Alberta Conservation Association
2009/10 Project Summary Report

Project Name: *A Fish-based Index of Biological Integrity for Assessing Ecological Condition of the Beaver River*

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Partnerships

Alberta Environment
Alberta Tourism, Parks and Recreation
Alberta Sustainable Resource Development
Beaver River Watershed Alliance
Municipal District of Bonnyville

Key Findings

* Surveyed 36 sites in the Beaver River watershed.
* Captured a total of 3,901 fish, representing 13 species.
* The fish assemblage was dominated by four species, White Sucker (54.11%), Lake Chub (30.22%), Longnose Sucker (8.07%) and Fathead Minnow (4.36%).

Introduction

The Beaver River Watershed Alliance is currently developing an Aquatic Health Ecosystem Monitoring Program (AHEM) for the Beaver River watershed which is an assessment of the health of the aquatic environment, including the fisheries resources. While the health of the full scope of the ecosystem is being considered in the AHEM program, fish health is the focus in this study as fish are considered to be good indicators of how well the aquatic ecosystem is functioning. Most of the Beaver River watershed is within the boreal central and dry mixedwood subregions (Strong and Leggat 1992) in the northeast region of the province, a region that is experiencing rapid industrial growth. Although agriculture, road construction and industrial activities are prominent in the watershed, the cumulative effects of theses human activities on aquatic health, including fisheries resources, is largely unknown. The purpose of this study is to develop and validate an Index of Biological Integrity (IBI) for assessing the health of the Beaver

River using data collected on fish assemblages and a suite of physicochemical variables. Our objective for the first phase of the study was to conduct field surveys during the spring/summer to collect data on fish assemblages, water chemistry, and local habitat features.

Methods

We collected data on fish community composition using boat electrofishing. Sampling occurred from June 4 to July 20, 2009. Length of study sites were based primarily on the 85 times the mean wettedchannel width procedure as per Hughes et al. (2002). For all fish species, we recorded number captured, lengths and examined for DELTS (disease, deformities, eroded fins, lesions, and tumors). We recorded catch-per-unit-effort (CPUE) as the number of fish/100s of electrofishing. We collected grab water samples along each site and measured water dissolved oxygen, pH, temperature, conductivity, and collected standard habitat data (e.g., stream wetted width, stream depth and riparian width). In this preliminary report, we present data on fish community composition only.

Results

We surveyed 22 sites on the Beaver River, six sites on the Sand River, and two sites on the Amisk River (Figure 1). Sites ranged in size from 400 to 4,200 m in length. In total, we caught 3,901 fish, of which 54.11% were White Sucker (*Castostomus commersonii*), 30.22% Lake Chub (*Couesius auratus*), 8.07% Longnose Sucker (*Catostomus catostomus*), 4.36% Fathead Minnow (*Pimephales promelas*) and 1.13% Walleye (*Sander vitreus*). Together, Log Perch (*Percina caprodes*), Northern Pike (*Esox lucius*), Brook Stickleback (*Culaea inconstans*), Yellow Perch (*Perca flavescens*), Longnose Dace (*Rhinichthys cataractae*), Burbot (*Lota lota*), Spottail Shiner (*Notropis hudsonius*) and Northern Redbelly Dace (*Phoxinus eos*) comprised less than 2% of the total catch. CPUE ranged from 1.17 to 15.43 fish/100s.
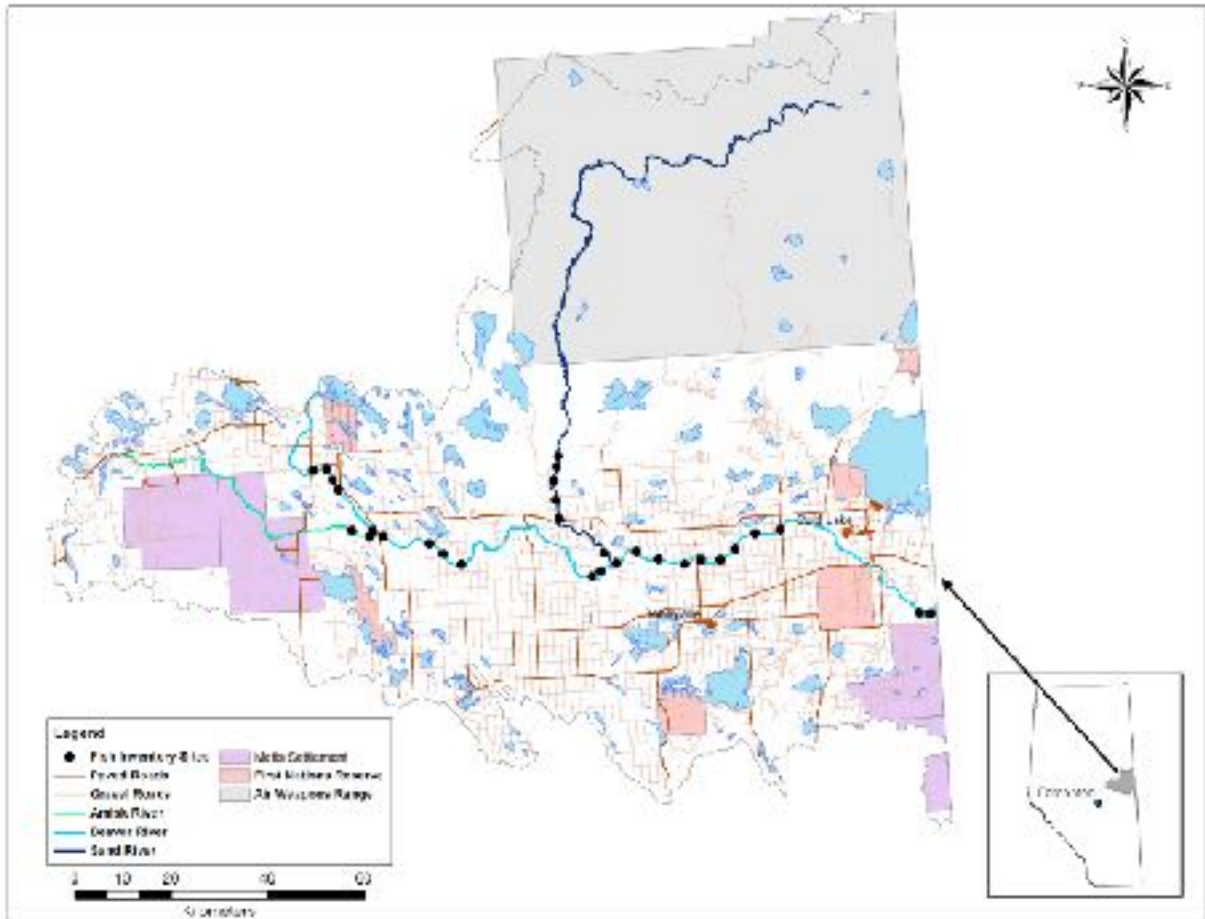
Conclusions

We sampled a total of 30 sites in the Beaver River watershed. Data collected in 2009, along with data collected in the spring/summer 2010, will be used to develop an IBI for the Beaver River watershed. This study will provide a better understanding of the influences of human disturbances on the health of the aquatic ecosystem and will provide resource managers a rapid assessment tool for characterizing aquatic ecosystem health.

Communications

- Annual progress report presented to the Beaver River Watershed Alliance.

Literature Cited

Hughes, R.M., P.R. Kaufmann, A.T. Herlihy, S.S. Intelmann, S.C. Corbett, M.C. Arbogast and R.C. Hijort. 2002. Electrofishing distance needed to estimate fish species richness in raftable Oregon rivers. North American Journal of Fisheries Management 22:1229-1240.

Strong, W.L., and K.R. Legggat. 1992. Ecoregions of Alberta. Land Information Services Divison, Alberta Forestry, Land and Wildlife, Edmonton, Alberta, Canada. 59 pp.