Alberta Conservation Association

2019/20 Project Summary Report

Project Name: Westslope Cutthroat Trout Range Expansion Feasibility.

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Partnerships

Alberta Environment and Parks

Fisheries and Oceans Canada

Key Findings

- We are developing a range expansion framework to facilitate decisions for reintroductions of WSCT into habitats above fish barriers.
- We established instream summer growing degree days (SGDD) as a strong predictor of WSCT and subsequently a useful measure of thermal habitat quality for reintroductions.
- We assigned scores to assessed barriers, rating the extent to which they prevent upstream invasion, and catalogued waterbodies for WSCT range expansion potential.
- Final ranked lists of both stream and lake habitats above barriers will be a valuable resource to third party agencies to inform WSCT reintroduction initiatives.

Abstract

Westslope cutthroat trout (WSCT) currently occupy only 5% of their historic range in Alberta. Recovery of the species requires expanding their distribution and protection from invasive species, which are considered their greatest threat. ACA has been investigating methods for assessing the feasibility of WSCT range expansions into streams and lakes above waterfalls that

prevent upstream fish migration. We have adapted components of a range expansion framework originally developed by bull trout researchers, to score and rank habitats above barriers based on WSCT life history requirements. We will determine range expansion feasibility for each upstream habitat based on the sum of scores that rate habitat quality, habitat quantity, habitat complexity, threats to existing WSCT populations, and future invasion risk. Before these habitats can be comprehensively ranked, thorough cataloguing of existing and new information is required to address the components that make up the range expansion scoring framework. Work is ongoing to compile the information required to populate these components and comprehensively rank available habitats for future WSCT range expansions. Final lists of both stream and lake habitats will be produced and ranked by range expansion suitability score, providing a valuable resource to third party agencies involved in WSCT reintroduction projects.

Introduction

Westslope cutthroat trout (WSCT) currently occupy only 5% of their historic range in Alberta, and recovery of the species requires expanding their distribution and protection from invasive species, which are considered their greatest threat (Fisheries and Oceans Canada 2014). In 2018 we began investigating methods for assessing the feasibility of WSCT range expansions above waterfalls that are migration barriers to fish, into streams and lakes currently unoccupied by pure WSCT populations. In 2019 we adapted components of a range expansion framework originally developed for bull trout (Galloway et al. 2016), to reflect the life history requirements of WSCT, to rank potential habitats above waterfall barriers for reintroductions. We identified five major components of the range expansion framework that include: 1) habitat quality, 2) habitat quantity, 3) habitat complexity, 4) threats to existing WSCT populations, and 5) invasion risk to potentially newly established WSCT populations. Work is ongoing to compile the information required to populate these major components and comprehensively rank available habitats for future WSCT range expansions. Final lists of both stream and lake WSCT habitats will be produced and ranked by range expansion suitability score, from which agencies can select individual stream reaches or waterbodies best suited for WSCT re-establishment.

Methods

We catalogued information pertaining to three of the five major components of the range expansion framework; these include: 1) habitat quality, 2) habitat quantity, and 5) risk of invasion to introduced WSCT. We based the habitat quality measure on WSCT temperature requirements (Bear et al. 2007) and analyzed instream temperature data from a network of tributaries we have monitored since 2016 using temperature data-loggers. We calculated in-stream summer growing degree days (SGDD) (Coleman and Fausch 2007) as the three-month (June, July and August) summer average per stream of daily mean temperature, from 58 data-logger locations on 18 streams in the Upper Oldman River Watershed. To validate SGDD as a reliable measure of habitat quality, we investigated its relationship with past electrofishing catches of WSCT from 15 streams with corresponding WSCT electrofishing capture. To assess risk of invasion to introduced WSCT populations, we developed a scoring system to rate the extent that waterfall barriers prevent upstream fish passage, using a barrier assessment manual we developed and barrier assessment survey data we have collected using the manual. To assess habitat quantity, we initiated a comprehensive GIS search for potential lakes for WSCT reintroductions in the Oldman River drainage, and continue to catalogue and assess new barriers and upstream watershed areas in the Bow River drainage. We will continue to work at developing measures for habitat complexity, and threats to existing WSCT population measures through 2020.

Results

We established SGDD as a strong predictor of WSCT densities (i.e. catch rates), and subsequently as a useful measure of thermal habitat quality for WSCT reintroductions (Figure 1). We assigned barrier scores to a total of 178 barrier features at 122 barrier locations within the Upper Oldman River watershed (Table 1), and catalogued 37 lakes to investigate for WSCT range expansion potential.

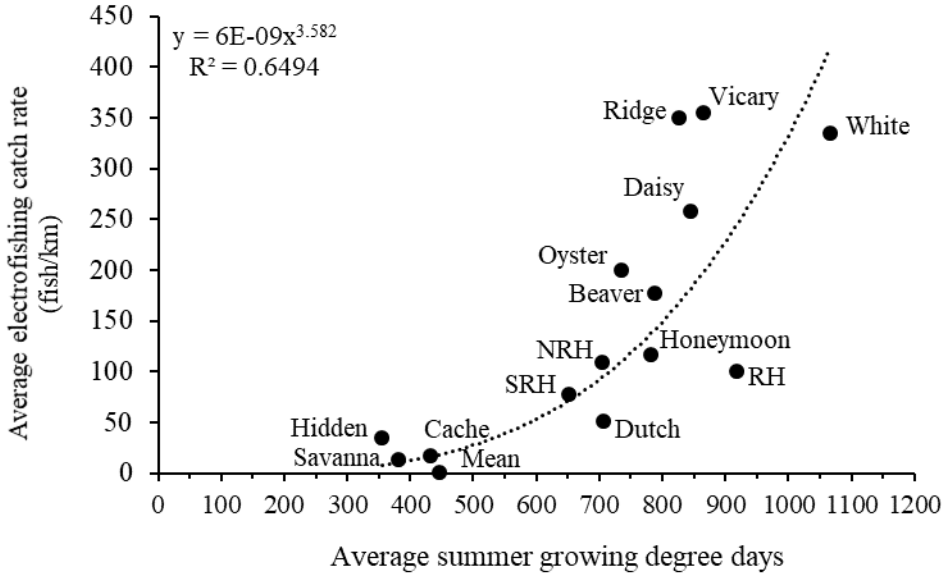

Figure 1. Relationship between average WSCT electrofishing catch rate and three-month summer average (June, July and August) SGDD by stream, in the Upper Oldman River watershed. NRH = North Racehorse Creek, SRH = South Racehorse Creek, RH = Racehorse Creek.

Table 1. Summary of scored barriers by fish passage difficulty in the Upper Oldman River Drainage

Barrier reliability	Number of assessed barriers
Complete barriers to all upstream migrating fish	75
Complete upstream migration barriers to local size classes of fish	16
Significant but unreliable obstacle to upstream migrating fish	21
Poses an unreliable obstacle to upstream fish movement	10

Conclusions

Conservation of WSCT in Alberta requires moving beyond preservation into active recovery and reintroduction of the species. We are currently developing a habitat-scoring framework that will facilitate selection of the most suitable habitats for WSCT reintroductions in Alberta. Work is ongoing in the Oldman River watershed and will expand into the Bow River watershed in 2020. Following completion of the framework, ranked lists for both stream and lake habitats will be made available to third party agencies to inform WSCT reintroduction projects.

Communications

- Preliminary concepts have been communicated with Alberta Environment and Parks managers.

Literature Cited

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Galloway, B., C. Muhlfeld, C. Guy, C. Downs, and W. Fredenberg. 2016. A framework for assessing the feasibility of native fish conservation translocations: applications to threatened Bull Trout. North American Journal of Fisheries Management, 36(4), 754-768.

Photos

Photo 1. ACA staff member, Brad Hurkett, investigating locations for installation of spring temperature data-loggers on Slacker Creek. Photo: Jason Blackburn.

Photo 2. Example of an impassable fish barrier on Bruin Creek where it enters the Livingstone River with perspective views from below the barrier, (left), and immediately above the barrier, facing upstream (top right), and downstream (bottom right). Photos: Jason Blackburn