Alberta Conservation Association

2019/20 Project Summary Report

Project Name: Lake Aeration

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Partnerships

Alberta Environment and Parks
Edmonton Trout Club
Mercer Peace River
Mountain View County
Municipal District of Clear Hills
Municipal District of Greenview No. 16
Saddle Hills County
Thorhild County
Trout Unlimited Canada – Oldman River Chapter
West Fraser - Edson Forest Products
Weyerhauser Grand Prairie Lumber

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 reported kills.
- We established new financial partnerships with Mercer Peace River and Municipal District of Clear Hills at Sulphur Lake, and Saddle Hills County and Weyehauser Grand Prairie Lumber at Spring Lake (NW).

Abstract

At ACA, we use aeration as a fisheries management technique to provide Albertans with diverse recreational angling opportunities in areas of the province where such opportunities would be otherwise limited. Aerated waterbodies are typically shallow, eutrophic, experience prolonged ice cover, and are prone to summer and winter fish kills. Using aeration, we maintain dissolved oxygen levels above 3 mg/L to promote year-round survival and availability of larger fish to anglers. In 2019/20, we aerated 19 waterbodies across the province, all of which successfully overwintered fish without any reported fish kills. We established new financial partnerships with Mercer Peace River and Municipal District of Clear Hills at Sulphur Lake, and Saddle Hills County and Weyehauser Grand Prairie Lumber at Spring Lake (NW), and continue to maintain financial and in-kind partnerships for existing aeration projects.

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 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 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 one-meter intervals using a YSI© optic sensor at multiple stations.

Results

In 2019/20, we aerated 19 waterbodies (Table 1), all of which maintained DO concentration above 3 mg/L and successfully overwintered fish. During winter operations, we followed ACA's Winter Lake Aeration Public Warning and Protection Procedures at each site to mitigate the hazards associated with winter aeration to ensure public safety. We established new financial partnerships with Mercer Peace River and Municipal District of Clear Hills at Sulphur Lake, and Saddle Hills County and Weyehauser Grand Prairie Lumber at Spring Lake (NW).

Table 1. Location and size of waterbodies and aeration technique used in ACA's aeration project in 2019/20.

Waterbody	Legal location	Aeration technique	No. of aerators	Size (ha)	Winter angling?
Northwest Region					
Cecil Thompson Pond	SW-23-083-21-W5	Surface	1	1	Yes
Dollar Lakes	SE-18/NW-08-073-21-W5	Surface	3	13	Yes
Figure Eight Lake	NE-20-084-25-W5	Surface	3	39	Yes
Spring Lake (NW)[1]	SE-23-075-11-W6	Diffuser	1	32	Yes
Sulphur Lake	NW-07-089-02-W6	Surface	4	53	Yes
Swan Lake	SE-13-070-26-W5	Surface	10	140	Yes
Northeast Region					
Millers Lake	SW-08-053-19-W5	Surface	2	36	Yes
Muir Lake	NW-32-053-27-W4	Surface	2	29	No
Radway Pond[2]	SE-31-058-20-W4	Diffuser	3	1	Yes
Spring Lake (NE)	SW-30-052-01-W5	Surface	4	69	Yes
Central Region					
Beaver Lake	NE/SE-16-035-06-W5	Surface	3	31	No
Birch Lake	NW-18-035-06-W5	Surface	2	29	Yes
Fiesta Lake	NE-12-035-06-W5	Surface	2	7	No
Hansen's Reservoir	SE-29-038-03-W5	Surface	2	6	Yes
Ironside Pond	SW-07-038-07-W5	Surface	1	3	No
Mitchell Lake	NE-25-037-08-W5	Surface	2	18	Yes
Winchell Lake	NW-02-029-05-W5	Surface	2	5	Yes
Southern Region					
Coleman Fish & Game Pond	SW-24-008-05-W5	Surface	1	3	Yes
Police Outpost Lake	NE/NW-06-001-26-W4	Surface	4	98	No

[1]Fall destratification

[2]Summer aeration

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. In 2019/20, we established four new financial partnerships.

Communications

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

ACA staff installing aerators at Police Lake. Photo: Brad Hurkett

Winter aeration operations at Sulphur Lake. Photo: Dave Jackson

A successful fishing day at West Dollar Lake. Photo: Dave Jackson