Alberta Conservation Association

2018/19 Project Summary Report

Project Name: Mountain Whitefish Overwintering Habitat

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Partnerships

Alberta Environment and Parks
Alberta Innovates
Department of Fisheries and Oceans
Millar Western Forest Products Ltd. – Whitecourt Pulp

Key Findings

- We surgically implanted 54 mountain whitefish from the McLeod River with radio telemetry tags and completed monthly aerial surveys to track their movement.
- Tagged fish travelled up to nine kilometres upstream and 89 kilometres downstream, moving greater distances from September to November than from November to March.
- Habitat measurements were collected at fish locations and 50 randomly selected sites to assess overwintering habitat preference for mountain whitefish.
- Mountain whitefish showed preference for shallower habitats with substrate dominated by large gravel and cobble.

Introduction

As demand continues to grow for industrial, agricultural, and domestic water use, Albertans are seeking strategies to manage water needs (Locke and Paul 2011, Government of Alberta 2011). One of the primary tasks in water management is understanding the habitat required to maintain a healthy river ecosystem so that managers can seek to meet socio-economic needs, while maintaining the ecological integrity of a watershed. In 2015, Alberta Environment and Parks completed a study in the Wapiti River to determine overwintering areas and microhabitat characteristics for mountain whitefish (*Prosopium williamsoni*; MNWH) (Compass 2017). Mountain whitefish were selected as a species of focus due to their tendency to occupy areas of faster moving water, which could make them more sensitive to water withdrawals during low winter flows (Addley *et al*. 2003). In collaboration with Alberta Environment and Parks, we seek to build our understanding of under-ice habitat use and availability for MNWH and validate results from the Wapiti River using the McLeod River. The results will allow for broader application of MNWH habitat needs and allow for more informed management decisions with regards to winter instream flow needs.

Methods

In September 2017, we implanted 54 fish with radio tags and released them back to initial capture locations (Rosevear or Hwy 32). We conducted monthly aerial telemetry surveys to track fish locations from November 2017 to March 2018. We completed three ground surveys in February and March 2018 to collect data on habitat use of tagged mountain whitefish and overall habitat availability. For the habitat use survey, we travelled to last known fish locations via snowmobile and used a hand-held antenna and receiver to determine precise fish locations. At each site we drilled three holes and recorded water quality parameters, depth, velocity, and substrate type at each.

For the habitat availability survey, we selected 50 sites that proportionately represented the mesohabitat features (ie., riffle, run, pool) found within our study reach of the McLeod River. At

each site we drilled three holes (forming a transect running perpendicular across the river) where we took the same measurements as the habitat use survey.

Results

Tag detection during surveys was high, allowing us to account for 53 of 54 fish. This was in part due to stable ice conditions on the McLeod River, allowing easy access to all tag locations. Distance travelled from initial tagging locations varied from 9 km upstream to 89 km downstream, with fish travelling an average of 16 km downstream (Figure 1). Fish moved greater distances from September to November, with movement slowing from November to March.

Dominant substrate at habitat use and availability locations was predominantly large gravel, with cobble as the second most dominant. Although ranges in velocity varied between use and available habitats, averages and standard deviations were nearly identical (Table 1). Ranges and averages for dissolved oxygen, temperature, conductivity, and pH did not vary substantially between habitat use and availability sites (Table 1). The range of depths recorded at our habitat availability sites was greater than at the use sites; average depth and standard deviation were also higher indicating a wider distribution in available depths relative to those used by fish (Table 1).

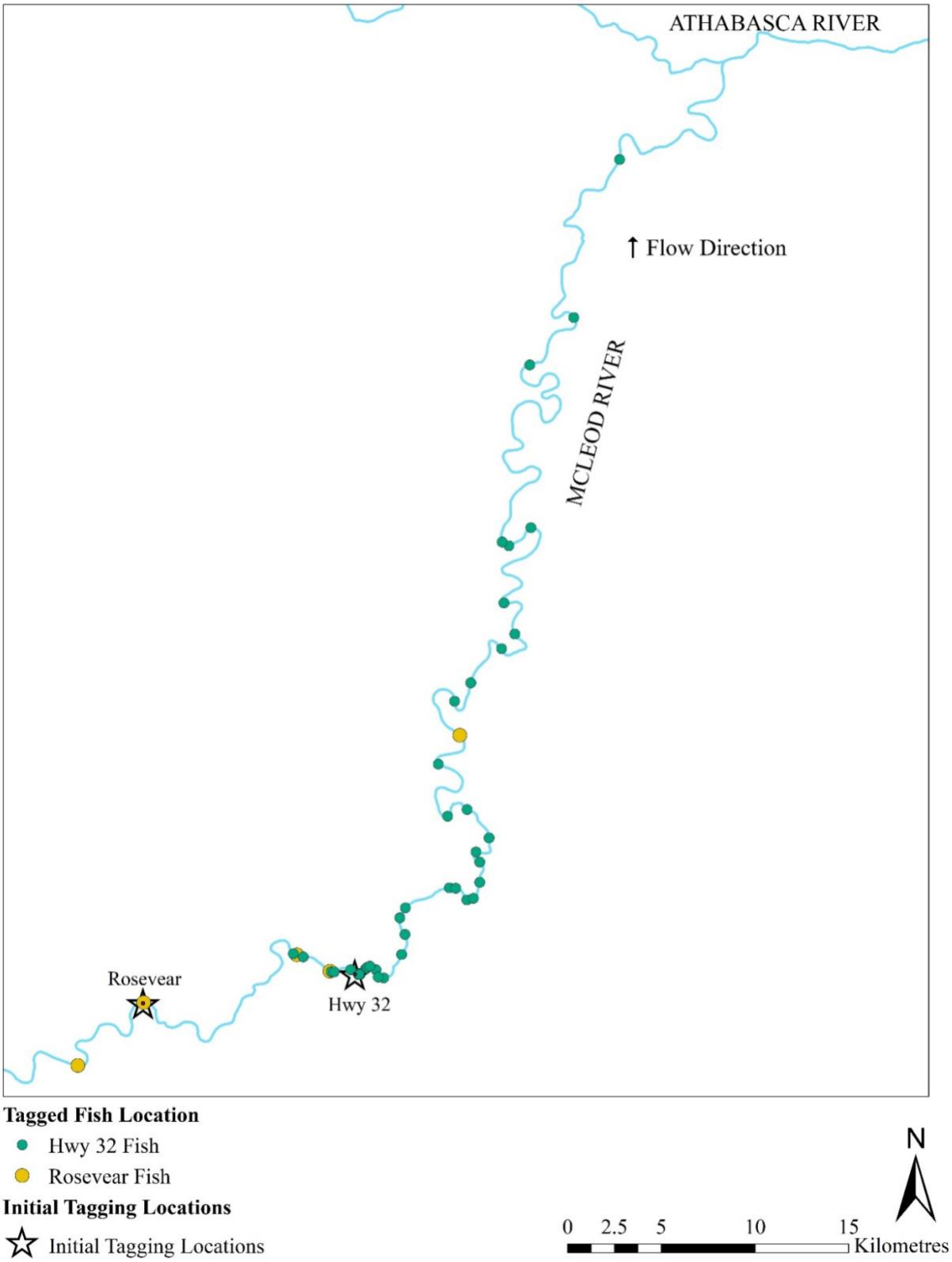

Figure 1. Locations of tagged mountain whitefish during March 2018 aerial telemetry survey in relation to initial tagging locations.

Table 1. Summary of habitat data collected at sites used by mountain whitefish (Use) and sites available to fish (Available).

Variable	Range		Average ± SD	
	Use	Available	Use	Available
Mean Column Velocity (m/s)	0.00 – 0.61	0.00 – 1.15	0.21 ± 0.14	0.21 ± 0.17
Dissolved Oxygen (mg/L)	6.7 – 9.4	6.7 – 9.7	8.1 ± 0.6	8.0 ± 0.7
Temperature (°C)	- 0.1 – 0.6	0 – 0.7	0.09 ± 0.1	0.1 ± 0.1
Conductivity (µS/cm)	101 – 607	192 - 598	514 ± 84	552 ± 52
pH	6.93 – 9.75	6.94 – 9.34	8.17 ± 1.02	7.58 ± 0.53
Depth (m)	0.02 – 1.68	0.02 – 2.67	0.41 ± 0.31	0.52 ± 0.43

Conclusions

Although some mountain whitefish moved greater distances over the course of the study, most fish did not travel far from tagging locations and showed reduced movement as winter progressed. Velocity and water quality remained consistent between habitat used by mountain whitefish and the habitat available in the river; however, fish showed greater use of shallower habitats with substrate dominated by large gravel and cobble. Our data provide valuable information with regards to under ice habitat use for mountain whitefish and can be used with the Wapiti River dataset to make informed management decisions with regards to winter instream flow needs.

Communications

- Progress report for Alberta Innovates, April 2018
- ACA Data Report, April 2019
- Final report for Alberta Innovates, April 2019

Acknowledgement

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Literature Cited

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Compass Resource Management (Compass). 2017. Wapiti River Water Management Plan. Prepared for the Wapiti River Water Management Plan (WRWMP) Steering Committee.

Locke, A., and A. Paul. 2011. A Desk-top Method for Establishing Environmental Flows in Alberta Rivers and Streams. Government of Alberta. 100pp.

Government of Alberta. 2011. Water for Life; A progress Report December 1, 2008 – March 31, 2011. 72pp.

Photos

Aerial photo from the helicopter during telemetry survey. Photo: Scott Seward

Data being entered during ground survey. Photo: Scott Seward

Ground survey crew on the McLeod River. Photo: Scott Seward