

Alberta Conservation Association
2020/21 Project Summary Report

Project Name: Fish Barrier Assessments in the Bow River Watershed

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Partnerships

Alberta Environment and Parks
Fisheries and Oceans Canada

Key Findings

- We ground-truthed 50 potential barriers and performed 41 comprehensive barrier assessments to determine fish passage in the Bow River watershed during low September flows.
- We will resume assessments in spring and fall 2021 and complete barrier evaluations to inform WSCT recovery activities.

Abstract

The historic range of Westslope cutthroat trout (WSCT) in Alberta lies entirely within the Oldman and Bow River watersheds. In recent decades, genetically pure populations have declined to approximately 5% of the historic distribution. Invasive species are among the biggest contributors to the WSCT declines because of hybridization and competition. Natural waterfall barriers that impede upstream fish movements are known to protect headwater populations of WSCT from non-native rainbow trout and brook trout invasions. As a conservation measure,

ACA has undertaken a broad-scale inventory and assessment of these barriers to identify barriers protecting crucial populations currently sustaining the species, and find opportunities to expand the WSCT range into secure, unoccupied habitat reaches above barriers. Since 2017, we have developed standard methods to identify, measure, classify, and rank a complex range of fish barriers in the context of invasion risk and conservation potential, and have completed assessments in much of the Oldman River watershed. In 2020, we finalized assessment methods into a field manual that assesses four main mechanisms that impede fish passage over barriers: 1) height/length obstructions to leaping, 2) water velocity obstructions to swimming, 3) water depth obstructions to swimming, and 4) turbulence obstructions to swimming. We have broadened surveys into the Bow River watershed, visiting 50 of approximately 250 locations in that watershed. We will continue barrier surveys through 2021 to comprehensively catalogue all barriers across the WSCT range and help prioritize future range expansion strategies to restore and reconnect WSCT populations.

Introduction

The historic range of Westslope cutthroat trout (WSCT) in Alberta lies entirely within the Oldman and Bow River watersheds. In recent decades, genetically pure populations have declined to approximately 5% of the historic distribution. Invasive species are among the biggest contributors to the WSCT declines because of hybridization and competition (Fisheries and Oceans Canada 2014). Natural waterfall barriers that impede upstream fish movements are known to protect headwater populations of WSCT from non-native rainbow trout and brook trout invasions. Therefore, broad-scale inventory and assessment of these barriers is an important conservation measure to identify barriers protecting crucial populations currently sustaining the species, and to recognize opportunities to expand the WSCT range into secure, unoccupied habitat reaches above barriers. From 2017 to 2019, we developed standard methods to identify, measure, classify, and rank a complex range of fish barriers in the context of invasion risk and conservation potential, and completed assessments in the Oldman River watershed. In 2020, we finalized the assessment methods and broadened surveys into the Bow River watershed to comprehensively catalogue all barriers across the WSCT range and help prioritize future range expansion strategies to restore and reconnect WSCT populations.

Methods

We completed desktop aerial imagery and GIS searches, and sourced backcountry hiking and tourism information for the Bow River watershed to identify a total of 138 potential barriers for investigation. Combined with an existing 109 barriers amassed by AEP from various sources, we assembled a 247-barrier catalogue for barrier assessment eligibility. The COVID-19 pandemic precluded barrier assessments and field activities during the spring freshet. We shortlisted approximately 130 barriers as priority candidates for September 2020 assessments during low flows, based on proximity to pure WSCT populations, estimated barrier severity, proximity to watersheds unoccupied by fish or with unknown fish occupancy, and access that was favourable to COVID-19 work restrictions. We used the “ACA Waterfall Fish Barrier Assessment Field Manual” (Blackburn et al. 2020), to assess the four main mechanisms that impede fish passage over barriers: 1) height/length obstructions to leaping, 2) water velocity obstructions to swimming, 3) water depth obstructions to swimming, and 4) turbulence obstructions to swimming. We measured barrier dimensions using a TruPulse 200X laser rangefinder, stream depths using measuring-poles and sounding lines, water velocities using a HACH FH950 handheld flowmeter, and turbulence using a qualitative literature-based visual assessment method. To best determine the efficacy of barriers to prevent fish passage across changing hydrologic regimes, we will revisit select barriers during spring freshet’s high flows to determine fish size-ranges differentially obstructed by barriers relative to flows and fish swimming and leaping capabilities.

Results

We ground-truthed 50 barrier locations in the Bow River watershed and completed a total of 41 barrier assessments, consisting of 130 individual barrier features on 20 waterbodies (Table 1). Barrier data analyses and evaluations have been delayed due to pandemic-related project reconfigurations. We will resume assessments in spring and fall 2021 to complete barrier evaluations at both high and low flows in the Bow River watershed.

Table 1. Summary of barriers assessed in the Bow River watershed, September 2020.

Barriers ground- truthed	HUC 8 Watershed	Waterbodies visited
4	Bow River/Ghost Reservoir	Exshaw Creek Pigeon Creek
13	Elbow River	Elbow River Ford Creek Little Elbow River Nihahi Creek Sylvester Creek
3	Jumpingpound Creek	Coxhill Creek Unnamed to Jumpingpound Creek
20	Sheep River	Bluerock Creek Dyson Creek Gorge Creek Junction Creek Long Prairie Creek Sheep River Unnamed to Gorge Creek Unnamed to Sheep River Unnamed to Sheep River
10	Kananaskis River	Pocaterra Creek Ribbon Creek

Conclusions

Threats to the persistence of WSCT in Alberta are increasing, requiring not only stronger protections for existing populations but active recovery and recolonization into habitats currently unoccupied by the species. Barrier assessments are a key component in determining secure locations for WSCT reintroductions in Alberta. We will continue assessing barriers in the Bow River watershed through 2021 to comprehensively catalogue priority barriers in the WSCT range to help inform a framework to rank habitats for future WSCT reintroduction projects.

Communications

- Webinar presentation to Alberta Environment and Parks managers and biologists.

Literature Cited

Blackburn J., B. Hurkett and L. Redman. 2020. Guide to Natural Fish Barrier Assessments.

Working Paper. Alberta Conservation Association. 42 pp. + Appendices and field manual.

Fisheries and Oceans Canada. Recovery Strategy for the Alberta populations of Westslope

Cutthroat Trout (*Oncorhynchus clarkii lewisi*) in Canada. 2014. Species at Risk Act

Recovery Strategy Series. Fisheries and Oceans Canada, Ottawa. iv + 28 pp +

Appendices.

Photos



Crew calibrating methods on a small obstruction on the Sheep River prior to barrier assessments. Brad Hurkett (left), and Kevin Fitzsimmons. Photo: Jason Blackburn.



Staff measuring waterfall dimensions with a laser rangefinder on Long Prairie Creek.

Photo: Jason Blackburn



Staff measuring multiple waterfall features with a laser rangefinder on the Sheep River. Photo: Jason Blackburn



Ground-truthing fish barriers in Bluerock Canyon. Photo: Jason Blackburn