

**Alberta Conservation Association
2018/19 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

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.
- We expanded our aeration program through initiating winter aeration at West Dollar Lakes.

Introduction

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 typically shallow and eutrophic, experience prolonged ice cover, and are susceptible to summer and winter fish kills. Winterkill is 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). In contrast, Summerkill is 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 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 record 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 2018/19, we aerated 19 waterbodies (Table 1), all of which successfully overwintered fish; DO concentrations remained above 3 mg/L. New developments in the aeration program this year included first time winter aeration of West Dollar Lake in partnership with Municipal District of Greenview. Prolonged late winter conditions resulted in a partial winterkill at Police Lake in 2018, as a result, additional aeration was deployed for the 2018/19 season. Extremely warm summer temperatures and productive waters led to partial summerkill events at Police Outpost and Swan Lake. Though these events happened outside of the periods of active aeration, ACA remained in communication with local managers, and collected DO measures, and recorded observations of mortalities and surviving fish.

Table 1. Location and size of waterbodies and aeration application used in ACA’s aeration project in 2018/19.

Waterbody	Legal location	Aeration Technique	Size (ha)	Winter angling?
Northwest Region				
Cecil Thompson Pond	SW-23-083-21-W5	Surface	1	Yes
Dollar Lakes	SE-18/NW-08-073-21-W5	Surface	13	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	SE-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)	SW-30-052-01-W5	Surface	69	Yes
Central Region				
Beaver Lake	NE/SE-16-035-06-W5	Surface	31	No
Birch Lake	NW-18-035-06-W5	Surface	29	Yes
Fiesta Lake	NE-12-035-06-W5	Surface	7	No
Hansen Reservoir	SE-29-038-03-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	NE/NW-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 maintained 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 projects to fisheries that may benefit from winter survival of fish.

Communications

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

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 artedii*) 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



Surface aerators with perimeter fence at Sulphur Lake. Photo: Nikita Lebedynski



ACA staff installing perimeter fence at Millers Lake. Photo: Brendan Ganton



ACA staff replacing stalled aerator pump mid-season at Spring Lake (Stony Plain). Photo: Troy Furukawa