

Alberta Conservation Association 2017/18 Project Summary Report

Project Name: Kakwa River Watershed Arctic Grayling FSI Assessment (year 2 of 2)

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Partnerships

Alberta Environment and Parks

Key Findings

- We angled for Arctic grayling at 117 sites covering a distance of 55.8 km of stream in the Kakwa River watershed during the summers of 2016 and 2017.
- We captured 259 Arctic grayling, most of which were immature (< 283 mm fork length).
- Relative abundance of Arctic grayling was low with catch-per-unit-effort of 0.56 fish/hr.

Introduction

Alberta's Arctic grayling population has declined by as much as 70% since the 1960's as a result of habitat degradation and fragmentation, and overfishing. (ASRD 2005). Although Ripley (1998) described the Kakwa watershed as "pristine" in the context of the Arctic grayling fishery, resource development in the Kakwa River watershed has expanded over the last two decades (Ripley et al. 2005, McKay et al. 2014) with the greatest increase in stand-replacing disturbance occurring between 2004 and 2006 (24 percent) (White 2011). Yet, existing data on Arctic grayling in the Kakwa watershed are outdated. Thus, the goal of this project is to collect data on Arctic grayling density and population structure in the Kakwa River watershed to address data deficiencies identified by Alberta Environment and Parks (AEP). To ensure consistency in fish population assessments across the province, AEP developed the Fish Sustainability Index (FSI) (MacPherson et al. 2014). The FSI provides a standardized approach for evaluation of existing data and identification of additional data needs that will allow for robust assessment of species status. One of the priority species for which an FSI is being developed is Arctic grayling (Government of Alberta 2014). The data collected from our study will inform provincial Arctic grayling FSI development, as well as be used to support regulatory actions to remediate the effects of industrial activities on Arctic grayling populations and their habitats in the Kakwa River watershed.

Methods

We angled Arctic grayling throughout the Kakwa River watershed, focusing on streams order three (Strahler 1952) or greater during July 4 – August 31, 2016 and July 5 – August 31, 2017. We selected sample sites randomly using the generalized random-tessellation stratified design. We angled sites in an upstream direction, and sampled all habitat types for a minimum of 45 minutes when no fish was captured, and a maximum of 120 minutes when fish were captured. Sites were sampled only once. We measured lengths (fork length [FL] and total length [TL] mm) of all fish captured and recorded relative abundance of Arctic grayling in catch-per-unit-effort (CPUE) expressed as number of fish captured per hour. We sampled 117 sites covering a total distance of 55.8 stream kilometers. We calculated CPUE for each site and determined relative abundance of Arctic grayling by averaging CPUE of all sites sampled in 2016 and 2017.

Results

We angled for 362.15 hours and captured 259 Arctic grayling downstream of both lower Kakwa Falls and South Kakwa Falls, detecting Arctic grayling at 44% of sites sampled. We captured 192 juvenile grayling and 67 adults (Figure 1). The mean catch rate for Arctic grayling was low, 0.56 fish/hr (95% CI: 0.40 – 0.72). Our highest catch rates for adult Arctic grayling were in sixth- and seventh-order streams. While fifth- and seventh-order streams had the highest catch rates of juvenile Arctic grayling. No Arctic grayling were captured upstream of both the Lower Kakwa River Falls and the South Kakwa River Falls (Figure 2). However, we were able to determine that South Kakwa Falls is a fish barrier and therefore, sites above South Kakwa Falls should not be included in an FSI score.

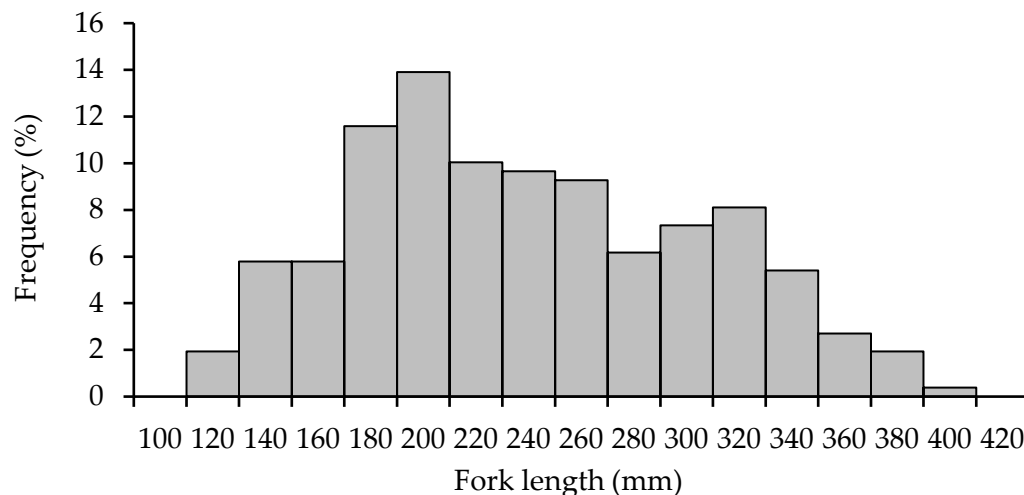


Figure 1. Length distribution of Arctic grayling captured (n = 259) while angling in the Kakwa River Watershed.

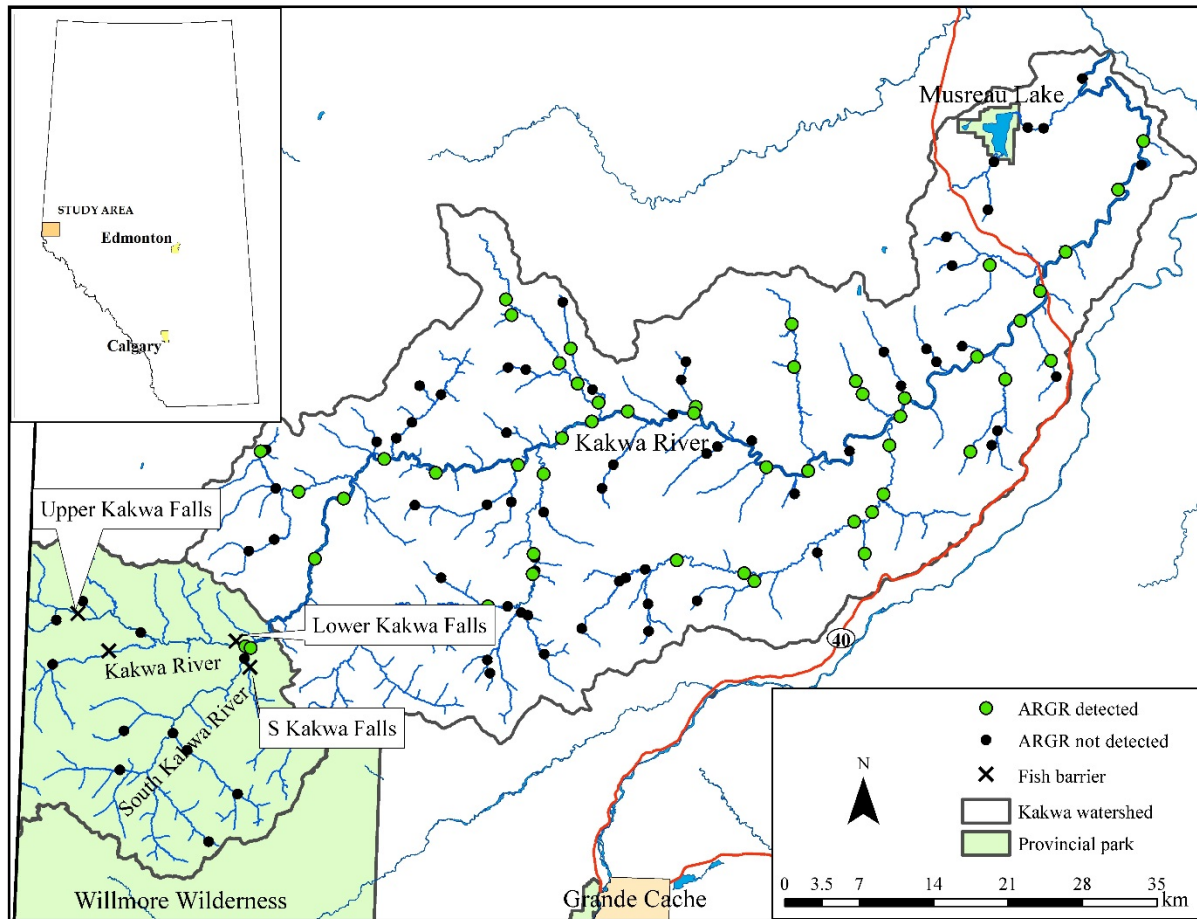


Figure 2. Sample site locations, sites where Arctic grayling were detected/not detected, and locations of potential fish barriers in the Kakwa River Watershed.

Conclusion

Our catch rate for Arctic grayling was low in the Kakwa River watershed. We captured Arctic grayling in the lower three quarters of the watershed, downstream of both the Lower Kakwa River Falls and South Kakwa River Falls. We found no evidence of missing size classes within the fork length distributions. Our highest catch rates for adult Arctic grayling were in sixth- and seventh-order streams while fifth- and seventh-order streams had the highest catch rates of juvenile grayling. The higher catch rates in these large order streams emphasizes the importance of a consistent and well thought out sampling design for FSI scoring, particularly when comparing fish abundance through time. Furthermore, the detection of Arctic grayling throughout the different stream orders highlights the importance of stream connectivity to allow for selection of suitable habitat to fulfill the various life stages of Arctic grayling.

Communications

- Submitted data to Alberta Environment and Parks for inclusion in its Fisheries and Wildlife Management Information System database.
- Final data report will be completed by March 31, 2018.

Literature Cited

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Photos



Arctic grayling habitat in a tributary of the Kakwa River. Photo: Colin Eyo



An Alberta Conservation Association staff member, Dave Jackson, angling for Arctic grayling in a tributary of the Kakwa River. Photo: Scott Seward



Arctic grayling captured during an angling survey. The fish was sacrificed to obtain ageing structures. Photos: Scott Seward