

Alberta Conservation Association 2017/18 Project Summary Report

Project Name: Hasse Lake Fisheries Restoration

Fisheries Program Manager: Peter Aku

Project Leader: Brendan Ganton

Primary ACA staff on project: Troy Furukawa and Brendan Ganton

Partnerships

Alberta Biodiversity Monitoring Institute (ABMI)

Alberta Environment and Parks (AEP)

North Saskatchewan Watershed Alliance (NSWA)

Parkland County Alternative Land Use Services Program (ALUS)

Key Findings

- Dissolved oxygen concentrations were limited below 3 m at Hasse Lake throughout the summer months.
- Nutrient (i.e. phosphorus and chlorophyll *a*) levels were moderately high, indicating the lake was eutrophic to hyper-eutrophic.
- Fecal coliforms and *E-coli* remained below federal and provincial water quality guidelines.
- We continued partnerships with Parkland County and other stakeholders interested in fisheries restoration at Hasse Lake.

Introduction

Eutrophication and deteriorating water quality of lakes in developed areas of Alberta is a common problem (Casey 2011). In recent decades, changes in watershed land use have resulted in increased nutrient runoff, particularly phosphorus, into many lakes, including Hasse Lake (Schindler and Donahue 2006). Increased phosphorus in aquatic systems can result in substantial increases in phytoplankton production and algal blooms, including blue-green cyanobacteria blooms. Aside from aesthetic concerns, algal blooms have been linked with anoxic water conditions and toxic or harmful impacts to fisheries, human health, and recreation. Over the last decade, high productivity and recurring algal blooms have become more prevalent in Hasse Lake, resulting in degradation of water quality, and summer and winter fish kills that has decimated what used to be a popular recreational sport fishery. The focus of this multi-year project is to work with local community groups and landowners in the lake watershed to reduce nutrient loading to Hasse Lake, improve water quality and restore the stocked sport fishery. In 2017, we focused on continuing to develop partnerships within the watershed and generating data to examine nutrient supply, water quality, zooplankton, and phytoplankton communities in Hasse Lake.

Methods

We assessed water quality monthly at Hasse Lake from June 15 to August 21, 2017. We measured temperature, conductivity, pH, and dissolved oxygen (DO) using a handheld multi-parameter probe (YSI Professional Plus) at three sampling locations and derived averages for each depth across the three sampling locations. Vertically integrated water samples were collected from each of the three sampling locations and mixed to create a composite samples that were analyzed for chlorophyll *a*, total phosphorous (TP), *E-coli*, and fecal coliforms by Maxxam Analytics.

With the support of partners at NSWA and ABMI, we used the best available elevation models (i.e., LiDAR) to delineate the Hasse Lake basin, then using a process developed by Habib et.al (2016) we applied a model to predict mass phosphorus (P) loading to Hasse Lake within the basin. This nutrient map will be instrumental in guiding delivery of landscape projects, as well as informing the development of a general nutrient budget for Hasse Lake.

We shared our monitoring results for Hasse Lake with numerous stakeholders, including Parkland County, AEP, and NSWA. We provided technical guidance and recommendations to Parkland County ALUS program, toward delivering on-the-ground restoration activities in collaboration with local agricultural producers.

Results

Dissolved oxygen in surface layers decreased from June to August but for most of the summer, DO levels in the upper 3 m of water remained above 5.5 mg/L (Figure 1), meeting Canadian Water Quality Guidelines for Protection of Aquatic Life (Canadian Council of Ministers of the Environment [CCME] 1999). There was little to no oxygen below 4 m depth. Surface water temperature increased from June through July then began to cool through August, but remained below temperatures lethal for Rainbow Trout (i.e., <24°C; Scott and Crossman 1998). The lake was weakly stratified throughout the summer (Figure 1).

Concentrations of TP and chlorophyll *a* increased through the summer of 2017, from lows of 94 and 41.6 µg/L, on June 15, to highs of 150 and 60.9 µg/L by August 21, respectively. Relative to Alberta Environment guidelines, Hasse Lake was Eutrophic – Hyper-eutrophic. Counts of *E-coli* and fecal coliforms ranged between 7 and 130 per 100 mL and 4 and 160 per 100 mL, respectively. Maximum levels for both *E-coli* and fecal coliforms were recorded on June 15, but remained below CCME and Alberta Health and Safety guidelines of 200 per 100 mL. Zooplankton samples (collected summer 2016) were dominated by herbivorous species which comprised nearly 60% of the sample, Omnivorous species comprised 31%, while predatory species made up 10%.

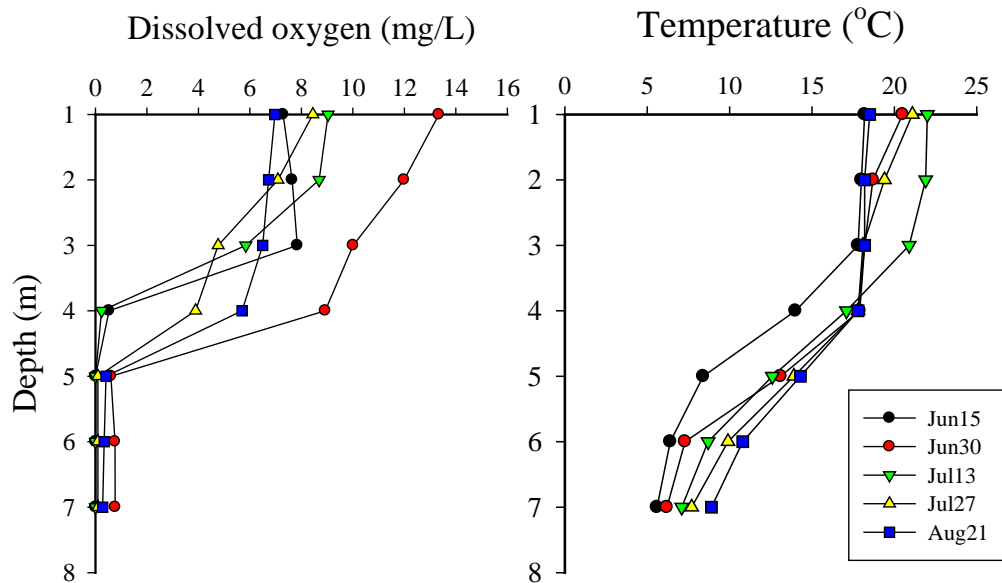


Figure 1. Dissolved oxygen and temperature profiles from June to August at Hasse Lake in 2017.

Conclusions

The information we collected on water quality and biota over the last three years has identified potential habitat limitations, as well as serves as baseline data to assess the effectiveness of future habitat improvements and fish stocking. The updated lake drainage basin map has allowed us to provide general nutrient supply information for the drainage basin and provides focus for ACA and our project partners for delivery of restoration projects. After identifying limiting factors to fish survival (e.g., low oxygen, high nutrient load) ACA has laid out a plan to begin to address these issues in 2018 through aeration, continued landscape projects and pursuing nutrient inactivation. ACA has further requested an experimental fish stocking in spring 2018.

Communications

Presentation and activity station for Watershed Stewardship Day at Hasse Lake, including article published in local newspaper.

<http://www.sprucegroveexaminer.com/2017/06/05/students-learn-about-the-importance-of-watershed-stewardship-in-parkland-county>

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Photos



ACA staff discusses lake and watershed health with local school group at Hasse Lake.
Photo: Myrna Neilson



The island at Hasse Lake, a favourite spot for gulls, geese, pelicans, and other waterfowl.
Photo: Brendan Ganton