

**Alberta Conservation Association
2018/19 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.
- 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. During surveys in past seasons, we have found no evidence of large fish species in Hasse Lake, catching only fathead minnows and brook stickleback. 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 2018, we focused on continuing to develop partnerships within the watershed and generating data to examine nutrient supply, and water quality in Hasse Lake.

Methods

We assessed water quality monthly at Hasse Lake between June 27 and September 19, 2018. 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 composite samples that were analyzed for chlorophyll *a*, total phosphorous (TP), *E-coli*, and fecal coliforms by Maxxam Analytics.

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 late July, then climbed again through August and September. DO remained above 5 mg/L above 3 m most of the summer which has been found to be adequate to support stocked trout in most stocked ACA ponds (Figure 1); however, at the lowest observed level on July 24 surface water was only 5.07 mg/l. Throughout most of the summer, there was little oxygen below 3 m depth until the lake had mixed in September. Similarly, surface water temperature increased from June through July then began to cool through August. Temperatures above 3 m 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 increased through the summer of 2018, from 130 µg/L on June 27, to highs of 210 by August 30. In contrast, chlorophyll *a* increased from 33.8 µg/L on June 27, to a high of 66.8 µg/L on July 24, falling to 24.4 µg/L in mid-August and increasing back to 40.9 µg/L by August 30. Relative to Alberta Environment guidelines, Hasse Lake was eutrophic – hyper-eutrophic. Counts of *E-coli* and fecal coliforms ranged between 10 and 200/100 mL and 4 and 160/100 mL, respectively. Maximum levels for both *E-coli* and fecal coliforms were recorded on July 24, but at 330 and 200/100 mL respectively, both remained at or below CCME and Alberta Health and Safety guidelines of 400/100 mL and 200/100 mL single sample maximum concentration, respectively (CCME 2012).

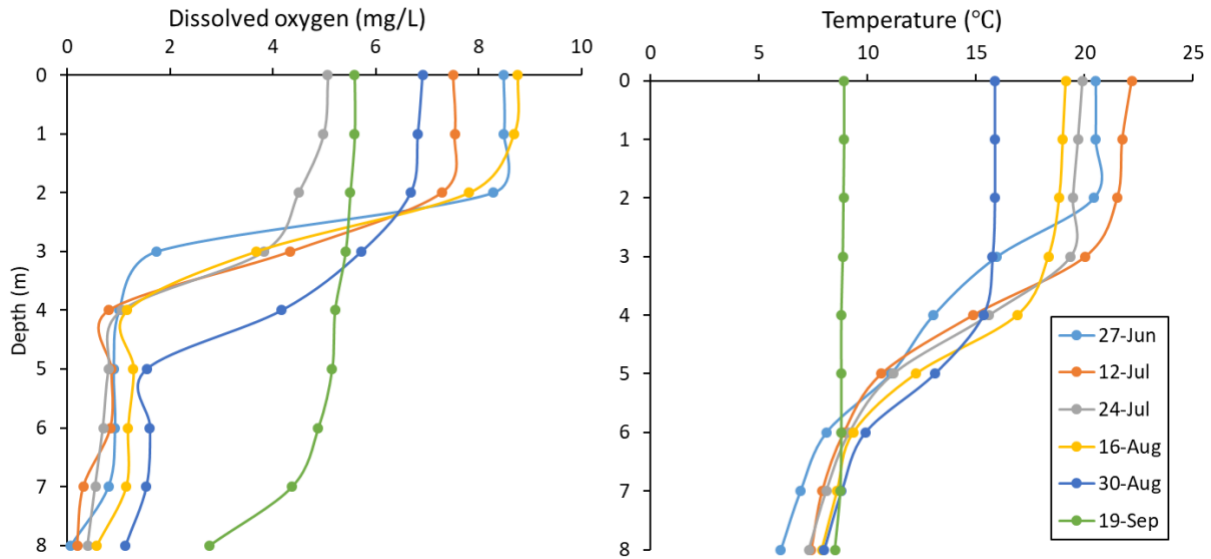


Figure 1. Dissolved oxygen and temperature profiles at Hasse Lake from June to September 2018.

Conclusions

The information we collected on water quality and biota over the last four years has identified potential habitat limitations, as well as serves as baseline data to assess the effectiveness of future habitat improvements and fish stocking. After identifying limiting factors to fish survival (e.g., low oxygen, high nutrient load), ACA continues to pursue a plan to address these issues through aeration, continued landscape projects, and pursuing nutrient inactivation.

Communications

Fish habitat presentation and activity station with local grade 5 students for Watershed Stewardship Day at Hasse Lake, May 25, 2018.

Literature Cited

- Canadian Council of Ministers of the Environment (CCME). 2012. Guidelines for Canadian Recreational Water Quality – Third Edition. Available online at <https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-recreational-water-quality-third-edition/guidelines-canadian-recreational-water-quality-third-edition-page-9.html#a411> [Accessed 15 February 2019].
- Casey, R. 2011. Water Quality Conditions and Long-Term Trends in Alberta Lakes. Alberta Environment and Water, Edmonton. 419 pp + App.
- D. Schindler., and W. Donahue. 2006. An Impending Water Crisis in Canada's Western Prairie Provinces. The proceedings of the National Academy of Sciences U.S.A. Available Online. <http://www.pnas.org/content/103/19/7210>
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Photos



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