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LOWER WINNIPEG RIVER BASIN DISCUSSION SHEET SERIES
Sheet #5

Aquatic Animals and Habitat

May 2021

Introduction

The lower Winnipeg River basin (LWRB) is located in the northwest section of the entire Winnipeg River basin (WRB), which spans parts of western Ontario and small parts of Manitoba and northern Minnesota, United States. The Discussion Sheet Series highlights research on ecological and socio-economic aspects of the basin to encourage discussion with experts, government departments, Indigenous groups, and stakeholders. The Discussion Sheet Series is based on available data collected in 2018 and 2019. Sheet 5 of 11 summarizes aquatic animals and habitat in the LWRB.

Aquatic Animals and Habitat

The LWRB receives water from various waterways, including rivers, lakes, streams, and wetlands that provide different habitat and ecosystem support for various aquatic biota. River use by aquatic biota is impacted by ecology, geomorphology, hydrology, suitable habitat, water quality, and hydroelectric operations. Due to the connection between the generating stations, the Coordinated Aquatic Monitoring Program (CAMP) was developed by Manitoba Hydro and the Province of Manitoba to monitor the health and integrity of aquatic ecosystems that are potentially influenced by hydroelectric generating stations (CAMP, 2017a). The LWRB has undergone annual and rotational benthic macroinvertebrate and fisheries assessments through the CAMP in Pointe du Bois Forebay, Pine Falls Forebay, Lac du Bonnet, and Eaglenest Lake (CAMP, 2017b).

Benthic Macroinvertebrates

CAMP (2017a) describes benthic macroinvertebrates as animals that lack a backbone and are greater or equal to 500 microns in size, from worms to some stages of insects. Visible to the eye, these species live within or on sediment, and they are abundant and sedentary in nature. Along with other factors, such as a wide diversity that responds to different aquatic stressors, benthic

macroinvertebrates are an ideal biological indicator of aquatic ecosystem integrity and health. Species richness (number of unique taxa) and diversity (Simpson's Diversity Index—relative abundance/probability of two individuals belonging to same taxa) are measured, as they can be indicators of potential site disruptions and water quality, respectively (CAMP, 2017a).

Hydrological conditions, potentially impacted by hydroelectric stations on the LWRB (CAMP, 2017b), may influence benthic macroinvertebrate species richness and diversity due to scouring, discharge, water level, and water temperature (CAMP, 2017b). Benthic macroinvertebrates monitored by CAMP from 2010 to 2013 identified that species richness was higher in nearshore environments for Pointe du Bois Forebay and Lac du Bonnet, indicating there may be less perturbation than in offshore environments. The Pointe du Bois Forebay had a higher mean nearshore richness and diversity index than Lac du Bonnet; however, Lac du Bonnet had a higher offshore mean richness and diversity index. Eaglenest Lake was monitored in 2012 and had the highest diversity of 0.85 in nearshore environments of that year and the lowest richness of 14 (CAMP, 2017b).

Fish

CAMP (2017b) recorded up to 21 fish species in Lac du Bonnet and Pointe du Bois Forebay from 2008 to 2013, 19 species in Eaglenest Lake in 2010 and 2013, and 14 species in Pine Falls Forebay in 2011.[1] Fish assemblages in the LWRB had a dominance of percids (including walleye/pickerel, sauger and yellow perch), white sucker, and northern pike. Fish species diversity (Hill's index of richness and evenness); species richness (number of unique taxa); fish abundance (catch per unit effort); condition factor (relationship between weight and length); and rate of deformities, erosions, lesions, or tumours (DELTs) were compared between CAMP sites (CAMP, 2014, 2017b). These parameters can be influenced by river conditions, stress, food availability, and water quality. Among all analyses, fish caught in Lac du Bonnet generally had the best performance. From 2008 to 2013, Lac du Bonnet had the highest fish species diversity and offshore benthic macroinvertebrate richness and diversity and the greatest abundance in nearshore and offshore environments (CAMP, 2017b). Fish communities may be influenced by prey and food availability, and also by habitat fragmentation and altered river morphology influencing habitat availability.

There has been research on the impact of hydroelectric generation on river morphology and how this may be impacting fish habitat use and movement along the Winnipeg River. Some preliminary research conducted by Barth et al. (2009, 2013), Barth (2011), and Struthers et al. (2017) found that habitat use and movement are highly influenced by powerhouse discharge, habitat and substrate type, water level, prey availability, and water temperature. However, there remain questions on how fish are influenced within the lower Winnipeg River.

[1] Using standard gang and small mesh index gill nets (CAMP, 2017b).

Species at Risk

There are four listed species at risk under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Species at Risk Act (SARA) status that may be present in or rely on the LWRB. These include bigmouth buffalo *(Ictiobus cyprinellus)*, carmine shiner *(Notropis percobromus)*, mapleleaf mussel *(Quadrula quadrula)*, and lake sturgeon *(Acipenser fulvescens)* (COSEWIC, 2009, 2016, 2017, 2018). These results were based on the Department of Fisheries and Oceans Canada Species at Risk Map,[2] COSEWIC status reports,[3] and the species at risk public registry.[4]

Water quality, river geomorphology, hydrology, and industrial development can all impact aquatic life and their habitat, including fish and benthic macroinvertebrates. Preliminary research within the LWRB has identified that fish habitat use and movement are influenced by discharge, habitat type, substrate type, and water level and temperature, all of which may be impacted by hydroelectric development. Seasonal or long-term changes to fish habitat and condition will, in turn, impact recreational fishing and domestic consumption in the LWRB (see Sheet 10: Industries and Economic Activity). Continued monitoring of benthic macroinvertebrates and fish populations will help identify impacts due to development in the LWRB.

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[2] See http://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html

[3] See https://wildlife-species.canada.ca/species-risk-registry/sar/assessment/status_e.cfm

[4] See https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

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