Alberta Conservation Association

2021/22 Project Summary Report

Project Name: Westslope Cutthroat Trout Range Expansion

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Partnerships

Alberta Environment and Parks
Fisheries and Oceans Canada through the Canada Nature Fund

Key Findings

- We are developing a list of the most suitable habitats for WSCT reintroductions and range expansions above fish barriers.
- Extreme summer temperatures reached and briefly exceeded WSCT tolerances in core areas, and far exceeded them in the adjacent Callum Creek watershed.
- Conservation of suitable habitats within core WSCT areas is imperative, as adjacent watersheds may not be feasible alternatives for WSCT colonization.

Abstract

Recovery of westslope cutthroat trout (WSCT) in Alberta requires recolonization and expansion of their range, which is currently 5% of the historical distribution. Recovery of the species requires strong protections for existing populations, as well as recolonization and expansion of their current range. Invasive species are among the biggest contributors to WSCT declines through hybridization and competition, and the subsequent population fragmentation incurred when neighbouring watersheds become dominated by hybridized and invasive species. Since 2018, we have been adapting a framework originally developed by researchers for bull trout into

a framework for WSCT range expansion feasibility in Alberta, into habitat reaches that are secure from invasion, above barriers. We are nearing the completion of compiling information to score habitats and develop candidate lists best suited for WSCT range expansion, as well as investigating watersheds adjacent to WSCT core areas to determine expansion potential and limitations. To date, we have established summer stream temperatures as a strong predictor of WSCT abundance and a measure of candidate habitat quality. In 2021, we completed stream temperature monitoring in the Oldman River, Bow River, and Crowsnest River watersheds and calculated respective summer growing degree days (SGDD) to aid in the final rankings of candidate habitats. In-stream temperature in core areas spanned a range of 921 SGDD, from coolest conditions and lower productivity in Lyall Creek (384 SGDD) (Upper Oldman River watershed) to warmer conditions with higher productivity in Sullivan Creek (1,305 SGDD). Average daily temperatures also reached, and briefly exceeded WSCT tolerances in core areas during 2021 summer temperature extremes. We continue to pursue opportunities for collaborative WSCT range expansion projects at candidate locations across the WSCT range.

Introduction

Recovery of westslope cutthroat trout (WSCT) in Alberta requires recolonization and expansion of their range, which is currently 5% of the historical distribution. Invasive species are a key threat to WSCT persistence (DFO 2014), and a primary consideration when investigating range expansion potential. Since 2018, we have been adapting a framework originally developed for bull trout (Galloway et al. 2016), for potential WSCT range expansions into above-barrier reaches that are secure from invasion. A key measure of habitat quality in proposed reaches and a strong predictor of WSCT productivity is summer growing degree days (SGDD). Since 2018, we have been investigating SGDD potential in watersheds across the WSCT range, as well as compiling information to populate metrics within the framework. In 2021, we began finalizing lists of candidate waterbodies for WSCT range expansion in core areas, as well as investigating adjacent watersheds to assess expansion potential, limitations, and thermal habitat feasibility. We continue to measure habitats and gather information to populate the framework and are nearing completion of ranking candidate waterbodies for range expansion potential.

Methods

We installed data loggers to monitor in-stream summer temperatures at 39 locations within WSCT core areas: 22 in the Upper Oldman River watershed, 13 in the Bow River watershed, and four in the Crowsnest River watershed. We calculated SGDD (Coleman and Fausch 2007) as the three-month (June, July, and August) summer average per stream of average daily temperature and consulted thermal requirements for WSCT by Bear et al. (2007). We also monitored in-stream summer temperatures adjacent to WSCT core areas, at ten locations in the Callum Creek watershed, five on Callum Creek mainstem, and five on main tributaries. We installed dissolved oxygen loggers to monitor winter (i.e., 2021-2022) water quality at four locations on Callum Creek and one on Sharples Creek, a main tributary. We completed lists of available watersheds and lakes for potential WSCT reintroduction and restoration and are currently ranking habitats for range expansion potential using the range expansion framework.

Results

Extreme temperatures observed in summer 2021 provided an opportunity to monitor streams at the upper-most thermal ranges in WSCT core areas, and across the WSCT range. In-stream temperature in core areas including the Upper Oldman River, Crowsnest River, and Bow River watersheds, spanned a range of 921 SGDD. In core areas we observed coolest, lower-productivity conditions in Lyall Creek (384 SGDD) (Upper Oldman River watershed) and warmest, higher-productivity conditions in Sullivan Creek (1,305 SGDD) (Bow River watershed) (Figure 1), where average daily temperatures reached and briefly exceeded WSCT tolerances for a total of four days (i.e., 20.0 °C, Bear et al. 2007). Adjacent to WSCT core areas in the Callum Creek watershed, peak summer water temperatures ranged from 26.7 – 30.8°C among the five mainstem locations (of which three exceed 30°C), and 15.8 – 28°C among the five tributary locations. Average daily temperatures exceeded WSCT tolerances at all five mainstem locations ranging from 5 – 38 total days, and from 5 – 15 consecutive days of unsuitable stream temperatures. Conversely, average daily stream temperatures at four of five tributary locations remained within WSCT tolerances, which was exceeded on only one tributary (i.e., Black Creek), for a total of 5 days, consecutively.

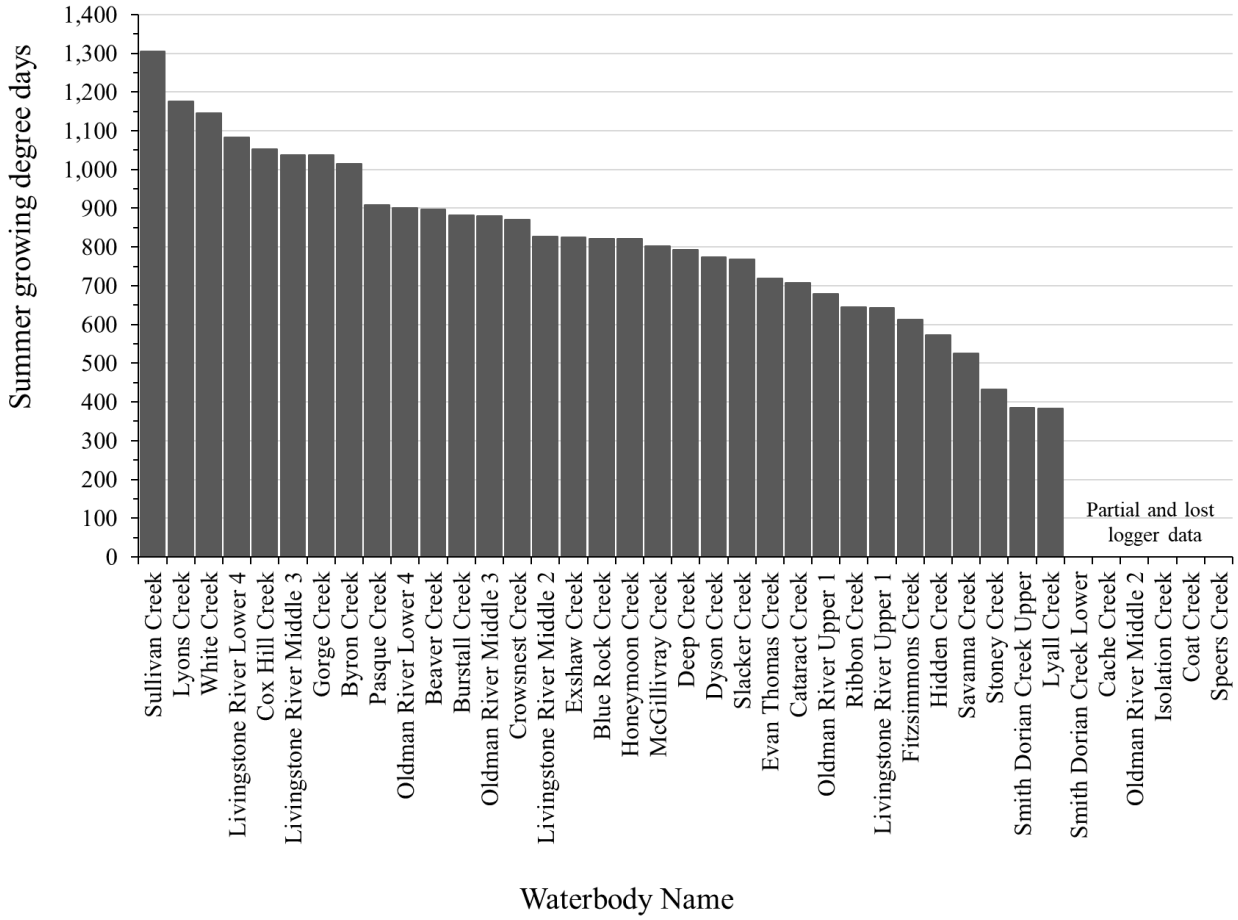

Figure 1. Three-month summer average (June, July, and August) summer growing degree days by stream, in the Upper Oldman River, Bow River, and Crowsnest River watersheds.

Conclusions

Increased threats to Alberta's Eastern Slopes necessitate strong protections for existing populations of WSCT, and active recovery and reintroduction of the species into available suitable habitats. We are developing a list of the most suitable habitats for WSCT reintroductions and range expansions. Watersheds such as Callum Creek that are adjacent to WSCT core areas, may not be feasible alternatives for WSCT colonization, underscoring the urgent need for conservation of suitable habitats within the existing WSCT core habitat areas.

Communications

- Discussions underway with AEP for collaborative WSCT range expansion projects and concepts.

Literature Cited

Bear, E.A., T.E. McMahon, and A.V. Zale. 2007. Comparative thermal requirements of westslope cutthroat trout and rainbow trout: implications for species interactions and development of thermal protection standards. *Transactions of the American Fisheries Society* 136(4): 1113-1121.

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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. Stream habitat in Evan Thomas Creek above a series of impassible waterfalls. Photo: Jason Blackburn

Photo 2. Hiking to install temperature data loggers in Adair Creek in the upper Callum Creek watershed, April 2021. Photo: Jason Blackburn

Photo 3. Lower Callum Creek pre-freshet, April 2021. Photo: Jason Blackburn

Photo 4. Installing a temperature data logger on upper Callum Creek. Photo: Jason Blackburn