Alberta Conservation Association
2016/17 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, Brendan Ganton and Britt Schmidt

Partnerships

Alberta Environment and Parks
North Saskatchewan Watershed Alliance
Parkland County Alternative Land Use Services Program

Key Findings

- Dissolved oxygen concentrations were limited below 3 m at Hasse Lake throughout the summer months.
- Levels of chlorophyll-*a* and phosphorus were low.
- Fecal coliforms and E-coli were detected but 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 are common problems. In recent decades, changes in watershed land use have resulted in increased nutrient runoff, particularly phosphorus, into many lakes, including Hasse Lake. 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, recurring algal blooms have become more prevalent in Hasse Lake, resulting in degradation of water quality, and summer and winter fish kills. These fish kills have 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 drainage basin to reduce nutrient loading to Hasse Lake to improve water quality and restore the stocked sport fishery. In 2016, we focused on continuing to develop partnerships within the watershed and gathering data to examine water quality and zooplankton and phytoplankton communities in Hasse Lake.

Methods

Water quality was assessed monthly at Hasse Lake from June 10 to August 30, 2016. 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. While at these locations, two zooplankton samples were collected, first with a plankton net tow and then with a Schindler-Patalas trap. These samples were catalogued and preserved in alcohol and submitted to the University of Alberta for analysis. Vertically integrated water samples were collected from each of the three sampling locations and mixed to create a composite sample. Composite water samples were analyzed for chlorophyll-*a*, total phosphorous (TP), E-coli and fecal coliforms by Maxxam Analytics. A representative sample (100 mL) was also filtered, and then frozen, to collect an algae sample for spectroscopic analysis at the University of Alberta.

We shared our monitoring results for Hasse Lake with numerous stakeholders, including the Alberta Lake Management Society, the Edmonton Trout Club, and Parkland County. We provided technical guidance and recommendations to Parkland County, delivering on-the-ground restoration activities in collaboration with local agricultural producers. An updated delineation of Hasse Lake drainage basin was developed with the help of limnologists at the North Saskatchewan Watershed Alliance, and Alberta Environment and Parks. This updated drainage basin will be instrumental in guiding delivery of landscape projects, as well as informing the development of a general nutrient budget for Hasse Lake.

Results

Dissolved oxygen levels varied between June and late August 2016 (Figure 1). For most of the summer, DO levels in the upper 2 m of water remained above 5.5 mg/L, meeting Canadian Water Quality Guidelines for Protection of Aquatic Life (Canadian Council of Ministers of the Environment [CCME] 1999). Following a late season destratification (30 August) and mixing of the deeper, anoxic water, the entire water column was near 4.5 mg/L. Water temperature increased throughout the summer, rising from an average of 14.9°C on June 10 to a high of 18.7°C on August 4, before cooler weather dropped the water temperature to 16.25°C on August 30.

Concentrations of TP and chlorophyll-*a* increased through the summer of 2016, from lows of 0.04 mg/L and 8.6 µg/L, respectively, on June 10, to highs of 0.09 mg/L and 40 µg/L by August 4 and July 21, respectively. However, both concentrations remained well below the adopted Alberta Conservation Association thresholds for predicting summer kill events of 0.40 mg/L for phosphorus (Maricas and Malone 1984) and 100 ug/L for chlorophyll-*a* (Barica 1975). Counts of E-coli and fecal coliforms ranged between 3 and 110 per 100 mL and 3 and 99 per 100 mL, respectively. Both E-coli and fecal coliforms reached maximum levels in early summer 2016 at 110 and 99 per 100 mL, respectively, measured on June 10, but remained below CCME and Alberta Health and Safety guidelines of 200 per 100 mL. Zooplankton and phytoplankton samples that were submitted to the University of Alberta are still being processed, and results are pending.

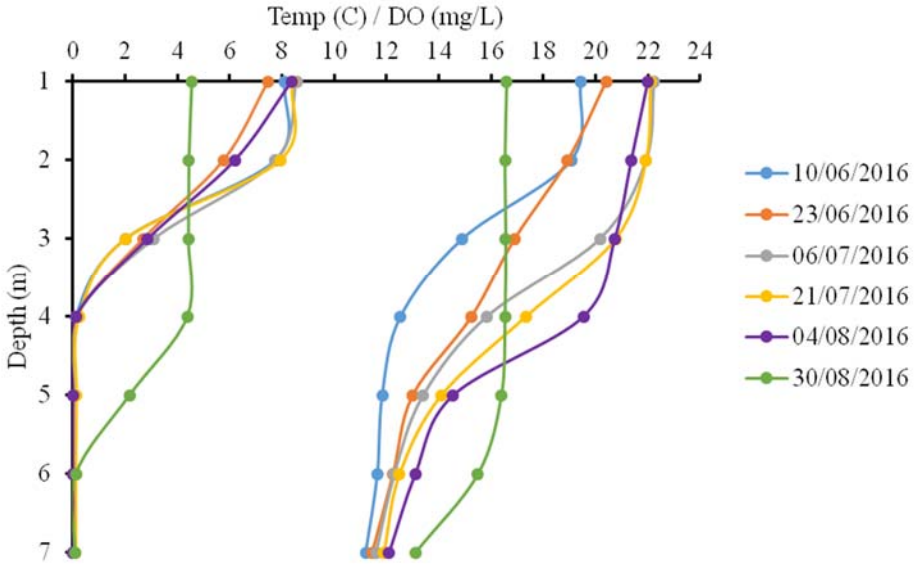

Figure 1. Dissolved oxygen (DO) and temperature profiles from June to August at Hasse Lake in 2016.

Conclusions

The second year of this project focused on assessing the potential to resume stocking at Hasse Lake. The collection of baseline information on water quality and composition of zooplankton and phytoplankton communities at Hasse Lake will help identify potential habitat limitations and serve as baseline data to assess the effectiveness of future habitat improvements. Further, the updated lake drainage basin map will allow us to provide more specific information to our project partners and local resource managers. We will continue to participate in local initiatives and provide support through data collection, communication and coordination.

Communications

None

Literature Cited

Barica, J. 1975. Summerkill risk in prairie ponds and possibilities of its prediction. Journal of the Fisheries Board of Canada 32: 1283–1288.

Canadian Council of Ministers of the Environment (CCME). 1999. Canadian environmental quality guidelines. Available online at http://ceqg-rcqe.ccme.ca/en/index.html [Accessed 29 February 2016].

Mericas, C., and R.F. Malone. 1984. A phosphorus-based fish kill response function for use with stochastic lake models. North American Journal of Fisheries Management 4: 556–565.

Photos

The boat launch shows evidence of the emergent vegetation and algal growth common at Hasse Lake. Photo: Brendan Ganton

Public access dock and landscape at Hasse Lake. This dock is a favourite spot for the many gulls that nest on the island at Hasse Lake. Photo: Brendan Ganton