Alberta Conservation Association
2023/24 Project Summary Report

Project Name: Oxygen-Temperature Trends in the Beaverlodge Redwillow River Watershed

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Partnerships

Beaverlodge River Arctic Grayling Society
County of Grande Prairie
fRI Research
Government of Alberta
Mighty Peace Watershed Alliance
TC Energy
West County Watershed Alliance

Key Findings

- Large portions of the Beaverlodge and Redwillow River watersheds were not suitable for all life stages of Arctic grayling due to high summer water temperatures and/or low winter dissolved oxygen concentrations.
- Water temperature was optimal for Arctic grayling in some headwaters and small tributaries with less-than-optimal temperatures being detected downstream in mainstem creeks and rivers.
- Dissolved oxygen concentrations were suitable for Arctic grayling at lower elevations and in the mainstems of the Beaverlodge and Redwillow Rivers but not suitable at higher elevations or in tributaries.

- There was spatial separation between high elevation tributaries where suitable thermal refuge for Arctic grayling was found and low elevation mainstem rivers where overwintering dissolved oxygen concentrations were found.
- A lack of continuous water flow throughout the year may limit Arctic grayling recovery in the Beaverlodge watershed.

Details

Arctic grayling (*Thymallus arcticus*) were historically abundant in the Redwillow Hydrologic Unit Code (HUC) 6 watershed but have been extirpated from the Beaverlodge River HUC 8 watershed sub-basin since the mid 1990s and are thought to be in decline in the Redwillow River HUC 8 watershed sub-basin as well. Alberta Conservation Association (ACA) has been working in the Beaverlodge River watershed since 2004 to improve riparian health and water quality in hopes of bringing Arctic grayling back to the watershed. In this study, we assessed the spatial and temporal distribution of summer (August) water temperature and winter dissolved oxygen (DO) throughout the Beaverlodge River and Redwillow River watersheds to allow for comparison between the two watersheds and to help determine the suitability of the Beaverlodge River watershed to support Arctic grayling reintroduction. In 2022/23, we installed 61 temperature and 11 DO loggers through the Redwillow and Beaverlodge HUC 8 watershed sub-basins. We used data from 35 temperature and ten DO sites in our analysis, but not the remaining sites because loggers were out of water due to large reductions in water levels and dry stream beds. Large portions of the watershed were above optimal temperature and below DO concentrations for Arctic grayling. Water temperature and DO increased downstream (lower elevation) and was higher in mainstem creeks and rivers than in tributaries. There was spatial separation between high elevation tributaries where suitable thermal refuge for Arctic grayling was found and low elevation mainstem rivers where overwintering DO concentrations were found. However, a lack of continuous flow in the Beaverlodge River watershed may limit fish passage between summer thermal refuge and overwintering habitat. Water temperature, overwintering DO concentrations, and water quantity may be limiting Arctic grayling recovery in Beaverlodge River (HUC 8) watershed.

Photos

Photo 1. Equipment for datalogger installation in the Redwillow HUC 6 watershed. Photo: David Jackson

Photo 2. Subsurface flow in Steeprock Creek that would be impassable for Arctic grayling Photo: Nikita Lebedynski

Photo 3. A datalogger attached to a post in a dry streambed. Photo: Nikita Lebedynski