

Alberta Conservation Association (ACA)

Date: 2014-2015

Project Name: Distribution of Sport Fish in the Waterton River Tailwater, 2014

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Partnerships

- Alberta Environment and Sustainable Resource Development

Key Findings

- Mountain whitefish dominated our catch downstream of Waterton dam.
- Mountain whitefish and brown trout occurred throughout the tailwater, from the dam to the confluence with the Belly River.
- Rainbow trout and lake whitefish, both cold-water species, were concentrated in upper reaches, where a cold-water refuge persists.
- Summer stream temperatures in 2014 remained favourable for brown trout and rainbow trout growth throughout the 60 km tailwater reach.

Introduction

Brown and rainbow trout are popular recreational species in waterbodies across Alberta. Both species grow best when average daily stream temperature remains at or below 20°C during summer months; temperatures exceeding 24°C are considered lethal. In southern Alberta, trout streams often exceed lethal tolerances, approaching 27°C in some tributaries. Tailwaters of some dams can serve as cold-water refuges in reaches that ordinarily would offer marginal angling potential. When a reservoir is deep enough, heavier, colder water resting at the reservoir bottom is released through the dam's outflow providing a constant discharge of cold water that is suitable for tailwater trout populations. The Waterton River downstream of Waterton dam supports introduced brown trout and rainbow trout populations. Daily temperature of the Waterton River upstream of the reservoir approaches 24°C during the hottest summer weather. Downstream of the reservoir, cold water discharged from below the dam cools the tailwater; however, it is unknown how far downstream the cooling, or the trout fishery, extends. The primary objective of our study was to determine the downstream extent of the trout fishery and suitable temperature conditions in the Waterton River tailwater.

Methods

From July 17 to 25, 2014, we used a raft electrofisher to sample the 60 km tailwater reach of the Waterton River from Waterton dam to the confluence with the Belly River. Electrofishing transects were spaced at 1 km intervals where we enumerated all captured fish by species and mapped their distributions using a GIS. We measured fork length (FL, mm), total length (TL, mm) and weight (g) before releasing fish back to the river. We also monitored stream temperature from April through September using data loggers at four locations between Waterton dam and the river mouth to assess temperature suitability for brown trout and rainbow trout growth, defined by Molony (2001) as daily summer averages at or below 20°C.

Results

In the 60 river-kilometre section, we captured a total of 832 sport fish, of which 78% were mountain whitefish ($n = 650$), 14% brown trout ($n = 118$), 3% rainbow trout ($n = 23$), 2% lake whitefish ($n = 20$), 1% burbot ($n = 9$), 1% lake trout ($n = 8$), and 1% northern pike and mooneye combined (Table 1). Mountain whitefish and brown trout occurred throughout the study area from the dam to the confluence with the Belly River (Figure 1). In contrast, rainbow trout and lake whitefish, both cold-water species, occurred primarily toward upper reaches of the tailwater, near the reservoir outlet where average daily stream temperature remained below 10°C throughout the summer. From the reservoir-outlet to the downstream-most data logger station near the mouth, average daily stream temperature remained at or below 20°C.

Table 1. Composition and size of the sport fish catch using electrofishing gear from the Waterton River tailwater, July 2014.

| Species | Fork length (mm) | | Weight (g) | | Fish captured | Mean \pm SE CPUE (fish/km) |
|--------------------|------------------|-----------|-------------------|-------------|---------------|------------------------------|
| | Mean \pm SD | Range | Mean \pm SD | Range | | |
| Mountain whitefish | 204 \pm 64 | 45 – 452 | 131 \pm 132 | 2 – 916 | 650 | 11.0 \pm 5.2 |
| Brown trout | 288 \pm 127 | 56 – 533 | 406 \pm 375 | 2 – 1,656 | 118 | 2.0 \pm 1.9 |
| Rainbow trout | 205 \pm 133 | 53 – 564 | 311 \pm 648 | 20 – 2,780 | 23 | 0.4 \pm 0.8 |
| Lake whitefish | 387 \pm 72 | 270 – 481 | 856 \pm 495 | 236 – 1,880 | 20 | 0.3 \pm 1.5 |
| Burbot | 717 \pm 142 | 460 – 945 | 2,019 \pm 1,181 | 550 – 3,478 | 9 | 0.1 \pm 0.4 |
| Lake trout | 466 \pm 130 | 399 – 787 | 1,386 \pm 1,885 | 646 – 6,050 | 8 | 0.1 \pm 0.8 |
| Northern pike | 548 \pm 33 | 511 – 575 | 1,192 \pm 218 | 978 – 1,414 | 3 | 0.0 \pm 0.2 |
| Mooneye | 256 | N/A | 220 | N/A | 1 | 0.0 \pm 0.1 |

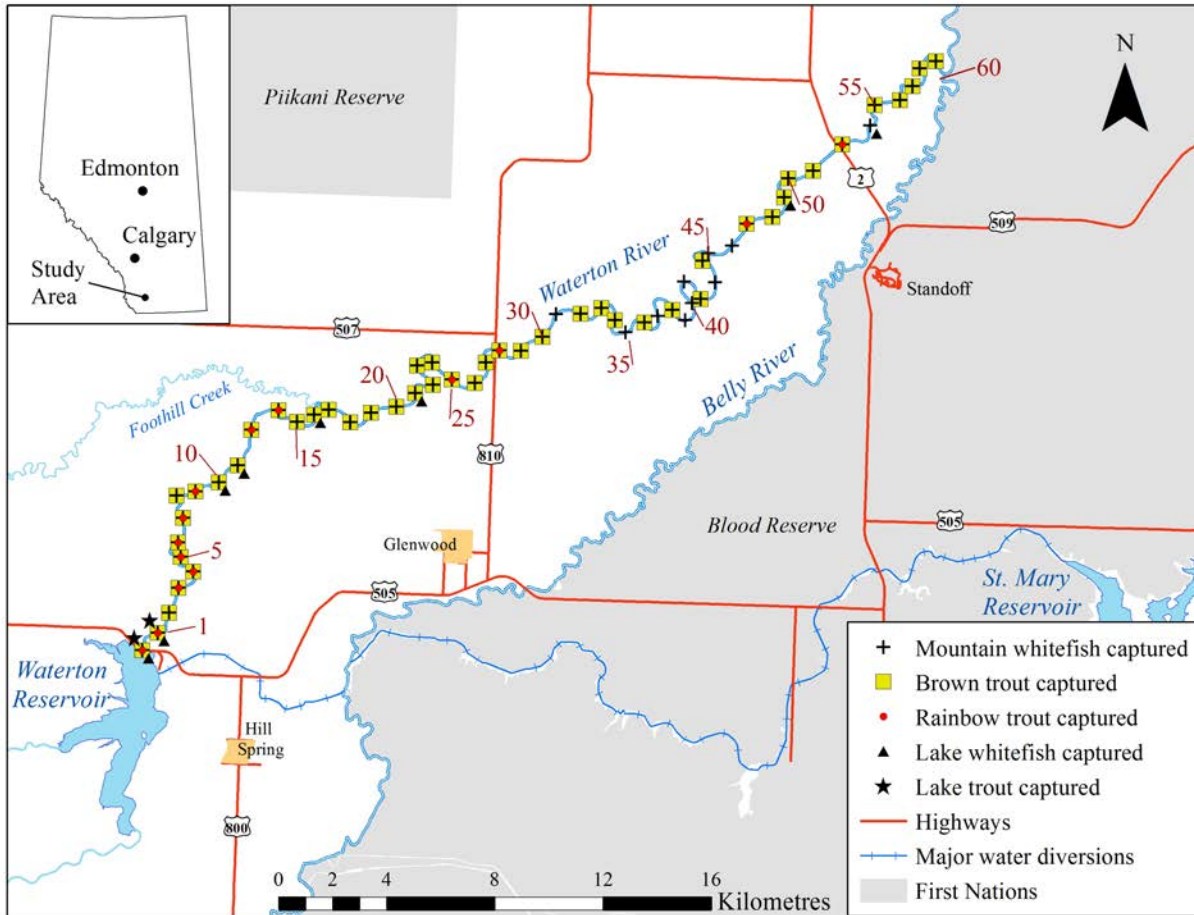


Figure 1. Distribution of salmonid species captured during July electrofishing on the Waterton River tailwater, 2014.

Conclusions

Summer water temperature in 2014 was suitable for both brown trout and rainbow trout growth throughout the 60 km tailwater reach of the Waterton River. Brown trout seemed to flourish throughout the tailwater, but rainbow trout were less abundant and more concentrated toward the upper reaches, suggesting variables other than summer water temperature are limiting their success. The release of cold water from beneath Waterton Reservoir has created a stable cold-water refuge downstream of Waterton dam that is beneficial to lake trout and lake whitefish.

Communications

- Presented preliminary study results at the Annual General Meeting of the Oldman River Chapter of Trout Unlimited Canada.
- Shared stream temperature data with the scientific director of NSERC HydroNet at the University of Montreal.

Literature Cited

Molony, B. 2001. Environmental requirements and tolerances of rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*) with special reference to western Australia: A review. Fisheries Research Report No. 130, 2001, Department of Fisheries, Government of Western Australia.

Photos



Brown trout close-up. Photo: Jason Blackburn



Alberta Conservation Association staff member Logan Redman holding lunker lake trout from Waterton River tailwater. Photo: Jason Blackburn



Alberta Conservation Association float-electrofishing crew on the Waterton River tailwater.
Photo: Jason Blackburn