

Alberta Conservation Association 2017/18 Project Summary Report

Project Name: North Saskatchewan River Drainage Fish Sustainability Index Data Gaps

Fisheries Program Manager: Peter Aku

Project Leader: Chad Judd

Primary ACA staff on project: Andrew Clough, Chad Judd, Bryce O'Connor, Mike Rodtka, and Zachary Spence

Partnerships

Alberta Environment and Parks
Hinton Wood Products – A Division of West Fraser Mills Ltd.

Key Findings

- We captured seven fish species at 52 sites distributed throughout the Blackstone River and Brazeau River tributaries in the upper North Saskatchewan River watershed.
- Bull trout were detected at 33 sites throughout the sampling area.
- The highest relative abundance of bull trout was in Thistle Creek a tributary to the Brazeau River.
- Mountain whitefish was most abundant in the Blackstone River and Wapiabi Creek.

Introduction

Fishery inventories provide resource managers with information on fish abundance, species distribution, and fish habitat. This information is a key component of responsible land-use planning and management if threats to stream health are to be minimized. Alberta Environment and Park's Fish Sustainability Index (FSI) is a standardized process of assessment that provides a landscape-level overview of fish sustainability within the province and enables broad-scale evaluation of management actions and land-use planning (MacPherson et al. 2014). Priority species for FSI assessment known to occur in our study area include bull trout (*Salvelinus confluentus*) and mountain whitefish (*Prosopium williamsoni*) (MacPherson et al. 2014). Collection of data to support FSI development for imperiled native sport species is a priority activity for Alberta Conservation Association (ACA).

Bull trout is classed as *Threatened* in Alberta (Saskatchewan – Nelson rivers populations) (COSEWIC 2012). Bull trout are particularly sensitive to habitat change and are thought to reflect general ecosystem health (COSEWIC 2012). This sensitivity, coupled with the species' relatively wide distribution, makes bull trout an attractive species for monitoring sustainability in headwater streams of the North Saskatchewan River watershed. In 2017, ACA assessed fish distribution and abundance in the Blackstone and Brazeau watersheds.

Methods

To assess sport fish distribution within the upper North Saskatchewan River watershed, we selected sample sites from points placed along third- to fifth-order streams using a spatially balanced design. Priority areas for sampling were identified in consultation with project partners and included upper Blackstone River, Wapiabi Creek, Chungo Creek, Brown Creek, Thistle Creek, and Devil Forks (Figure 1). Each sample area contained eight sites; Wapiabi Creek and Blackstone River had two additional sites added to ensure sampling took place on their mainstems. We sampled the sites using backpack and tote-barge electrofishing gear. Sampling took place from July 7 to August 24, 2017. Sites were 300 m and 500 m in length for backpack and tote-barge sampling, respectively. We enumerated all captured fish by species and measured their fork length (FL; mm). Stream temperature plays an important role in aquatic community processes and has been correlated to specific fish species distribution and abundance (Isaac et al. 2012, Riemen et al. 2007). We monitored summer (July 1 – August 31) stream temperature every hour at stations in each of the streams to describe the thermal habitats available in our study area.

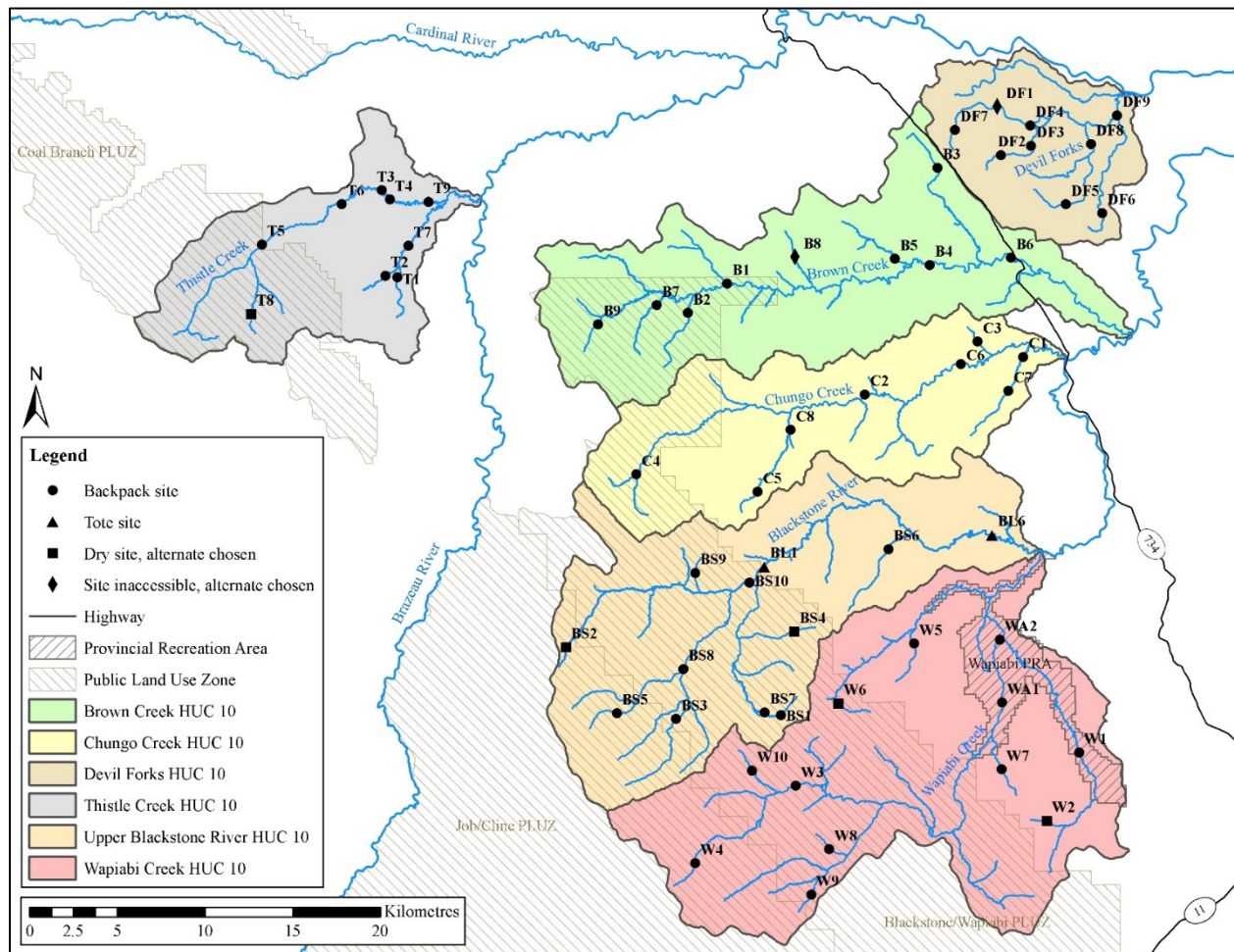


Figure 1. Fish inventory site locations within the sample area in the headwaters of the North Saskatchewan River, 2017.

Results

The 52 sites we sampled resulted in over 53,000 seconds of effort over 15.8 km of stream. We captured 701 fish, including 308 bull trout, and 235 mountain whitefish. Bull trout were detected at 33 sites and in all sample areas (Table 1). Bull trout were most abundant in Thistle Creek and had a mean catch rate of 5.68 fish/100m (Table 2). Mountain whitefish were most abundant in the Blackstone River. Stream water temperatures were coldest in Thistle Creek, having a mean summer temperature below 10°C (Table 3).

Table 1. Number of sites fish were detected per sample area and total catch of fish species during the North Saskatchewan River FSI Data Gaps project using backpack and tote-barge electrofishing gear, July 7 to August 24, 2017. Species codes: BKTR = brook trout, BLTR = bull trout, CTTR = cutthroat trout, LNDC = longnose dace, LNSC = longnose sucker, MNWH = mountain whitefish, SPSC = spoonhead sculpin.

Species	Site detections (n)						Total catch (%)
	Blackstone	Brown	Chungo	Devil Forks	Thistle	Wapiabi	
BKTR	1	5	2	5	0	3	80 (11)
BLTR	5	7	5	4	8	4	308 (44)
CTTR	5	2	2	0	1	3	66 (9)
LNDC	0	0	0	1	0	0	2 (<1)
LNSC	0	0	0	1	0	0	7 (1)
MNWH	4	1	0	1	0	2	235 (34)
SPSC	1	0	0	1	0	1	3 (<1)

Table 2. Bootstrapped mean relative abundance (10,000 replicates) of bull trout and mountain whitefish in each sampling area using backpack and tote-barge electrofishing gear, July 7 to August 24, 2017.

Sample area	Mean catch	
	BLTR/100m (95% CL)	MNWH/100m (95% CL)
Blackstone	1.08 (0.25 - 2.30)	4.38 (0.60 - 8.52)
Brown	1.88 (0.33 - 4.08)	0.17 (0 - 0.50)
Chungo	1.75 (0.67 - 3.08)	-
Devil Forks	0.42 (0.04 - 1.00)	0.04 (0 - 0.13)
Thistle	5.68 (4.04 - 7.58)	-
Wapiabi	1.17 (0.10 - 2.93)	1.36 (0 - 3.23)

Table 3. Summary of stream temperature recorded at 13 stations in the Blackstone and Brazeau watersheds July 1 to August 31, 2017 during the North Saskatchewan River FSI Data Gaps project.

Station	UTM Location NAD 83 Zone 11		Mean \pm SD temperature ($^{\circ}$ C)	Temperature range ($^{\circ}$ C)
	Easting	Northing		
Blackstone 1	545935	5840517	14 \pm 2	8 - 20
Blackstone 3	545619	5829733	12 \pm 2	7 - 19
Blackstone 4	528890	5829009	10 \pm 2	6 - 16
Blackstone 5	552954	5852156	16 \pm 2	10 - 22
Brown 1	542755	5846234	13 \pm 3	7 - 20
Brown 2	532785	5844739	12 \pm 2	7 - 18
Chungo 1	545882	5840552	13 \pm 2	8 - 19
Chungo 2	537683	5839108	11 \pm 3	5 - 18
Devil Forks 1	548814	5854939	13 \pm 2	7 - 19
Thistle 1	503961	5849299	8 \pm 2	4 - 14
Wapiabi 1	540942	5818164	11 \pm 2	6 - 17
Wapiabi 2	544371	5829227	12 \pm 3	7 - 19
Wapiabi 3	545304	5820914	11 \pm 2	6 - 15

Conclusions

Bull trout was the most abundant and widely distributed species captured in the study area. The high relative abundance of bull trout and cold stream temperatures indicate that Thistle Creek is an important spawning stream in the Brazeau watershed. Mountain whitefish were detected in every area except Chungo Creek and Thistle Creek and were most abundant in the Blackstone River. Our study provides current information on stream habitats, and the abundance and distribution of FSI priority species within the Blackstone and Brazeau rivers and surrounding tributaries. This information is useful to land managers when attempting to balance the diverse values of the landbase upon which they operate and critical for the conservation of native fish species particularly sensitive to habitat degradation like bull trout.

Communications

- Submitted data to Alberta Environment and Parks for inclusion in its Fisheries and Wildlife Management Information System database.
- Submitted progress report to Alberta Environment and Parks and Hinton Wood Products.
- Presentations to Edmonton Trout Club and Sundre Forest Products advisory committee.
- Data report to be completed and submitted to Alberta Environment and Parks and Hinton Wood Products.

Literature Cited

- Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2012. COSEWIC assessment and status report on the bull trout *Salvelinus confluentus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario, Canada. 103 pp.
- Isaak, D.J., S. Wollrab, D. Horan, and G. Chandler. 2012. Climate change effects on stream and river temperatures across the northwest U.S. from 1980 – 2009 and implications for salmonid fishes. *Climatic Change* 113: 499–524.
- MacPherson, L., M. Coombs, J. Reilly, M.G. Sullivan and D.J. Park. 2014. A generic rule set for applying the Alberta fish sustainability index, second edition. Environment and Sustainable Resource Development, Edmonton, Alberta, Canada. 51 pp.
- Rieman BE, D.J. Isaak, S. Adams, D. Horan, D. Nagel, C. Luce, and D. Myers. 2007. Anticipated climate warming effects on bull trout habitats and populations across the Interior Columbia River Basin. *Transactions of the American Fisheries Society* 136:1552–1565.

Photos



Alberta Conservation Association staff Andrew Clough and Bryce O'Connor backpack electrofishing in Thistle Creek. Photo: Chad Judd



Alberta Conservation Association staff Andrew Clough, Bryce O'Connor, and Zach Spence backpack electrofishing Wapiabi Creek. Photo: Chad Judd



A bull trout recovers from being handled by the electrofishing crew. Photo Andrew Clough