

Alberta Conservation Association 2017/18 Project Summary Report

Project Name: Lake Aeration

Fisheries Program Manager: Peter Aku

Project Leaders: Troy Furukawa, Brad Hurkett, Dave Jackson, and Chad Judd

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Partnerships

Access Pipelines
Alberta Environment and Parks
Daishowa-Marubeni International Ltd.
Edmonton Trout Fishing Club
Edson Forest Products
Fisheries and Oceans Canada
Fisheries Enhancement Society of Alberta
Mountain View County
Municipal District of Greenview No. 16
Northern Sunrise County
Radway Lions Club
Spring Lake Campground
Thorhild County
Trout Unlimited Canada – Oldman River Chapter
Village of Spring Lake

Key Findings

- Aeration helped maintain dissolved oxygen levels suitable for year-round survival of stocked trout in 19 lakes, thereby creating angling opportunities that would otherwise not exist.
- All winter aeration lakes successfully overwintered fish with no mortalities.
- We expanded our aeration program by adding Winchell Lake as an aerated waterbody.
- We continued to work with the Municipal District (MD) of Greenview toward developing aeration facilities at East Dollar Lake.

Introduction

Alberta Conservation Association (ACA) uses lake aeration to provide Albertans with recreational angling in areas of the province where such fishing opportunities are otherwise limited. Aerated waterbodies are shallow and eutrophic, experience prolonged ice cover, and are susceptible to summer and winter fish kills. Lakes prone to winterkill are a result of the interplay of low hypolimnetic dissolved oxygen (DO) levels, low photosynthetic oxygen production, and high biological oxygen demand (Miller and Mackay 1996). Similarly, lakes prone to summerkill are a result of the interaction between high surface temperatures and low hypolimnetic DO levels (Aku et al. 1997). Our primary objective is to develop and maintain lake habitats to promote year-round survival of sport fish in stocked waterbodies by maintaining DO concentrations at or above 3 mg/L.

Methods

We use two aeration techniques to promote fish survival: 1) mechanical surface aeration during winter months and 2) diffuser point-release aeration during summer aeration and fall destratification. Mechanical surface aerators are used before and during winter (October to April), when prolonged ice and snow conditions exist. Surface aerators oxygenate and destratify lakes through mixing and agitation caused by pumping water through a fountain on the surface. Additional atmospheric oxygen absorption occurs through the open water created and maintained by the aerator. Point-release aerators use a subsurface bubble diffuser connected by an air hose to an onshore air compressor to circulate and destratify the water column, thereby increasing DO levels and creating uniform thermal and oxygen gradients in the water column. During aerator operation, we visit each site regularly per ACA's Winter Lake Aeration Public Warning and Protection Procedures Protocol to monitor equipment functionality and compliance with public safety requirements. We also measure DO and temperature profiles at 1 m intervals using a YSI© optic sensor at multiple stations.

Results

In 2017/18, we aerated 19 waterbodies (Table 1), all of which successfully overwintered fish with no mortalities; DO concentrations remained above 3 mg/L in most cases. New developments in the aeration program this year included the following:

- Started winter aeration at Winchell Lake in partnership with Mountain View County.
- Completed trenching and powerline installation for surface aeration at Hansen's Reservoir eliminating reliance on ineffective windmill aeration.
- Continued to work with the MD of Greenview toward developing aeration facilities at East Dollar Lake.

Table 1. Location and size of waterbodies and aeration application used in Alberta Conservation Association's aeration program in 2017/18.

Waterbody	Legal location	Aeration Technique	Size (ha)	Winter angling?
Northwest Region				
Cecil Thompson Pond	SW 23-083-21 W5	Surface	1	Yes
East Dollar Lake	NW 08-073-21 W5	Surface	6	Yes
Figure Eight Lake	NE 20-084-25 W5	Surface	39	Yes
Spring Lake (NW)	SE 23-075-11 W6	Diffuser*	32	Yes
Sulphur Lake	NW 07-089-02 W6	Surface	53	Yes
Swan Lake	13-070-26 W5	Surface	140	Yes
Northeast Region				
Millers Lake	SW 08-053-19 W5	Surface	36	Yes
Muir Lake	NW 32-053-27 W4	Surface	29	No
Radway Pond	SE 31-058-20 W4	Diffuser	1	Yes
Spring Lake (NE)	30-52-001 W5	Surface	69	Yes
Central Region				
Beaver Lake	E 16-035-06 W5	Surface	31	No
Birch Lake	18-035-6 W5	Surface	29	Yes
Fiesta Lake	NE 12-035-6 W5	Surface	7	No
Hansen Reservoir	29-038-3 W5	Surface	6	Yes
Ironside Pond	SW 07-038-07 W5	Surface	3	No
Mitchell Lake	NE 25-037-08 W5	Surface	18	Yes
Winchell Lake	NW 02-029-05 W5	Surface	5	Yes
Southern Region				
Coleman Fish & Game Pond	SW 24-008-05 W5	Surface	3	Yes
Police Outpost Lake	06-001-26 W4	Surface	98	No

*Fall destratification

Conclusions

Mechanical surface aeration remains a cost-effective and proven technique to maintain DO concentrations suitable for overwintering sport fish, however, it does create open water that poses risks to public safety. We have increased public safety in areas affected by aeration through implementation of Winter Lake Aeration Public Warning and Protection Procedures (e.g. warning signage, barrier fencing) that are strictly followed while aerators are running. Several of our aeration projects would not be possible without partnership contributions. We continue to explore new partnerships and opportunities for expanding our aeration program to fisheries that may benefit from winter survival of fish.

Communications

- Posted monthly and sub-monthly (November – April) public service advertisements in local and regional newspapers, and websites (www.ab-conservation.com and www.mywildalberta.com) warning public about thin-ice and open-water conditions during winter aeration operations.

Literature Cited

Aku, P.M.K., L.G. Rudstam, and W.M. Tonn. 1997. Impact of hypolimnetic oxygen injection on the vertical distributions of cisco (*Coregonus artedi*) in Amisk Lake, Alberta. *Canadian Journal of Fisheries and Aquatic Sciences* 54: 2182–2195.

Miller, T.G., and W.C. Mackay. 1996. A comparison of mechanical surface aeration and point release air injection used to prevent winterkill in Alberta. Second annual progress report on winter lake aeration. Department of Biological Sciences, University of Alberta, Edmonton, Alberta, Canada. 64 pp.

Photos



Warning sign and perimeter fence used to inform the public about unsafe ice conditions at Muir Lake. Photo: Brendan Ganton



Surface aerators with perimeter fence in background at Spring Lake (Stony Plain). Photo: Brendan Ganton



Alberta Conservation Association staff installing perimeter fence at Spring Lake (Stony Plain). Photo: Brendan Ganton