000	0.000	0.031	0.000	0.491	0.362	1.236	-0.364
5324	Peace	0.000	0.000	0.000	0.017	0.000	0.982	0.001	-0.787	1.085
5353	Peace	0.000	0.000	0.000	0.004	0.000	0.995	0.001	-0.878	1.967
5702	Peace	0.000	0.000	0.000	0.011	0.000	0.989	0.000	-1.166	1.496
6010	Peace	0.000	0.000	0.000	0.008	0.000	0.980	0.012	0.121	1.267
6011	Peace	0.000	0.000	0.000	0.010	0.000	0.983	0.007	-0.107	1.192
6178	Peace	0.000	0.000	0.000	0.001	0.000	0.999	0.000	-0.967	3.016
6316	Pine	0.059	0.000	0.000	0.006	0.000	0.314	0.620	1.764	0.183
6708	Peace	0.000	0.000	0.000	0.004	0.000	0.995	0.000	-1.191	2.056

XLSTAT 2019.3.2.61545 - Discriminant Analysis (DA)
Prior probabilities are taken into account
Significance level (%): 5



Confusion matrix for the training sample:

from \ to	Chowade/Cypress/Fiddes	Colt/Kobes	Farrell	Halfway Main	Peace	Total	% correct
Chowade/Cypress/Fiddes	10	0	0	2	0	12	83.33%
Colt/Kobes	0	15	0	0	0	15	100.00%
Farrell	0	0	2	0	3	5	40.00%
Halfway Ma	2	0	1	19	23	45	42.22%
Peace	0	0	0	1	190	191	99.48%
Total	12	15	3	22	216	268	88.06%

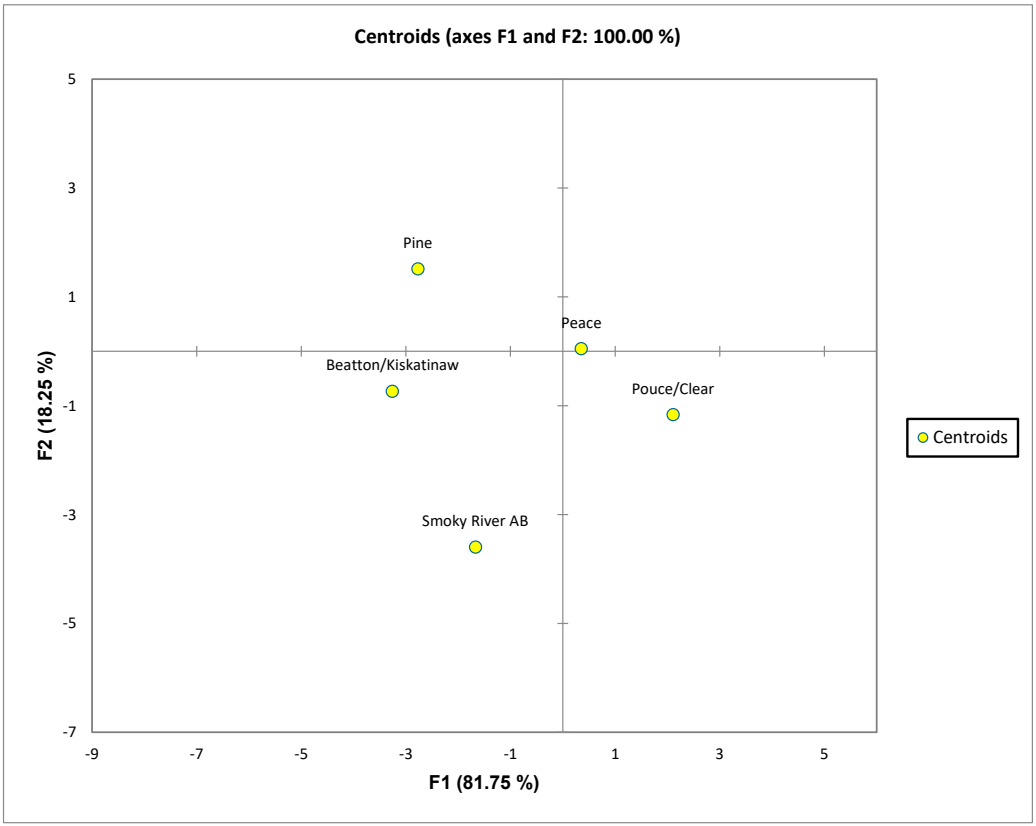
Results for the natal prediction sample:

	Predicted class	Pr(Chowade/ Cypress/Fiddes)	Pr(Colt/ Kobes)	Pr(Farrell)	Pr(Halfway Main)	Pr(Peace)	F1	F2
1491	Colt/Kobes	0.000	0.658	0.341	0.001	0.000	-5.010	-2.279
1736	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-7.140	-0.756
1717	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-8.800	0.661
1663	Farrell	0.000	0.346	0.648	0.006	0.000	-4.769	-2.377
788	Chowade/Cypress/Fiddes	0.933	0.000	0.000	0.067	0.000	-2.456	-4.989
548	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-6.257	-3.493
1920	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-9.244	-3.275
1787	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-9.120	0.244
1921	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-6.029	-4.668
1654	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-8.216	-2.727
1996	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-8.048	-3.889
1712	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-8.507	-3.097
877	Farrell	0.000	0.002	0.927	0.063	0.009	-3.878	-1.989
3870	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-6.810	-0.581
1430	Farrell	0.000	0.001	0.752	0.232	0.015	-3.672	-2.424

Results for the first summer prediction sample:

	Predicted class	Pr(Chowade/ Cypress/Fiddes)	Pr(Colt/ Kobes)	Pr(Farrell)	Pr(Halfway Main)	Pr(Peace)	F1	F2
1491	Colt/Kobes	0.000	0.999	0.001	0.000	0.000	-6.148	-2.013
1736	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-7.341	-0.820
1717	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-7.740	-1.524
1663	Colt/Kobes	0.000	0.989	0.011	0.000	0.000	-5.447	-3.267
788	Chowade/Cypress/Fiddes	0.992	0.000	0.000	0.008	0.000	-1.541	-5.336
548	Colt/Kobes	0.000	0.995	0.005	0.000	0.000	-6.279	-0.184
1920	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-9.941	-1.827
1787	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-8.931	0.296
1921	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-8.191	2.506
1654	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-7.758	-2.081
1996	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-9.313	-4.126
1712	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-8.164	-1.898
877	Farrell	0.000	0.001	0.994	0.002	0.003	-4.105	-0.589
3870	Colt/Kobes	0.000	1.000	0.000	0.000	0.000	-8.011	-0.839
1430	Halfway Main	0.001	0.000	0.001	0.844	0.153	-0.927	-2.022

XLSTAT 2019.3.2.61545 - Discriminant Analysis (DA)
Prior probabilities are taken into account
Significance level (%): 5



Confusion matrix for the training sample:

from \ to	Beatton/ Kiskatkinaw	Peace	Pine	Pouce/Clear	Smoky River	Total	% correct
Beatton/Kisk	16	5	1	0	0	22	72.73%
Peace	1	280	2	1	1	285	98.25%
Pine	2	1	11	0	0	14	78.57%
Pouce/Clear	0	6	0	1	0	7	14.29%
Smoky River	1	0	0	0	2	3	66.67%
Total	20	292	14	2	3	331	93.66%

Results for the natal prediction sample:

	Predicted class	Pr(Beatton/ Kiskatinaw)	Pr(Peace)	Pr(Pine)	Pr(Pouce/ Clear)	Pr(Smoky River)	F1	F2
787	Peace	0.031	0.962	0.001	0.001	0.005	-0.974	-1.423
124	Smoky River	0.280	0.042	0.000	0.000	0.678	-2.116	-2.979
377	Smoky River	0.000	0.000	0.000	0.000	1.000	-0.096	-5.863
479	Pouce/Clear	0.000	0.022	0.000	0.978	0.000	4.636	-1.829
535	Pouce/Clear	0.000	0.008	0.000	0.991	0.001	3.332	-4.496
540	Peace	0.000	0.967	0.000	0.033	0.000	1.343	-0.663
696	Peace	0.005	0.986	0.009	0.000	0.000	-0.861	0.387
718	Peace	0.001	0.994	0.000	0.004	0.000	-0.125	-1.115
806	Beatton/Kisk	0.681	0.248	0.070	0.000	0.001	-2.395	-0.557
870	Peace	0.000	0.995	0.000	0.005	0.000	0.519	-0.290
882	Smoky River	0.000	0.000	0.000	0.001	0.999	0.850	-6.787
969	Peace	0.000	0.911	0.000	0.089	0.000	1.757	-0.935
994	Pouce/Clear	0.000	0.041	0.000	0.760	0.199	1.988	-4.926
999	Pouce/Clear	0.000	0.065	0.000	0.935	0.000	4.329	-1.329
1016	Smoky River	0.000	0.000	0.000	0.000	1.000	-0.010	-13.893
1020	Beatton/Kisk	0.981	0.000	0.000	0.000	0.018	-4.542	-2.626
1079	Pouce/Clear	0.000	0.115	0.000	0.885	0.000	3.803	-1.579
1096	Peace	0.003	0.737	0.000	0.038	0.222	-0.057	-3.028
1267	Peace	0.000	0.969	0.000	0.031	0.000	1.606	-0.244
1292	Pouce/Clear	0.000	0.006	0.000	0.994	0.000	5.870	-1.113
1392	Beatton/Kisk	0.953	0.001	0.001	0.000	0.045	-3.561	-2.404
1394	Beatton/Kisk	0.985	0.003	0.004	0.000	0.008	-3.461	-1.746
1494	Pouce/Clear	0.000	0.012	0.000	0.988	0.000	4.519	-2.461
1512	Peace	0.000	0.914	0.000	0.086	0.000	2.441	0.084
1540	Beatton/Kisk	0.636	0.326	0.035	0.000	0.003	-2.230	-0.879
1561	Peace	0.023	0.864	0.000	0.007	0.106	-0.703	-2.422
1608	Pouce/Clear	0.000	0.196	0.000	0.789	0.015	1.924	-3.752
1652	Pouce/Clear	0.000	0.233	0.000	0.767	0.000	4.815	0.585
1667	Smoky River	0.000	0.002	0.000	0.090	0.908	1.742	-6.044
1670	Peace	0.000	0.972	0.000	0.028	0.000	1.858	0.217
1694	Peace	0.008	0.990	0.001	0.001	0.000	-0.689	-0.912
1700	Peace	0.010	0.987	0.001	0.001	0.001	-0.761	-0.929
1737	Beatton/Kisk	0.977	0.000	0.000	0.000	0.023	-5.350	-3.163
1776	Smoky River	0.000	0.000	0.000	0.000	1.000	0.155	-7.330
1834	Smoky River	0.036	0.100	0.000	0.001	0.863	-1.237	-3.293
1949	Smoky River	0.000	0.000	0.000	0.001	0.999	1.457	-7.505
1956	Peace	0.199	0.694	0.001	0.001	0.105	-1.442	-2.070
2140	Peace	0.006	0.979	0.015	0.000	0.000	-0.938	0.557
2179	Smoky River	0.000	0.044	0.000	0.087	0.869	0.872	-4.691
2230	Peace	0.000	0.499	0.000	0.358	0.143	1.034	-3.618
2261	Peace	0.000	0.873	0.000	0.126	0.001	1.184	-2.081
2476	Pouce/Clear	0.000	0.026	0.000	0.973	0.001	2.897	-4.200
2576	Beatton/Kisk	0.563	0.005	0.000	0.000	0.431	-2.884	-3.004
2896	Peace	0.000	0.906	0.000	0.094	0.000	2.344	-0.140
2949	Peace	0.000	0.604	0.000	0.396	0.000	4.476	1.420
3013	Pouce/Clear	0.000	0.015	0.000	0.985	0.000	5.856	-0.386

	Predicted class	Pr(Beatton/ Kiskatinaw)	Pr(Peace)	Pr(Pine)	Pr(Pouce/ Clear)	Pr(Smoky River)	F1	F2
3086	Peace	0.000	0.972	0.000	0.025	0.003	0.306	-1.930
3142	Peace	0.005	0.992	0.000	0.002	0.001	-0.503	-1.186
3223	Pouce/Clear	0.000	0.011	0.000	0.989	0.000	5.096	-1.760
3286	Peace	0.000	0.960	0.000	0.040	0.000	0.969	-1.377
3578	Peace	0.002	0.967	0.000	0.019	0.012	-0.017	-2.182
3620	Peace	0.000	0.823	0.000	0.176	0.000	1.536	-1.900
3672	Peace	0.101	0.822	0.077	0.000	0.000	-1.696	0.179
3898	Pouce/Clear	0.000	0.026	0.000	0.974	0.000	3.898	-2.732
3998	Peace	0.000	0.919	0.000	0.081	0.000	1.448	-1.294
4034	Pouce/Clear	0.000	0.010	0.000	0.990	0.000	5.458	-1.290
4170	Peace	0.000	0.895	0.000	0.105	0.000	2.129	-0.549
4172	Peace	0.003	0.994	0.000	0.002	0.000	-0.419	-1.036
4202	Smoky River	0.000	0.000	0.000	0.000	1.000	0.262	-8.008
4328	Smoky River	0.000	0.000	0.000	0.000	1.000	-0.674	-7.437
4376	Pouce/Clear	0.000	0.245	0.000	0.755	0.000	3.783	-0.854
4410	Peace	0.000	0.686	0.000	0.314	0.000	2.377	-1.311
4491	Pouce/Clear	0.000	0.091	0.000	0.909	0.000	3.906	-1.642
4501	Smoky River	0.000	0.000	0.000	0.000	1.000	0.286	-7.749
4535	Peace	0.000	0.642	0.000	0.358	0.000	2.441	-1.379
4579	Beatton/Kisk	0.546	0.000	0.000	0.000	0.454	-4.329	-3.835
4608	Peace	0.000	0.884	0.000	0.110	0.007	0.812	-2.495
4683	Smoky River	0.000	0.000	0.000	0.000	1.000	-1.461	-10.471
4766	Pouce/Clear	0.000	0.045	0.000	0.955	0.000	5.964	0.711
4844	Beatton/Kisk	0.774	0.019	0.001	0.000	0.206	-2.705	-2.535
4867	Peace	0.000	0.833	0.000	0.167	0.000	1.946	-1.251
4883	Peace	0.000	0.761	0.000	0.239	0.000	4.482	2.036
4954	Peace	0.000	0.978	0.000	0.022	0.000	0.790	-1.111
4966	Peace	0.000	0.902	0.000	0.098	0.000	1.538	-1.334
5018	Smoky River	0.000	0.000	0.000	0.000	1.000	-0.080	-7.637
5064	Pouce/Clear	0.000	0.320	0.000	0.680	0.000	3.600	-0.810
5140	Peace	0.000	0.875	0.000	0.116	0.009	0.796	-2.572
5150	Pouce/Clear	0.000	0.008	0.000	0.992	0.000	4.508	-2.835
5160	Peace	0.000	0.986	0.000	0.014	0.000	0.770	-0.793
5175	Pouce/Clear	0.000	0.025	0.000	0.975	0.000	4.549	-1.842
5235	Pouce/Clear	0.000	0.061	0.000	0.939	0.000	4.880	-0.599
5256	Peace	0.000	0.985	0.000	0.015	0.000	1.673	0.486
5289	Peace	0.005	0.990	0.000	0.003	0.001	-0.491	-1.333
5348	Smoky River	0.000	0.000	0.000	0.000	1.000	-0.083	-7.861
5355	Smoky River	0.000	0.000	0.000	0.000	1.000	0.732	-8.141
5361	Peace	0.003	0.595	0.000	0.036	0.366	-0.095	-3.202
5367	Peace	0.003	0.993	0.000	0.003	0.001	-0.406	-1.089
5388	Smoky River	0.000	0.000	0.000	0.021	0.979	1.533	-6.349
5452	Peace	0.000	0.990	0.000	0.010	0.000	0.537	-0.839
5618	Pouce/Clear	0.000	0.465	0.000	0.535	0.000	3.135	-0.976
5747	Peace	0.000	0.506	0.000	0.476	0.017	1.436	-3.261
5766	Peace	0.008	0.928	0.000	0.011	0.053	-0.420	-2.368
5774	Peace	0.000	0.985	0.000	0.015	0.000	0.706	-0.906
5834	Pouce/Clear	0.000	0.182	0.000	0.818	0.000	4.136	-0.651

	Predicted class	Pr(Beatton/ Kiskatinaw)	Pr(Peace)	Pr(Pine)	Pr(Pouce/ Clear)	Pr(Smoky River)	F1	F2
5869	Pouce/Clear	0.000	0.042	0.000	0.958	0.000	5.311	-0.292
5873	Pouce/Clear	0.000	0.279	0.000	0.721	0.000	3.484	-1.141
6149	Peace	0.000	0.989	0.000	0.011	0.000	2.427	1.796
6191	Peace	0.000	0.871	0.000	0.129	0.000	2.312	-0.473
6219	Peace	0.002	0.911	0.000	0.036	0.051	0.062	-2.633
6267	Peace	0.000	0.958	0.000	0.042	0.000	0.792	-1.664
6272	Peace	0.000	0.861	0.000	0.088	0.050	0.450	-2.860
6291	Smoky River	0.000	0.000	0.000	0.000	1.000	0.583	-6.547
6295	Peace	0.462	0.512	0.010	0.000	0.016	-1.910	-1.370
6428	Peace	0.000	0.974	0.000	0.026	0.000	0.740	-1.337
6837	Beatton/Kisk	0.740	0.225	0.008	0.000	0.027	-2.225	-1.571
6875	Peace	0.000	0.975	0.000	0.025	0.000	1.073	-0.813
6881	Beatton/Kisk	0.805	0.002	0.000	0.000	0.192	-3.232	-2.790
6921	Smoky River	0.001	0.008	0.000	0.000	0.990	-0.820	-4.243
7016	Pouce/Clear	0.000	0.018	0.000	0.982	0.000	4.359	-2.378
7029	Peace	0.000	0.614	0.000	0.322	0.064	1.043	-3.348
7042	Smoky River	0.002	0.000	0.000	0.000	0.998	-2.613	-5.191
7070	Smoky River	0.000	0.000	0.000	0.000	1.000	-1.380	-8.758
7108	Smoky River	0.012	0.306	0.000	0.007	0.674	-0.644	-3.247
7279	Smoky River	0.000	0.079	0.000	0.921	0.000	5.065	-0.093
7385	Smoky River	0.009	0.000	0.000	0.000	0.991	-2.511	-4.520
7455	Smoky River	0.002	0.247	0.000	0.022	0.729	-0.136	-3.609
7494	Smoky River	0.000	0.000	0.000	0.006	0.994	1.613	-6.968
7540	Peace	0.000	0.961	0.000	0.039	0.000	2.638	1.058
7600	Peace	0.000	0.950	0.000	0.049	0.001	0.803	-1.793
7666	Peace	0.004	0.937	0.000	0.018	0.041	-0.189	-2.426
7686	Smoky River	0.003	0.008	0.000	0.000	0.988	-1.103	-4.082
7754	Peace	0.000	0.619	0.000	0.300	0.080	0.982	-3.372
7755	Pouce/Clear	0.000	0.149	0.000	0.851	0.000	2.929	-2.589
8229	Peace	0.000	0.998	0.000	0.002	0.000	0.369	0.422
8419	Peace	0.000	0.965	0.000	0.034	0.001	0.617	-1.741
8809	Peace	0.003	0.817	0.000	0.037	0.143	-0.034	-2.891
8842	Peace	0.004	0.989	0.000	0.005	0.002	-0.386	-1.512
8907	Smoky River	0.000	0.000	0.000	0.000	1.000	-1.948	-8.738
8939	Peace	0.000	0.993	0.000	0.007	0.000	0.882	-0.075
9013	Pouce/Clear	0.000	0.248	0.000	0.752	0.000	3.076	-1.857
9032	Peace	0.000	0.776	0.000	0.222	0.001	1.356	-2.398

Results for the first summer prediction sample:

	Predicted class	Pr(Beatton/ Kiskatinaw)	Pr(Peace)	Pr(Pine)	Pr(Pouce/ Clear)	Pr(Smoky River)	F1	F2
787	Peace	0.001	0.996	0.000	0.003	0.000	-0.120	-0.841
124	Peace	0.000	0.806	0.000	0.194	0.000	1.998	-1.330
377	Pouce/Clear	0.000	0.010	0.000	0.737	0.253	2.330	-5.570
479	Peace	0.000	0.966	0.000	0.034	0.000	2.132	0.458
535	Pouce/Clear	0.000	0.081	0.000	0.912	0.007	2.328	-4.020
540	Pouce/Clear	0.000	0.127	0.000	0.873	0.000	2.925	-2.749
696	Peace	0.000	0.996	0.000	0.004	0.000	1.227	0.890

	Predicted class	Pr(Beatton/ Kiskatinaw)	Pr(Peace)	Pr(Pine)	Pr(Pouce/ Clear)	Pr(Smoky River)	F1	F2
718	Peace	0.003	0.995	0.002	0.001	0.000	-0.563	-0.156
806	Peace	0.001	0.997	0.001	0.001	0.000	-0.290	0.046
870	Peace	0.000	0.992	0.000	0.008	0.000	1.095	0.115
882	Smoky River	0.000	0.000	0.000	0.000	1.000	1.123	-7.375
969	Peace	0.000	0.718	0.000	0.282	0.000	3.200	0.002
994	Pouce/Clear	0.000	0.097	0.000	0.903	0.000	2.978	-2.921
999	Peace	0.000	0.901	0.000	0.099	0.000	2.005	-0.677
1016	Smoky River	0.000	0.000	0.000	0.000	1.000	1.075	-7.292
1020	Peace	0.000	0.989	0.000	0.011	0.000	0.796	-0.556
1079	Pouce/Clear	0.000	0.018	0.000	0.982	0.000	5.134	-1.246
1096	Peace	0.002	0.990	0.000	0.006	0.002	-0.225	-1.484
1267	Peace	0.000	0.967	0.000	0.033	0.000	2.181	0.549
1292	Pouce/Clear	0.000	0.070	0.000	0.930	0.000	5.045	-0.239
1392	Peace	0.000	0.969	0.000	0.031	0.000	0.839	-1.348
1394	Peace	0.001	0.995	0.000	0.004	0.000	-0.115	-0.949
1494	Peace	0.000	0.908	0.000	0.092	0.000	1.971	-0.653
1512	Peace	0.000	0.813	0.000	0.187	0.000	2.572	-0.461
1540	Peace	0.024	0.928	0.047	0.000	0.000	-1.343	0.517
1561	Peace	0.003	0.992	0.000	0.004	0.001	-0.350	-1.314
1608	Pouce/Clear	0.000	0.100	0.000	0.898	0.002	2.417	-3.706
1652	Peace	0.000	0.946	0.000	0.054	0.000	2.471	0.545
1667	Smoky River	0.000	0.001	0.000	0.007	0.992	0.764	-5.631
1670	Peace	0.000	0.834	0.000	0.166	0.000	2.732	-0.113
1694	Peace	0.082	0.908	0.008	0.000	0.001	-1.400	-0.786
1700	Peace	0.010	0.983	0.007	0.000	0.000	-0.963	-0.024
1737	Pouce/Clear	0.000	0.284	0.000	0.716	0.000	4.030	-0.328
1776	Smoky River	0.000	0.000	0.000	0.000	1.000	1.876	-8.443
1834	Peace	0.070	0.916	0.013	0.000	0.000	-1.417	-0.505
1949	Smoky River	0.000	0.000	0.000	0.000	1.000	0.009	-8.152
1956	Peace	0.001	0.987	0.012	0.000	0.000	-0.481	1.390
2140	Peace	0.003	0.995	0.001	0.001	0.000	-0.452	-0.590
2179	Smoky River	0.000	0.011	0.000	0.025	0.964	0.718	-5.008
2230	Pouce/Clear	0.000	0.276	0.000	0.537	0.188	1.327	-4.019
2261	Peace	0.000	0.940	0.000	0.059	0.001	0.835	-1.897
2476	Pouce/Clear	0.000	0.025	0.000	0.835	0.140	2.208	-5.085
2576	Peace	0.031	0.867	0.000	0.005	0.097	-0.807	-2.339
2896	Peace	0.000	0.992	0.000	0.008	0.000	1.531	0.798
2949	Peace	0.000	0.972	0.000	0.028	0.000	2.500	1.154
3013	Pouce/Clear	0.000	0.051	0.000	0.949	0.000	5.434	0.045
3086	Peace	0.000	0.982	0.000	0.018	0.000	1.043	-0.603
3142	Peace	0.000	0.994	0.000	0.005	0.000	0.189	-0.806
3223	Pouce/Clear	0.000	0.004	0.000	0.996	0.000	5.906	-1.374
3286	Pouce/Clear	0.000	0.175	0.000	0.825	0.000	3.498	-1.612
3578	Peace	0.003	0.929	0.000	0.022	0.046	-0.134	-2.490
3620	Pouce/Clear	0.000	0.283	0.000	0.717	0.000	2.540	-2.482
3672	Peace	0.038	0.949	0.013	0.000	0.000	-1.284	-0.270
3898	Pouce/Clear	0.000	0.012	0.000	0.988	0.000	4.398	-2.639
3998	Peace	0.000	0.826	0.000	0.174	0.000	2.687	-0.226

	Predicted class	Pr(Beatton/ Kiskatinaw)	Pr(Peace)	Pr(Pine)	Pr(Pouce/ Clear)	Pr(Smoky River)	F1	F2
4034	Pouce/Clear	0.000	0.004	0.000	0.996	0.000	6.308	-0.816
4170	Peace	0.000	0.994	0.000	0.006	0.000	1.201	0.549
4172	Peace	0.000	0.996	0.000	0.003	0.000	0.340	-0.224
4202	Smoky River	0.000	0.000	0.000	0.000	1.000	0.051	-8.180
4328	Smoky River	0.000	0.000	0.000	0.000	1.000	0.048	-7.753
4376	Peace	0.000	0.972	0.000	0.028	0.000	2.451	1.064
4410	Peace	0.000	0.971	0.000	0.029	0.000	1.309	-0.594
4491	Peace	0.000	0.931	0.000	0.069	0.000	1.901	-0.497
4501	Smoky River	0.000	0.000	0.000	0.000	1.000	1.535	-8.137
4535	Peace	0.016	0.959	0.000	0.004	0.020	-0.687	-1.948
4579	Pouce/Clear	0.000	0.041	0.000	0.959	0.000	4.095	-2.065
4608	Peace	0.000	0.656	0.000	0.344	0.000	2.166	-1.729
4683	Smoky River	0.000	0.000	0.000	0.000	1.000	0.519	-8.063
4766	Peace	0.000	0.987	0.000	0.013	0.000	2.905	2.365
4844	Peace	0.000	0.908	0.000	0.092	0.000	2.606	0.264
4867	Peace	0.000	0.971	0.000	0.029	0.000	0.957	-1.112
4883	Peace	0.000	0.998	0.000	0.002	0.000	2.227	3.081
4954	Peace	0.000	0.671	0.000	0.329	0.000	3.143	-0.261
4966	Peace	0.000	0.916	0.000	0.084	0.000	1.657	-1.026
5018	Smoky River	0.000	0.000	0.000	0.000	1.000	0.159	-6.932
5064	Pouce/Clear	0.000	0.176	0.000	0.824	0.000	4.111	-0.723
5140	Peace	0.000	0.551	0.000	0.449	0.000	2.526	-1.570
5150	Pouce/Clear	0.000	0.021	0.000	0.928	0.051	2.445	-4.994
5160	Peace	0.001	0.997	0.000	0.002	0.000	-0.088	-0.547
5175	Pouce/Clear	0.000	0.030	0.000	0.970	0.000	3.892	-2.641
5235	Peace	0.000	0.951	0.000	0.049	0.000	2.264	0.324
5256	Peace	0.001	0.969	0.000	0.021	0.009	0.076	-2.135
5289	Peace	0.000	0.972	0.000	0.027	0.000	0.654	-1.497
5348	Smoky River	0.000	0.000	0.000	0.000	1.000	1.527	-8.365
5355	Smoky River	0.000	0.000	0.000	0.003	0.997	1.208	-6.678
5361	Smoky River	0.000	0.022	0.000	0.040	0.938	0.732	-4.825
5367	Peace	0.001	0.984	0.000	0.012	0.003	-0.005	-1.786
5388	Smoky River	0.000	0.000	0.000	0.000	1.000	1.178	-8.527
5452	Peace	0.000	0.894	0.000	0.106	0.000	1.828	-0.988
5618	Peace	0.000	0.954	0.000	0.046	0.000	2.403	0.586
5747	Peace	0.000	0.842	0.000	0.120	0.038	0.622	-2.884
5766	Pouce/Clear	0.000	0.385	0.000	0.615	0.000	2.236	-2.544
5774	Peace	0.000	0.976	0.000	0.024	0.000	0.866	-1.096
5834	Pouce/Clear	0.000	0.016	0.000	0.984	0.000	4.863	-1.768
5869	Pouce/Clear	0.000	0.026	0.000	0.974	0.000	5.968	0.262
5873	Peace	0.000	0.915	0.000	0.085	0.000	1.749	-0.902
6149	Peace	0.000	0.996	0.000	0.004	0.000	1.754	1.737
6191	Peace	0.000	0.960	0.000	0.040	0.000	1.854	-0.090
6219	Pouce/Clear	0.000	0.104	0.000	0.896	0.000	3.335	-2.346
6267	Pouce/Clear	0.000	0.410	0.000	0.590	0.000	2.894	-1.509
6272	Peace	0.002	0.950	0.000	0.025	0.022	0.022	-2.373
6291	Smoky River	0.000	0.006	0.000	0.004	0.990	0.136	-4.855
6295	Peace	0.013	0.983	0.001	0.002	0.001	-0.780	-1.175

	Predicted class	Pr(Beatton/ Kiskatinaw)	Pr(Peace)	Pr(Pine)	Pr(Pouce/ Clear)	Pr(Smoky River)	F1	F2
6428	Peace	0.016	0.981	0.002	0.001	0.001	-0.915	-0.850
6837	Peace	0.006	0.991	0.003	0.001	0.000	-0.766	-0.295
6875	Peace	0.000	0.989	0.000	0.010	0.000	0.159	-1.351
6881	Beatton/Kisk	0.980	0.006	0.007	0.000	0.006	-3.297	-1.520
6921	Peace	0.000	0.791	0.000	0.209	0.000	1.664	-1.889
7016	Pouce/Clear	0.000	0.008	0.000	0.992	0.000	4.225	-3.221
7029	Peace	0.002	0.854	0.000	0.040	0.104	0.026	-2.825
7042	Pouce/Clear	0.000	0.013	0.000	0.854	0.133	2.404	-5.359
7070	Smoky River	0.000	0.000	0.000	0.000	1.000	-0.687	-7.249
7108	Peace	0.000	0.944	0.000	0.056	0.000	1.455	-0.963
7279	Peace	0.000	0.634	0.000	0.366	0.000	2.834	-0.844
7385	Smoky River	0.000	0.000	0.000	0.000	0.999	-0.126	-5.439
7455	Pouce/Clear	0.000	0.134	0.000	0.866	0.000	2.860	-2.795
7494	Smoky River	0.000	0.000	0.000	0.000	1.000	-1.057	-9.664
7540	Peace	0.000	0.608	0.000	0.392	0.000	3.981	0.723
7600	Peace	0.000	0.940	0.000	0.059	0.001	0.871	-1.852
7666	Pouce/Clear	0.000	0.082	0.000	0.918	0.000	3.624	-2.139
7686	Pouce/Clear	0.000	0.273	0.000	0.727	0.000	2.586	-2.460
7754	Peace	0.001	0.667	0.000	0.078	0.254	0.247	-3.260
7755	Pouce/Clear	0.000	0.190	0.000	0.810	0.000	3.691	-1.249
8229	Peace	0.000	0.998	0.001	0.001	0.000	-0.027	0.317
8419	Peace	0.000	0.996	0.000	0.004	0.000	0.230	-0.520
8809	Peace	0.000	0.527	0.000	0.473	0.000	2.348	-1.907
8842	Peace	0.000	0.982	0.000	0.018	0.000	0.557	-1.299
8907	Smoky River	0.000	0.000	0.000	0.000	1.000	-1.682	-8.727
8939	Peace	0.000	0.971	0.000	0.029	0.000	1.843	0.176
9013	Peace	0.000	0.833	0.000	0.167	0.000	2.614	-0.289
9032	Peace	0.001	0.971	0.000	0.020	0.008	0.063	-2.101

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APPENDIX C - Predicted Natal and First Summer Habitat

Arctic Grayling Otolith Predicted Natal and First Summer Habitat

			Site-specific Natal % Probability									Site-specific First Summer % Probability								
ID	Capture	Upstream (US)/ Downstream (DS)	Beatton	Chowade/ Cypress/Fiddes	Colt/Kobes	Farrell	Halfway Main	Moberly	Peace	Pine	Predicted Natal	Beatton	Chowade/ Cypress/Fiddes	Colt/Kobes	Farrell	Halfway Main	Moberly	Peace	Pine	Predicted First Summer
3335	Peace R.	US			1%			99%			Moberly R.	<1%			39%		21%	<1%	39%	Moberly R.
3884	Peace R.	US			3%			97%			Moberly R.			4%			96%			Moberly R.
13	Moberly R.	US			21%			79%			Moberly R.			16%			84%			Moberly R.

indicates <0.1% probability

indicates ≥0.1% - <1% probability

percentage probability of manually integrated habitat (suspected error in prediction)

Bull Trout Otolith Summary Habitat

			Site-specific Natal % Probability							Site-specific First Summer % Probability						
ID	Capture	Upstream (US)/ Downstream (DS)	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted Natal	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted First Summer
78	Chowade R.	US	100%		<1%				Chowade/Cypress/Fiddes	98%		2%				Chowade/Cypress/Fiddes
208	Cypress Cr.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
539	Cypress Cr.	US	99%		<1%				Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
540	Cypress Cr.	US	99%		<1%				Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
541	Cypress Cr.	US	99%		<1%				Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
542	Cypress Cr.	US	97%		3%				Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
543	Cypress Cr.	US	99%		<1%				Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
544	Cypress Cr.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
545	Cypress Cr.	US	100%		<1%				Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
546	Cypress Cr.	US	99%		<1%				Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
547	Cypress Cr.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
874	Fiddes Cr.	US	99%		<1%				Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
1154	Chowade R.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes

Bull Trout Fin Ray Summary Habitat

			Site-specific Natal % Probability							Site-specific First Summer % Probability						
ID	Capture	Upstream (US)/ Downstream (DS)	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted Natal	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted First Summer
18	Peace R.	DS	96%		3%			<1%	Chowade/Cypress/Fiddes	56%		39%		4%	<1%	Chowade/Cypress/Fiddes
32	Peace R.	DS	97%		3%				Chowade/Cypress/Fiddes	14%		68%		18%		Halfway Main
66	Peace R.	US	40%		3%	14%		43%	Pine R.	<1%		<1%	45%	<1%	54%	Pine R.
119	Peace R.	US			26%		63%	11%	Halfway Main			4%		96%	<1%	Halfway Main
155	Peace R.	DS	100%						Chowade/Cypress/Fiddes	6%		67%		27%		Halfway Main
158	Peace R.	US	100%		<1%				Chowade/Cypress/Fiddes	100%		<1%				Chowade/Cypress/Fiddes
196	Peace R.	DS	<1%		46%		54%		Halfway Main	8%		68%		24%		Halfway Main
263	Peace R.	US	100%						Chowade/Cypress/Fiddes	60%		15%	<1%	1%	23%	Chowade/Cypress/Fiddes
375	Peace R.	DS	86%			13%		<1%	Chowade/Cypress/Fiddes		<1%		99%		<1%	unknown
484	Peace R.	DS	100%						Chowade/Cypress/Fiddes	97%		3%				Chowade/Cypress/Fiddes
486	Peace R.	DS	4%		65%		31%	<1%	Halfway Main	10%		68%		22%	<1%	Halfway Main
493	Peace R.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
539	Cypress Cr.	US	84%		3%	1%		12%	Chowade/Cypress/Fiddes	61%		34%		4%	<1%	Chowade/Cypress/Fiddes
539	Peace R.	DS		3%		97%			Moberly R.		3%		97%			Moberly R.
540	Cypress Cr.	US	99%		<1%				Chowade/Cypress/Fiddes	97%		2%			<1%	Chowade/Cypress/Fiddes
541	Cypress Cr.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
542	Cypress Cr.	US	100%		<1%				Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
543	Cypress Cr.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
544	Cypress Cr.	US	92%		8%		<1%		Chowade/Cypress/Fiddes	94%		5%			<1%	Chowade/Cypress/Fiddes
545	Cypress Cr.	US	100%		<1%			<1%	Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
546	Cypress Cr.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes

			Site-specific Natal % Probability							Site-specific First Summer % Probability						
ID	Capture	Upstream (US)/ Downstream (DS)	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted Natal	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted First Summer
547	Cypress Cr.	US	100%		<1%				Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
623	Peace R.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
638	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
651	Peace R.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
652	Peace R.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
828	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
869	Peace R.	US	66%		31%		3%	<1%	Chowade/Cypress/Fiddes			7%		93%		Halfway Main
874	Fiddes Cr.	US	49%		<1%	35%		15%	Chowade/Cypress/Fiddes	100%			<1%			Chowade/Cypress/Fiddes
877	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%		<1%				Chowade/Cypress/Fiddes
929	Peace R.	US	99%		<1%				Chowade/Cypress/Fiddes	81%		18%		1%	<1%	Chowade/Cypress/Fiddes
939	Peace R.	DS	100%		<1%				Chowade/Cypress/Fiddes	67%		28%		3%	2%	Chowade/Cypress/Fiddes
1041	Peace R.	US	5%		<1%	71%		24%	Pine R.			2%	6%	4%	88%	Pine R.
1097	Peace R.	DS	100%		<1%				Chowade/Cypress/Fiddes	33%		57%		10%		Halfway Main
1139	Peace R.	DS	97%		3%				Chowade/Cypress/Fiddes	<1%		44%		53%	2%	Halfway Main
1223	Peace R.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
1377	Peace R.	DS			23%		77%		Halfway Main	<1%		51%		48%	<1%	Halfway Main
1560	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
1746	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
1750	Peace R.	US	100%						Chowade/Cypress/Fiddes	100%		<1%				Chowade/Cypress/Fiddes
1870	Peace R.	DS	100%						Chowade/Cypress/Fiddes	99%		<1%				Chowade/Cypress/Fiddes
1892	Peace R.	DS		<1%		99%		<1%	Moberly R.		<1%		97%		3%	Moberly R.
1903	Peace R.	US		98%		2%			Colt/Kobes Cr.			12%		60%	28%	Unknown
1975	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
2221	Peace R.	DS	5%		60%		26%	9%	Halfway Main	8%		64%		23%	5%	Halfway Main
2262	Peace R.	DS	99%		1%				Chowade/Cypress/Fiddes	46%		47%		6%	<1%	Halfway Main
2336	Peace R.	US	100%						Chowade/Cypress/Fiddes	99%		1%				Chowade/Cypress/Fiddes
2444	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
2615	Peace R.	US	3%		54%		28%	15%	Halfway Main			8%		91%	<1%	Halfway Main
2672	Peace R.	DS	100%						Chowade/Cypress/Fiddes	98%		2%				Chowade/Cypress/Fiddes
2710	Peace R.	DS	95%		5%		<1%		Chowade/Cypress/Fiddes			24%		76%		Halfway Main
2765	Peace R.	US			8%		92%		unknown	<1%		51%		48%		Halfway Main
2792	Peace R.	US			7%		91%	2%	unknown			9%		91%	<1%	unknown
3052	Peace R.	DS	99%		<1%				Chowade/Cypress/Fiddes	57%		25%		2%	15%	Chowade/Cypress/Fiddes
3074	Peace R.	DS	100%						Chowade/Cypress/Fiddes	64%		32%		3%	<1%	Chowade/Cypress/Fiddes
3148	Peace R.	DS	99%		1%				Chowade/Cypress/Fiddes	100%		<1%				Chowade/Cypress/Fiddes
3159	Peace R.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
3236	Peace R.	DS	3%		17%	1%	5%	74%	Pine R.	<1%		14%	1%	7%	76%	Pine R.
3334	Peace R.	US	100%						Chowade/Cypress/Fiddes	94%		5%		<1%	<1%	Chowade/Cypress/Fiddes
3377	Peace R.	US	100%						Chowade/Cypress/Fiddes	90%		10%		<1%		Chowade/Cypress/Fiddes
3386	Peace R.	DS	69%		22%		2%	7%	Chowade/Cypress/Fiddes	99%		<1%				Chowade/Cypress/Fiddes
3471	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
3639	Peace R.	US			10%		90%	<1%	unknown			6%		94%		Unknown
3759	Peace R.	DS			<1%		92%	7%	unknown			2%		98%		Unknown
3765	Peace R.	US	68%		28%		3%	1%	Chowade/Cypress/Fiddes	1%		55%		42%	2%	Halfway Main
3785	Peace R.	US	1%	<1%		91%		8%	unknown	2%		56%		40%	2%	Halfway Main
3823	Peace R.	US		27%		73%			Moberly R.		15%		85%			Moberly R.

			Site-specific Natal % Probability							Site-specific First Summer % Probability						
ID	Capture	Upstream (US)/ Downstream (DS)	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted Natal	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted First Summer
4520	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
4637	Peace R.	DS	22%		61%		13%	4%	Halfway Main			7%		93%	<1%	Halfway Main
4657	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
4687	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
4785	Peace R.	US			7%		87%	6%	unknown			4%		96%	<1%	Unknown
4794	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
4812	Peace R.	US	61%		29%		3%	7%	Chowade/Cypress/Fiddes	50%		44%		6%	<1%	Chowade/Cypress/Fiddes
4833	Peace R.	US	7%		5%	12%	<1%	75%	Pine R.				74%		26%	Pine R.
4846	Peace R.	DS	2%		38%		21%	39%	Halfway Main	<1%		50%		45%	4%	Halfway Main
4890	Peace R.	DS		11%		89%			Moberly R.	0%			74%		25%	Moberly R.
4951	Peace R.	US	2%		60%		36%	1%	Halfway Main	<1%		35%		61%	4%	Halfway Main
4983	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
5133	Peace R.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
5172	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%		<1%				Chowade/Cypress/Fiddes
5192	Peace R.	DS	100%						Chowade/Cypress/Fiddes	95%		3%			2%	Chowade/Cypress/Fiddes
5202	Peace R.	DS	92%		7%		<1%	<1%	Chowade/Cypress/Fiddes	77%		21%		2%		Chowade/Cypress/Fiddes
5215	Peace R.	DS	62%		34%		3%	1%	Chowade/Cypress/Fiddes	29%		57%		11%	3%	Halfway Main
5222	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%		0%				Chowade/Cypress/Fiddes
5224	Peace R.	DS	100%						Chowade/Cypress/Fiddes	16%		67%		17%		Halfway Main
5237	Peace R.	DS	<1%		27%		51%	21%	Halfway Main	4%		53%		24%	19%	Halfway Main
5256	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
5278	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
5358	Peace R.	DS	81%		18%		1%		Chowade/Cypress/Fiddes	79%		20%		1%		Chowade/Cypress/Fiddes
5373	Peace R.	DS	14%		67%		19%	<1%	Halfway Main	<1%		44%		49%	6%	Halfway Main
5409	Peace R.	DS	15%		67%		17%		Halfway Main	61%		35%		4%		Chowade/Cypress/Fiddes
5418	Peace R.	US			<1%	52%	<1%	48%	Moberly R.		<1%		99%		<1%	Moberly R.
5532	Peace R.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
5595	Peace R.	DS	98%		2%				Chowade/Cypress/Fiddes	41%		51%		7%	<1%	Halfway Main
5632	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
5692	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
5737	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
5764	Peace R.	US	99%		1%				Chowade/Cypress/Fiddes	52%		43%		5%		Chowade/Cypress/Fiddes
5836	Peace R.	DS	100%						Chowade/Cypress/Fiddes	76%		22%		2%	<1%	Chowade/Cypress/Fiddes
6191	Peace R.	DS			<1%	16%	2%	81%	unknown	100%						Chowade/Cypress/Fiddes
6202	Peace R.	DS	3%		61%		34%	2%	Halfway Main	9%		68%		22%		Halfway Main
6315	Peace R.	DS	100%		<1%				Chowade/Cypress/Fiddes	30%		31%	<1%	4%	34%	Chowade/Cypress/Fiddes
6324	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%	<1%					Chowade/Cypress/Fiddes
6342	Peace R.	DS			<1%	32%	<1%	67%	Pine R.		<1%		99%		<1%	Unknown
6400	Peace R.	DS	56%		39%		4%		Chowade/Cypress/Fiddes	<1%		51%		48%	<1%	Halfway Main
6586	Peace R.	US	7%		67%		26%		Halfway Main			26%		74%		Halfway Main
6602	Peace R.	US	100%						Chowade/Cypress/Fiddes			3%	1%	21%	75%	Unknown
6648	Peace R.	DS	98%		2%				Chowade/Cypress/Fiddes	66%		31%		3%		Chowade/Cypress/Fiddes
6681	Peace R.	DS	26%		4%	15%	<1%	55%	Pine R.	5%		5%	13%	<1%	78%	Pine R.
6687	Peace R.	DS		<1%		98%		2%	unknown			<1%	6%	13%	81%	Pine R.
6701	Peace R.	DS	100%						Chowade/Cypress/Fiddes	81%		18%		1%		Chowade/Cypress/Fiddes
6706	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%		<1%				Chowade/Cypress/Fiddes

			Site-specific Natal % Probability							Site-specific First Summer % Probability						
ID	Capture	Upstream (US)/ Downstream (DS)	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted Natal	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted First Summer
6813	Peace R.	US	93%		3%	<1%		4%	Chowade/Cypress/Fiddes	77%		21%		1%	<1%	Chowade/Cypress/Fiddes
6839	Peace R.	US	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
6854	Peace R.	US	41%		50%		7%	1%	Halfway Main	4%		64%		32%	<1%	Halfway Main
6863	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
6884	Peace R.	US			21%		78%	2%	Halfway Main			9%		91%		Unknown
6891	Peace R.	DS	98%		2%			<1%	Chowade/Cypress/Fiddes	24%		63%		13%	<1%	Halfway Main
6898	Peace R.	DS	100%						Chowade/Cypress/Fiddes	88%		12%		<1%		Chowade/Cypress/Fiddes
6975	Peace R.	DS			33%		66%	<1%	Halfway Main			1%		99%		Unknown
6996	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
7017	Peace R.	DS	100%						Chowade/Cypress/Fiddes	100%						Chowade/Cypress/Fiddes
7022	Peace R.	DS	<1%		48%		51%	<1%	Halfway Main	2%		61%		36%	<1%	Halfway Main
7031	Peace R.	DS	100%		<1%				Chowade/Cypress/Fiddes	98%		2%				Chowade/Cypress/Fiddes
7146	Peace R.	US			13%		86%	<1%	unknown			16%		83%	<1%	Unknown
7186	Peace R.	US	96%		2%			2%	Chowade/Cypress/Fiddes	3%		16%	1%	5%	75%	Unknown
7213	Peace R.	US	75%		23%		2%		Chowade/Cypress/Fiddes	<1%		46%		53%	<1%	Halfway Main
7243	Peace R.	US	100%						Chowade/Cypress/Fiddes	77%		21%		2%		Chowade/Cypress/Fiddes
7394	Peace R.	US			24%		76%	<1%	Halfway Main			9%		90%	1%	Unknown
7450	Peace R.	US	100%						Chowade/Cypress/Fiddes			<1%	12%	2%	85%	Unknown
7496	Peace R.	DS	99%		<1%			<1%	Chowade/Cypress/Fiddes	97%		3%				Chowade/Cypress/Fiddes
7531	Peace R.	DS	100%		<1%				Chowade/Cypress/Fiddes	85%		14%		<1%	<1%	Chowade/Cypress/Fiddes
7790	Peace R.	US	97%		3%			<1%	Chowade/Cypress/Fiddes	<1%		43%		56%	1%	Halfway Main
8898	Peace R.	DS	100%		<1%				Chowade/Cypress/Fiddes	100%		<1%				Chowade/Cypress/Fiddes
8973	Peace R.	DS			20%		65%	14%	Halfway Main	2%		46%		32%	20%	Halfway Main
9062	Peace R.	US	7%		67%		25%		Halfway Main	<1%		44%		56%		Halfway Main
9270	Peace R.	US	<1%		37%		43%	20%	Halfway Main			5%		85%	10%	Unknown
9374	Peace R.	US			15%		84%	<1%	unknown			31%		69%		Halfway Main

indicates <0.1% probability

indicates ≥0.1% - <1% probability

percentage probability of manually integrated habitat (suspected error in prediction)

Goldeye Fin Ray Predicted Natal and First Summer Habitat

			Site-specific Natal % Probability							Site-specific First Summer % Probability						
ID	Capture	Upstream (US)/ Downstream (DS)	Beatton	Kiskatinaw	Peace	Pine	Pouce/Clear	Smoky	Predicted Natal	Beatton	Kiskatinaw	Peace	Pine	Pouce/Clear	Smoky	Predicted First Summer
2	Peace R.	DS						100%	Smoky R.						100%	Smoky R.
58	Peace R.	DS						100%	Smoky R.						100%	Smoky R.
1028	Peace R.	DS						100%	Smoky R.						100%	Smoky R.
1369	Peace R.	DS						100%	Smoky R.						100%	Smoky R.
2430	Peace R.	DS						100%	Smoky R.						100%	Smoky R.
2498	Peace R.	DS						100%	Smoky R.						100%	Smoky R.
2901	Peace R.	DS						100%	Smoky R.						100%	Smoky R.
4553	Peace R.	DS			<1%		2%	98%	Smoky R.					<1%	100%	Smoky R.
4562	Peace R.	DS						100%	Smoky R.						100%	Smoky R.
4617	Peace R.	DS						100%	Smoky R.						100%	Smoky R.
5035	Peace R.	DS						100%	Smoky R.						100%	Smoky R.
6670	Peace R.	DS						100%	Smoky R.						100%	Smoky R.
6671	Peace R.	DS						100%	Smoky R.						100%	Smoky R.

indicates <0.1% probability

indicates ≥0.1% - <1% probability

percentage probability of manually integrated habitat (suspected error in prediction)

			Site-specific Natal % Probability								Site-specific First Summer % Probability							
ID	Capture	Upstream (US)/ Downstream (DS)	Beatton	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted Natal	Beatton	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted First Summer
28	Peace R.	US	65%				29%		6%	Beatton R.						100%		Peace R.
44	Pine R.	DS	<1%			<1%		66%	33%	Pine R.	4%			<1%		36%	60%	Pine R.
45	Pine R.	DS				<1%		100%		Peace R.				2%		97%	<1%	Peace R.
46	Pine R.	DS	3%			8%		82%	7%	Peace R.						100%		Peace R.
47	Pine R.	DS	93%			<1%		<1%	7%	Beatton R.	<1%			2%		90%	8%	Peace R.
48	Pine R.	DS	62%			<1%	<1%	2%	35%	Beatton R.				<1%		98%	2%	Peace R.
49	Pine R.	DS	99%				<1%		<1%	Beatton R.	2%			<1%		47%	51%	Peace R.
117	Peace R.	US	94%			2%		<1%	3%	Beatton R.				<1%		100%		Peace R.
182	Peace R.	US	71%			15%		8%	6%	Beatton R.				<1%		99%		Peace R.
183	Peace R.	US	<1%			7%		91%	2%	Peace R.						100%		Peace R.
229	Peace R.	US				<1%		99%		Peace R.						100%		Peace R.
352	Peace R.	DS	2%			31%		67%	<1%	Peace R.	<1%			3%		90%	7%	Peace R.
470	Colt Cr.	US	26%			44%		27%	3%	Halfway Main				11%		89%		Peace R.
494	Peace R.	DS	87%			1%		1%	11%	Beatton R.	<1%			3%		94%	3%	Peace R.
507	Peace R.	DS	2%		<1%		98%			Moberly R.	80%			4%		4%	12%	Unknown
551	Colt Cr.	US			49%		51%			Colt/Kobes Cr.			63%		37%			Colt/Kobes Cr.
555	Peace R.	US	56%			30%		11%	3%	Beatton R.				<1%		100%		Peace R.
964	Peace R.	DS	93%			<1%			6%	Beatton R.	80%				2%		18%	Beatton R.
989	Peace R.	US	94%				2%		5%	Beatton R.	47%			1%		8%	44%	Beatton R.
996	Peace R.	US	62%				6%	<1%	32%	Beatton R.				<1%		99%	<1%	Peace R.
997	Peace R.	US	2%			38%		60%	<1%	Peace R.				<1%		99%		Peace R.
998	Peace R.	US	48%				20%		32%	Pine R.	2%				<1%	16%	82%	Pine R.
999	Peace R.	US	60%			20%		13%	7%	Beatton R.				4%		96%	<1%	Peace R.
999	Peace R.	US	33%			8%		34%	25%	Peace R.	<1%			20%		79%	<1%	Peace R.
1000	Peace R.	DS			6%		94%			Moberly R.			7%		93%			Moberly R.
1001	Peace R.	DS	2%		<1%		97%			Moberly R.			3%		96%		<1%	Moberly R.
1032	Peace R.	US				<1%		99%	<1%	Peace R.				<1%		100%		Peace R.
1033	Peace R.	US	7%			8%		72%	13%	Peace R.	<1%			2%		96%	2%	Peace R.
1241	Peace R.	DS	89%			4%		2%	5%	Beatton R.				<1%		100%		Peace R.
1328	Peace R.	DS	89%			<1%		<1%	10%	Beatton R.	53%			7%		18%	22%	Beatton R.
1493	Peace R.	DS	94%				3%		3%	Beatton R.	1%			<1%		59%	39%	Peace R.
1540	Peace R.	US	20%			58%		21%	1%	Halfway Main	3%			38%		58%	<1%	Peace R.
1678	Peace R.	DS				<1%		100%		Peace R.				<1%		100%		Peace R.
1718	Peace R.	US	11%			6%		59%	24%	Peace R.	<1%			2%		91%	7%	Peace R.
1719	Peace R.	US	1%			17%		81%	1%	Peace R.				<1%		100%		Peace R.
1721	Peace R.	DS	83%			3%		2%	12%	Beatton R.				2%		98%		Peace R.
1726	Peace R.	DS				4%		96%	<1%	Peace R.				<1%		100%		Peace R.
1727	Peace R.	DS	<1%			2%		96%	2%	Peace R.				<1%		99%	<1%	Peace R.
1751	Peace R.	DS	15%			26%		53%	6%	Peace R.	<1%			17%		83%	<1%	Peace R.
1765	Peace R.	DS	<1%			3%		92%	4%	Peace R.				<1%		100%		Peace R.
1766	Peace R.	DS	97%						3%	Beatton R.	89%			<1%		<1%	10%	Beatton R.
1767	Peace R.	DS	84%			6%		3%	7%	Beatton R.				1%		99%		Peace R.
1769	Peace R.	DS				2%		98%	<1%	Peace R.				<1%		100%		Peace R.
1906	Peace R.	US	1%			29%		69%	<1%	Peace R.	7%			27%		63%	3%	Peace R.
1907	Peace R.	US	100%				<1%			Beatton R.	<1%			2%		96%	1%	Peace R.
2124	Peace R.	US	3%			20%		75%	2%	Peace R.				2%		98%	<1%	Peace R.
2130	Peace R.	US				16%		84%		Peace R.				5%		94%	<1%	Peace R.
2166	Peace R.	US	97%				1%		2%	Beatton R.				1%		98%	<1%	Peace R.

			Site-specific Natal % Probability								Site-specific First Summer % Probability							
ID	Capture	Upstream (US)/ Downstream (DS)	Beatton	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted Natal	Beatton	Chowade/Cypress/ Fiddes	Colt/Kobes	Halfway Main	Moberly	Peace	Pine	Predicted First Summer
2167	Peace R.	US				<1%		99%		Peace R.				1%		99%		Peace R.
2168	Peace R.	US	<1%			4%		94%	1%	Peace R.	<1%			3%		96%	<1%	Peace R.
2169	Peace R.	US	<1%			15%		84%	<1%	Peace R.	<1%			8%		91%	<1%	Peace R.
2171	Peace R.	US	46%		<1%		41%		13%	Beatton R.				<1%		100%	<1%	Peace R.
2173	Peace R.	US	69%			<1%	<1%	<1%	30%	Beatton R.				1%		98%	1%	Peace R.
2432	Peace R.	US	15%			14%		59%	12%	Peace R.				2%		98%		Peace R.
2633	Peace R.	US	51%			9%		21%	19%	Beatton R.	2%			1%		64%	33%	Peace R.
2693	Peace R.	US	100%			<1%			<1%	Beatton R.	97%				2%		1%	Beatton R.
2709	Peace R.	DS	96%				<1%		3%	Beatton R.				<1%		100%		Peace R.
2904	Peace R.	DS	75%			1%		2%	22%	Beatton R.	<1%			3%		91%	5%	Peace R.
2942	Peace R.	DS	44%			4%		17%	35%	Beatton R.				2%		98%		Peace R.
3035	Peace R.	DS				13%		87%		Peace R.	28%			22%		41%	9%	Peace R.
3176	Peace R.	DS	36%			21%		33%	10%	Beatton R.				4%		96%	<1%	Peace R.
3300	Peace R.	US	63%			21%		11%	5%	Beatton R.	57%			<1%	<1%	<1%	41%	Beatton R.
3301	Peace R.	US	99%				<1%			Beatton R.				<1%		100%		Peace R.
3384	Peace R.	US			3%		97%			Moberly R.	<1%			1%		95%	3%	Peace R.
3468	Peace R.	US				2%		98%		Peace R.	2%			8%		85%	5%	Peace R.
3646	Peace R.	US	58%			7%		15%	20%	Beatton R.				<1%		97%	3%	Peace R.
3653	Peace R.	DS	5%			69%		26%	<1%	Halfway Main				13%		87%		Peace R.
3733	Peace R.	US	69%			6%		9%	16%	Beatton R.				<1%		100%		Peace R.
4009	Peace R.	US				2%		97%	<1%	Peace R.				<1%		99%		Peace R.
4250	Peace R.	US				3%		97%	<1%	Peace R.				<1%		100%		Peace R.
4505	Peace R.	DS	24%			9%		46%	21%	Peace R.				<1%		100%		Peace R.
4506	Peace R.	DS				<1%		100%		Peace R.				<1%		100%		Peace R.
4507	Peace R.	DS				<1%		100%		Peace R.				<1%		100%		Peace R.
4555	Peace R.	US	1%			19%		79%	1%	Peace R.				2%		98%	<1%	Peace R.
4560	Peace R.	DS	85%				12%		3%	Beatton R.	9%			5%		62%	24%	Peace R.
4603	Peace R.	DS	90%				7%		3%	Beatton R.	<1%			3%		94%	3%	Peace R.
4616	Peace R.	DS	42%			<1%	<1%	5%	52%	Pine R.	<1%			1%		96%	2%	Peace R.
4693	Peace R.	DS	86%				13%		1%	Beatton R.				2%		97%	1%	Peace R.
4694	Peace R.	DS	47%			3%		14%	36%	Beatton R.	33%			11%		37%	19%	Peace R.
4705	Peace R.	US	<1%			16%		84%	<1%	Peace R.				<1%		99%	<1%	Peace R.
4732	Peace R.	DS	83%				<1%	<1%	16%	Beatton R.	1%			14%		83%	2%	Peace R.
4735	Peace R.	DS	91%			<1%		<1%	8%	Beatton R.				2%		97%	<1%	Peace R.
5072	Peace R.	DS	99%						<1%	Beatton R.	17%			9%		55%	19%	Peace R.
5095	Peace R.	DS	98%			<1%			1%	Beatton R.				1%		99%		Peace R.
5096	Peace R.	DS	94%			<1%		<1%	5%	Beatton R.				<1%		99%		Peace R.
5165	Peace R.	US	45%			<1%	<1%	4%	50%	Pine R.				<1%		100%		Peace R.
5293	Peace R.	DS	90%				2%		8%	Beatton R.	12%			3%		49%	36%	Peace R.
5324	Peace R.	US	82%			3%		3%	12%	Beatton R.				2%		98%	<1%	Peace R.
5353	Peace R.	US				8%		92%	<1%	Peace R.				<1%		100%		Peace R.
5702	Peace R.	US	91%			1%		<1%	7%	Beatton R.				1%		99%		Peace R.
6010	Peace R.	DS				<1%		99%	<1%	Peace R.				<1%		98%	1%	Peace R.
6011	Peace R.	DS	91%			<1%		<1%	8%	Beatton R.				<1%		98%	<1%	Peace R.
6178	Peace R.	DS			4%		86%		10%	Moberly R.						100%		Peace R.
6316	Peace R.	DS	27%			3%		25%	45%	Pine R.	6%			<1%		31%	62%	Pine R.
6708	Peace R.	DS	24%			9%		45%	22%	Peace R.				<1%		100%		Peace R.

indicates <0.1% probability

indicates ≥0.1% - <1% probability

percentage probability of manually integrated habitat (suspected error in prediction)

Rainbow Trout Otolith Predicted Natal and First Summer Habitat

			Site-specific Natal % Probability						Site-specific First Summer % Probability					
ID	Capture	Upstream (US)/ Downstream (DS)	Chowade/Cypress/ Fiddes	Colt/Kobes	Farrell	Halfway Main	Peace	Predicted Natal	Chowade/Cypress/ Fiddes	Colt/Kobes	Farrell	Halfway Main	Peace	Predicted First Summer
548	Cypress Cr.	US		100%				Colt/Kobes Cr.		100%	<1%			Colt/Kobes Cr.
788	Cypress Cr.	US	93%			7%		Chowade/Cypress/Fiddes	99%			<1%		Chowade/Cypress/Fiddes
877	Farrell Cr.	US		<1%	93%	6%	<1%	Unknown		<1%	99%	<1%	<1%	Unknown
1430	Peace R.	DS			75%	23%	2%	Halfway Main	<1%		<1%	84%	15%	Halfway Main
1491	Colt Cr.	US		66%	34%	<1%		Colt/Kobes Cr.		100%				Colt/Kobes Cr.
1654	Kobes Cr.	US		100%				Colt/Kobes Cr.		100%				Colt/Kobes Cr.
1663	Colt Cr.	US		35%	65%	<1%		Colt/Kobes Cr.		99%	1%			Colt/Kobes Cr.
1712	Kobes Cr.	US		100%				Colt/Kobes Cr.		100%				Colt/Kobes Cr.
1717	Colt Cr.	US		100%				Colt/Kobes Cr.		100%				Colt/Kobes Cr.
1736	Colt Cr.	US		100%				Colt/Kobes Cr.		100%				Colt/Kobes Cr.
1787	Kobes Cr.	US		100%				Colt/Kobes Cr.		100%				Colt/Kobes Cr.
1920	Kobes Cr.	US		100%				Colt/Kobes Cr.		100%				Colt/Kobes Cr.
1921	Kobes Cr.	US		100%				Colt/Kobes Cr.		100%				Colt/Kobes Cr.
1996	Kobes Cr.	US		100%				Colt/Kobes Cr.		100%				Colt/Kobes Cr.
3870	Peace R.	US		100%				Colt/Kobes Cr.		100%				Colt/Kobes Cr.

indicates <0.1% probability

indicates ≥0.1% - <1% probability

percentage probability of manually integrated habitat (suspected error in prediction)

Walleye Fin Ray Predicted Natal and First Summer Habitat

			Site-specific Natal % Probability						Site-specific First Summer % Probability					
ID	Capture	Upstream (US)/ Downstream (DS)	Kiskatinaw	Peace	Pine	Pouce/Clear	Smoky	Predicted Natal	Kiskatinaw	Peace	Pine	Pouce/Clear	Smoky	Predicted First Summer
124	Peace R.	DS	28%	4%			68%	Smoky R.		81%		19%		Peace R.
377	Peace R.	DS					100%	Smoky R.		<1%		74%	25%	Smoky R.
479	Peace R.	US		2%		98%		Pouce/Clear Cr.		97%		3%		Peace R.
535	Peace R.	DS		<1%		99%		Pouce/Clear Cr.		8%		91%	<1%	Pouce/Clear Cr.
540	Peace R.	US		97%		3%		Unknown		13%		87%		Pouce/Clear Cr.
696	Peace R.	DS	<1%	99%	<1%			Peace R.		100%		<1%		Peace R.
718	Peace R.	DS	<1%	99%		<1%		Peace R.	<1%	100%	<1%			Peace R.
787	Peace R.	DS	3%	96%		<1%	<1%	Peace R.		100%		<1%		Peace R.
806	Peace R.	DS	68%	25%	7%		<1%	Beatton/Kiskatinaw		100%				Peace R.
870	Peace R.	US		99%		<1%		Peace R.		99%		<1%		Peace R.
882	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
969	Peace R.	DS		91%		9%		Peace R.		72%		28%		Peace R.
994	Peace R.	DS		4%		76%	20%	Pouce/Clear Cr.		10%		90%		Pouce/Clear Cr.
999	Peace R.	US		7%		93%		Pouce/Clear Cr.		90%		10%		Peace R.
1016	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
1020	Peace R.	DS	98%				2%	Beatton/Kiskatinaw		99%		1%		Peace R.
1079	Peace R.	DS		11%		89%		Pouce/Clear Cr.		2%		98%		Pouce/Clear Cr.
1096	Peace R.	DS	<1%	74%		4%	22%	Peace R.	<1%	99%		<1%	<1%	Peace R.
1267	Peace R.	DS		97%		3%		Peace R.		97%		3%		Peace R.
1292	Peace R.	US		<1%		99%		Pouce/Clear Cr.		7%		93%		Pouce/Clear Cr.
1392	Peace R.	DS	95%	<1%			4%	Beatton/Kiskatinaw		97%		3%		Peace R.
1394	Peace R.	DS	98%	<1%	<1%		<1%	Beatton/Kiskatinaw		100%		<1%		Peace R.
1494	Peace R.	DS		1%		99%		Pouce/Clear Cr.		91%		9%		Peace R.
1512	Peace R.	DS		91%		9%		Peace R.		81%		19%		Peace R.
1540	Peace R.	DS	64%	33%	3%		<1%	Beatton/Kiskatinaw	2%	93%	5%			Peace R.
1561	Peace R.	DS	2%	86%		<1%	11%	Peace R.	<1%	99%		<1%	<1%	Peace R.
1608	Peace R.	DS		20%		79%	1%	Pouce/Clear Cr.		10%		90%	<1%	Pouce/Clear Cr.
1652	Peace R.	DS		23%		77%		Pouce/Clear Cr.		95%		5%		Peace R.
1667	Peace R.	DS		<1%		9%	91%	Smoky R.		<1%		<1%	99%	Smoky R.
1670	Peace R.	DS		97%		3%		Peace R.		83%		17%		Peace R.
1694	Peace R.	DS	<1%	99%		<1%		Peace R.	8%	91%	<1%		<1%	Peace R.
1700	Peace R.	DS	<1%	99%		<1%		Peace R.	1%	98%	<1%			Peace R.
1737	Peace R.	DS	98%				2%	Beatton/Kiskatinaw		28%		72%		Peace R.
1776	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
1834	Peace R.	DS	4%	10%			86%	Smoky R.	7%	92%	1%			Peace R.
1949	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
1956	Peace R.	DS	20%	69%	<1%		10%	Peace R.		99%	1%			Peace R.
2140	Peace R.	DS	<1%	98%	1%			Peace R.	<1%	100%		<1%		Peace R.
2179	Peace R.	DS		4%		9%	87%	Smoky R.		1%		3%	96%	Smoky R.
2230	Peace R.	DS		50%		36%	14%	Pouce/Clear Cr.		27%		54%	19%	Pouce/Clear Cr.
2261	Peace R.	DS		87%		13%		Peace R.		94%		6%		Peace R.
2476	Peace R.	US		3%		97%	<1%	Pouce/Clear Cr.		2%		84%	14%	Pouce/Clear Cr.
2576	Peace R.	DS	56%	<1%			43%	Beatton/Kiskatinaw	3%	87%		<1%	10%	Peace R.
2896	Peace R.	DS		91%		9%		Peace R.		99%		<1%		Peace R.
2949	Peace R.	DS		60%		40%		Peace R.		97%		3%		Peace R.
3013	Peace R.	DS		1%		99%		Pouce/Clear Cr.		5%		95%		Pouce/Clear Cr.
3086	Peace R.	DS		97%		2%	<1%	Peace R.		98%		2%		Peace R.
3142	Peace R.	DS	<1%	99%		<1%		Peace R.		99%		<1%		Peace R.
3223	Peace R.	DS		1%		99%		Pouce/Clear Cr.		<1%		100%		Pouce/Clear Cr.
3286	Peace R.	DS		96%		4%		Unknown		18%		82%		Pouce/Clear Cr.

Walleye Fin Ray Predicted Natal and First Summer Habitat

			Site-specific Natal % Probability						Site-specific First Summer % Probability					
ID	Capture	Upstream (US)/ Downstream (DS)	Kiskatinaw	Peace	Pine	Pouce/Clear	Smoky	Predicted Natal	Kiskatinaw	Peace	Pine	Pouce/Clear	Smoky	Predicted First Summer
3578	Peace R.	DS	<1%	97%		2%	1%	Peace R.	<1%	93%		2%	5%	Peace R.
3620	Peace R.	DS		82%		18%		Unknown		28%		72%		Pouce/Clear Cr.
3672	Peace R.	DS	10%	82%	8%			Peace R.	4%	95%	1%			Peace R.
3898	Peace R.	US		3%		97%		Pouce/Clear Cr.		1%		99%		Pouce/Clear Cr.
3998	Peace R.	US		92%		8%		Peace R.		83%		17%		Peace R.
4034	Peace R.	DS		<1%		99%		Pouce/Clear Cr.		<1%		100%		Pouce/Clear Cr.
4170	Peace R.	US		89%		11%		Peace R.		99%		<1%		Peace R.
4172	Peace R.	US	<1%	99%		<1%		Peace R.		100%		<1%		Peace R.
4202	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
4328	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
4376	Peace R.	DS		24%		76%		Pouce/Clear Cr.		97%		3%		Peace R.
4410	Peace R.	US		69%		31%		Peace R.		97%		3%		Peace R.
4491	Peace R.	US		9%		91%		Pouce/Clear Cr.		93%		7%		Peace R.
4501	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
4535	Peace R.	DS		64%		36%		Peace R.	2%	96%		<1%	2%	Peace R.
4579	Peace R.	DS	55%				45%	Beatton/Kiskatinaw		4%		96%		Peace R.
4608	Peace R.	DS		88%		11%	<1%	Peace R.		66%		34%		Peace R.
4683	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
4766	Peace R.	DS		5%		95%		Pouce/Clear Cr.		99%		1%		Peace R.
4844	Peace R.	DS	77%	2%			21%	Beatton/Kiskatinaw		91%		9%		Peace R.
4867	Peace R.	DS		83%		17%		Peace R.		97%		3%		Peace R.
4883	Peace R.	DS		76%		24%		Peace R.		100%		<1%		Peace R.
4954	Peace R.	DS		98%		2%		Peace R.		67%		33%		Peace R.
4966	Peace R.	DS		90%		10%		Peace R.		92%		8%		Peace R.
5018	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
5064	Peace R.	DS		32%		68%		Pouce/Clear Cr.		18%		82%		Pouce/Clear Cr.
5140	Peace R.	DS		88%		12%	<1%	Peace R.		55%		45%		Peace R.
5150	Peace R.	DS		<1%		99%		Pouce/Clear Cr.		2%		93%	5%	Pouce/Clear Cr.
5160	Peace R.	DS		99%		1%		Peace R.		100%		<1%		Peace R.
5175	Peace R.	DS		2%		98%		Pouce/Clear Cr.		3%		97%		Pouce/Clear Cr.
5235	Peace R.	DS		6%		94%		Pouce/Clear Cr.		95%		5%		Peace R.
5256	Peace R.	DS		99%		1%		Peace R.	<1%	97%		2%	<1%	Peace R.
5289	Peace R.	DS	<1%	99%		<1%		Peace R.		97%		3%		Peace R.
5348	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
5355	Peace R.	DS					100%	Smoky R.				<1%	100%	Smoky R.
5361	Peace R.	DS	<1%	60%		3%	37%	Smoky R.		2%		4%	94%	Smoky R.
5367	Peace R.	DS	<1%	99%		<1%		Peace R.	<1%	98%		1%	<1%	Peace R.
5388	Peace R.	DS				2%	98%	Smoky R.					100%	Smoky R.
5452	Peace R.	DS		99%		1%		Peace R.		89%		11%		Peace R.
5618	Peace R.	DS		47%		53%		Pouce/Clear Cr.		95%		5%		Peace R.
5747	Peace R.	DS		51%		47%	2%	Pouce/Clear Cr.		84%		12%	4%	Peace R.
5766	Peace R.	DS	<1%	93%		1%	5%	Unknown		38%		62%		Pouce/Clear Cr.
5774	Peace R.	US		99%		1%		Peace R.		98%		2%		Peace R.
5834	Peace R.	DS		18%		82%		Pouce/Clear Cr.		2%		98%		Pouce/Clear Cr.

Walleye Fin Ray Predicted Natal and First Summer Habitat

			Site-specific Natal % Probability						Site-specific First Summer % Probability					
ID	Capture	Upstream (US)/ Downstream (DS)	Kiskatinaw	Peace	Pine	Pouce/Clear	Smoky	Predicted Natal	Kiskatinaw	Peace	Pine	Pouce/Clear	Smoky	Predicted First Summer
5869	Peace R.	DS		4%		96%		Pouce/Clear Cr.		3%		97%		Pouce/Clear Cr.
5873	Peace R.	US		28%		72%		Pouce/Clear Cr.		92%		8%		Peace R.
6149	Peace R.	US		99%		1%		Peace R.		100%		<1%		Peace R.
6191	Peace R.	US		87%		13%		Peace R.		96%		4%		Peace R.
6219	Peace R.	DS	<1%	91%		4%	5%	Unknown		10%		90%		Pouce/Clear Cr.
6267	Peace R.	DS		96%		4%		Unknown		41%		59%		Pouce/Clear Cr.
6272	Peace R.	DS		86%		9%	5%	Peace R.	<1%	95%		3%	2%	Peace R.
6291	Peace R.	US					100%	Smoky R.		<1%		<1%	99%	Smoky R.
6295	Peace R.	DS	46%	51%	<1%		2%	Peace R.	1%	98%		<1%	<1%	Peace R.
6428	Peace R.	US		97%		3%		Peace R.	2%	98%	<1%			Peace R.
6837	Peace R.	DS	74%	22%	<1%		3%	Beatton/Kiskatinaw	<1%	99%	<1%			Peace R.
6875	Peace R.	US		98%		2%		Peace R.		99%		<1%		Peace R.
6881	Peace R.	US	80%	<1%			19%	Beatton/Kiskatinaw	98%	<1%	<1%		<1%	Beatton/Kiskatinaw
6921	Peace R.	US	<1%	<1%			99%	Smoky R.		79%		21%		Peace R.
7016	Peace R.	DS		2%		98%		Pouce/Clear Cr.		<1%		99%		Pouce/Clear Cr.
7029	Peace R.	DS		62%		32%	6%	Peace R.	<1%	85%		4%	10%	Peace R.
7042	Peace R.	DS	<1%				100%	Smoky R.		1%		86%	13%	Unknown
7070	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
7108	Peace R.	DS	1%	31%		<1%	67%	Smoky R.		94%		6%		Peace R.
7279	Peace R.	US		8%		92%		Pouce/Clear Cr.		63%		37%		Pouce/Clear Cr.
7385	Peace R.	US	<1%				99%	Smoky R.					100%	Smoky R.
7455	Peace R.	US	<1%	25%		2%	73%	Unknown		13%		87%		Pouce/Clear Cr.
7494	Peace R.	DS				<1%	99%	Smoky R.					100%	Smoky R.
7540	Peace R.	DS		96%		4%		Peace R.		61%		39%		Peace R.
7600	Peace R.	US		95%		5%		Peace R.		94%		6%		Peace R.
7666	Peace R.	US	<1%	94%		2%	4%	Unknown		8%		92%		Pouce/Clear Cr.
7686	Peace R.	US	<1%	<1%			99%	Smoky R.		27%		73%		Peace R.
7754	Peace R.	US		62%		30%	8%	Peace R.	<1%	67%		8%	25%	Peace R.
7755	Peace R.	US		15%		85%		Pouce/Clear Cr.		19%		81%		Pouce/Clear Cr.
8229	Peace R.	US		100%		<1%		Peace R.		100%				Peace R.
8419	Peace R.	US		97%		3%		Peace R.		100%		<1%		Peace R.
8809	Peace R.	DS	<1%	82%		4%	14%	Peace R.		53%		47%		Peace R.
8842	Peace R.	DS	<1%	99%		<1%	<1%	Peace R.		98%		2%		Peace R.
8907	Peace R.	DS					100%	Smoky R.					100%	Smoky R.
8939	Peace R.	DS		99%		<1%		Peace R.		97%		3%		Peace R.
9013	Peace R.	DS		25%		75%		Pouce/Clear Cr.		83%		17%		Peace R.
9032	Peace R.	DS		78%		22%		Peace R.	<1%	97%		2%	<1%	Peace R.

indicates <0.1% probability

indicates ≥0.1% - <1% probability

percentage probability of manually integrated habitat (suspected error in prediction)