

## **Alberta Conservation Association 2015/16 Project Summary Report**

**Project Name:** Sport Fisheries Restoration at Isle and Hasse Lakes

**Fisheries Program Manager:** Peter Aku

**Project Leader:** Brendan Ganton

**Primary ACA staff on project:**

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### **Partnerships**

Environment Canada – Environmental Damages Fund  
Lake Isle & Lac Ste. Anne Water Quality Management Society  
North Saskatchewan Watershed Alliance  
Parkland County and Lac Ste. Anne County Alternative Land Use Services Program  
Sturgeon River Watershed Alliance

### **Key Findings**

- We established partnerships with a variety of stakeholders interested in fisheries restoration at both Isle and Hasse lakes, including Parkland County, Lac Ste. Anne County and the Sturgeon River Watershed Alliance.
- Levels of chlorophyll-*a*, phosphorus, *E. coli* and fecal coliforms were low at Hasse Lake.
- The fish community at Hasse Lake consisted predominantly of fathead minnows, with a few brook stickleback; no large-bodied fish species were recorded.
- Mature northern pike, walleye and yellow perch were found in Isle Lake despite previous concerns of complete winterkill, suggesting some fish may have survived the winterkill events or migrated from nearby waterbodies.

### **Introduction**

Eutrophication and deteriorating water quality of lakes are common problems in developed areas of Alberta. In recent decades, changes in watershed land use have resulted in increased nutrient runoff, particularly phosphorus, into many lakes, such as Isle and Hasse lakes. Increased phosphorus to 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 effects on fisheries, human health and recreation. Over the last decade, recurring algal blooms have become more prevalent in both Isle and Hasse lakes, resulting in degradation of water quality and summer and winter fish kills. These fish kills have decimated what used to be vibrant and popular recreational sport fisheries. This multi-year project is focused on working with local community groups and landowners in surrounding watersheds to reduce nutrient loading to Isle

and Hasse lakes to improve water quality and restore the fish communities and associated sport fisheries. In 2015, the initial year of the project, we focused on developing partnerships throughout the watersheds and gathering preliminary data to examine current water quality and fish community composition in both lakes.

## **Methods**

### *Fish Sampling*

We used community-type Fall Walleye Index Netting nets (AFMB 2013) and minnow traps to characterize the existing fish community and population structure in Isle and Hasse lakes between July 13 and 22, 2015. At Hasse Lake, we set 6 nets and 14 minnow traps for 24 h. At Isle Lake, we set 6 nets and 8 minnow traps for 24 h; we reset 7 minnow traps for an additional 19 h. We set nets and traps at randomly selected locations following methods described in Morgan (2002) and AFMB (2013), respectively. After fishing overnight, nets and traps were collected, and fish were identified. We recorded species, fork length (mm), total length (mm), total weight (g), sex and state of maturity of each fish. We also collected otoliths, cleithrum and operculum for determining age of walleye, northern pike and perch, respectively, following protocols outlined by Mackay et al. (1990).

### *Water Quality*

Water quality was assessed monthly at Hasse Lake from June 8 to September 2, 2015. We measured temperature, conductivity, pH, and dissolved oxygen using a hand-held multi-parameter probe (YSI Professional Plus) at three sampling locations. Parameters were averaged across the three sampling locations at each depth. 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*, ammonia, total phosphorous, total nitrogen, nitrite/nitrate, turbidity and conductivity by Maxxam Analytics. Samples were also tested for the presence of *E. coli* and fecal coliforms.

### *Partnerships*

We developed numerous partnerships with key stakeholders throughout the watersheds in support of the project. We shared the results of water quality and fish community monitoring at Isle and Hasse lakes with numerous stakeholders, including Lake Isle & Lac Ste. Anne Water Quality Management Society, Alberta Lake Management Society, St. Albert Fish & Game Club, Edmonton Trout Club, and the Lakes of Parkland County community group. We also shared our results with the public and agricultural producers at a Parkland County and Lac Ste. Anne Alternative Land Use Services launch event and an Isle Lake Watershed Awareness Day. We provided technical guidance and recommendations to Parkland and Lac Ste. Anne counties, delivering on-the-ground restoration activities in collaboration with local agricultural producers. We also accepted a seat on the Technical Advisory Committee of the Sturgeon River Watershed Alliance, allowing us to provide information on the health of these systems directly to the communities, municipalities and organizations that compose this committee.

## Results

### *Fish Sampling*

Fish community sampling in Isle Lake revealed the presence of northern pike, walleye, yellow perch, white suckers and fathead minnows (Table 1). Most sport fish caught in Isle Lake were mature females (Table 1), and most fish were large. Length of northern pike ranged from 38.8 to 80.0 cm (60.4 cm on average), length of walleye ranged from 56.5 to 62.2 cm (58.9 cm on average), and length of yellow perch ranged from 5.9 to 26.3 cm (18.8 cm on average). Age of northern pike ranged from 2 to 7 y (4 y on average), age of walleye ranged from 16 to 17 y (16 y on average), and age of yellow perch ranged from 4 to 7 y (5 y on average). The old age of these fish suggest that some may have survived the winterkill observed in 2013/14 or may have immigrated to Isle Lake from nearby waterbodies (e.g., Sturgeon River, Lac Ste. Anne). We found no evidence of large fish species in Hasse Lake. Our catch at this lake was limited to fathead minnows and brook stickleback; in total, we caught 2,541 fish, 99% of which were fathead minnows and 1% were brook stickleback.

Table 1. Fish caught in Isle Lake in July 2015.

Species	Female		Male		Total
	Mature	Immature	Mature	Immature	
Northern pike	20	8	7	2	37
Walleye	4	0	0	0	4
Yellow perch <sup>1</sup>	6	0	1	0	9

<sup>1</sup>The sex of two yellow perch could not be determined.

### *Water Quality*

Dissolved oxygen levels decreased from June to September (Figure 1) at Hasse Lake; however, despite anoxic conditions near the bottom of the lake, the upper 3 m of water remained above 5.5 mg/L, meeting Canadian Water Quality Guidelines for Protection of Aquatic Life (CCME 1999).

Phosphorus and chlorophyll-*a* concentrations increased through the summer from lows of 0.03 and 15 µg/L, respectively, on June 8, to highs of 0.05 and 39 µg/L, respectively, by September 2, 2015. However, both concentrations remained well below the adopted ACA thresholds for predicting summerkill events of 0.40 mg/L for phosphorus (Maricas and Malone 1984) and 100 µg/L for chlorophyll-*a* (Barica 1975). *E. coli* and fecal coliform counts ranged between 8.5 and 40/100 mL and between 3 and 55/100 mL, respectively. Both *E. coli* and fecal coliform counts reached maximum levels in mid-summer at 40/100 mL and 55/100 mL, respectively, measured on July 23, 2015, but remained below Canadian Council of Ministers of the Environment and Alberta Health and Safety guidelines of 200/100 mL.

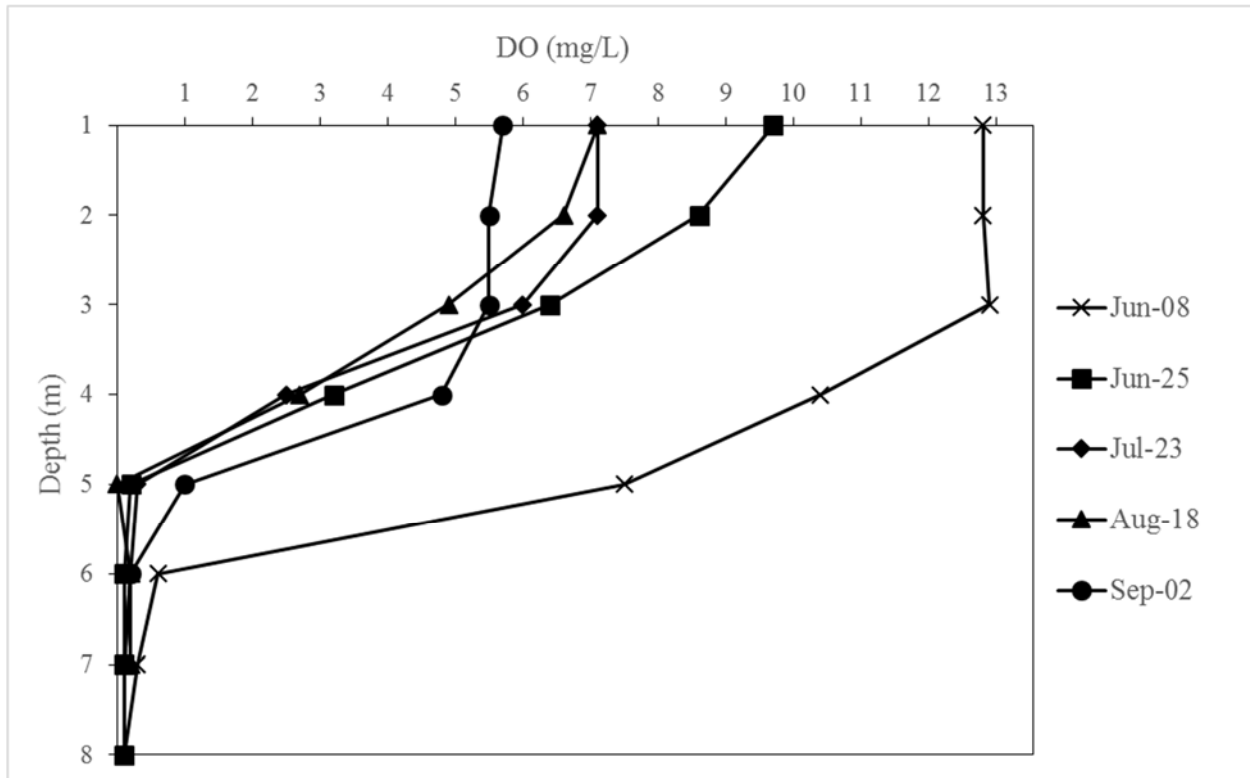


Figure 1. Dissolved oxygen profiles from June to September at Hasse Lake in 2015.

## Conclusions

The first year of this project focused on collaborating with local community groups, municipalities and other key stakeholders involved in efforts to improve water quality in Isle and Hasse lakes. The data we collected on baseline water quality and fish community composition will aid our project partners and local resource managers in restoration efforts. We will continue to participate in local initiatives and provide support through data collection, communication and coordination.

## Communications

### *Public Presentations*

- Lake Isle & Lac Ste. Anne Water Quality Society
- Sturgeon River Watershed Alliance Technical Advisory Committee
- Alberta Lake Management Society annual workshop
- St. Albert Fish & Game Club
- Edmonton Trout Club
- Lakes of Parkland County community group
- Parkland County and Lac Ste. Anne Alternative Land Use Services Program launch event
- Isle Lake Watershed Awareness Day

### *Acknowledgement*

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### **Literature Cited**

Alberta Fisheries Management Branch (AFMB). 2013. Standard for sampling small-bodied fish in Alberta (Public Version). Available online at <http://aep.alberta.ca/fish-wildlife/fish-research-licence/documents/Standard-SamplingSmallBodiedFish-May2013B.pdf> [Accessed February 29, 2016].

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 guidelines. Available online at <http://ceqg-rcqe.ccme.ca/en/index.html> [Accessed February 29, 2016].

MacKay, W., G. Ash, and H. Norris. 1990. Fish ageing methods for Alberta. R.L. & L. Environmental Services Ltd. in association with Alberta Fish and Wildlife Division, and University of Alberta, Edmonton. 113 pp.

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



Cattle grazing adjacent to Isle Lake's north shore. Photo: Juanna Thompson



Boat launch access to Hasse Lake, showing considerable algal growth on June 11, 2015. Photo: Brendan Ganton



Alberta Conservation Association biologists Brendan Ganton and Juanna Thompson gill netting on Hasse Lake. Photo: Peter Aku