

**Alberta Conservation Association  
2020/21 Project Summary Report**

**Project Name:** Lake Aeration

**Fisheries Program Manager:** Peter Aku

**Project Leaders:** Andrew Clough, Troy Furukawa, Brad Hurkett, Dave Jackson, and Logan Redman

**Primary ACA staff on project:** Kristen Azar, Kacey Barrett, Sarah Bradley, Meagan Butler, Lance Engley, Stefanie Fenson, John Hallett, Jalen Hulit, Tyler Johns, Mike Jokinen, Chad Judd, Kris Kendell, Nikita Lebedynski, Natasha Mackintosh, Garret McKen, Andy Murphy, Sue Peters, Mike Ranger, Amanda Rezansoff, Diana Rung, Roy Schmelzeisen, Britt Schmidt, Scott Seward, Zachary Spence, Dan Sturgess, Jon Van Dijk, and Ken Wright

**Partnerships**

Alberta Environment and Parks

County of Northern Lights

Edmonton Trout Club

Mercer Peace River

Mountain View County

Municipal District of Clear Hills

Municipal District of Greenview No. 16

Northern Sunrise County

Saddle Hills County

Thorhild County

Trout Unlimited Canada – Northern Lights Fly Tiers

West Fraser – Edson Forest Products

## **Key Findings**

- Aeration helped maintain dissolved oxygen levels suitable for year-round survival of stocked trout in 21 lakes, thereby creating angling opportunities that would otherwise not exist.
- Expanded aeration project by adding two new waterbodies, Kerbes Pond and Hasse Lake.
- Discontinued aeration at Police Outpost Lake because we could not meet the public safety liability requirements due to very frequent extreme weather events.
- Established three new financial and in-kind partnerships with 1) Northern Sunrise County at Cecil Thompson Pond, 2) County of Northern Lights at Figure Eight Lake, and 3) Trout Unlimited Canada – Northern Lights Fly Fishers Chapter at Hasse Lake.

## **Abstract**

We use lake 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 2020/21, we aerated 21 waterbodies across the province, all of which successfully overwintered stocked trout without any reported fish kills. This year, we expanded the aeration project with the addition of two new waterbodies, Hasse Lake and Kerbes Pond, but discontinued aeration at Police Outpost Lake because we could not meet the public safety liability requirements due to very frequent extreme weather events. We also established three new financial and in-kind partnerships with 1) Northern Sunrise County at Cecil Thompson Pond, 2) County of Northern Lights at Figure Eight Lake, and 3) Trout Unlimited Canada – Northern Lights Fly Fishers Chapter at Hasse 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 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 promote year-round survival of stocked trout in 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 open water and fall destratification. Mechanical surface aerators are used during winter (October – 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 polynya (open water) created and maintained by the aerator. Subsurface diffusers connected by air hoses to onshore air compressors are used to circulate and destratify the water column, thereby increasing DO levels and creating uniform thermal and oxygen gradients in the water column. During aeration, we monitor water quality at each waterbody by collecting monthly DO and temperature profiles at 1-meter intervals at multiple stations. During winter 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 liability requirements.

## **Results**

In 2020/21, we aerated 21 waterbodies, all of which maintained DO concentrations above 3 mg/L and successfully overwintered fish (Table 1). During winter aeration, we followed ACA's Winter Lake Aeration Public Warning and Protection Procedures Protocol at each site to mitigate the hazards associated with winter aeration to ensure public safety. This year, we expanded the aeration project with the addition of two waterbodies, Hasse Lake and Kerbes Pond, but we discontinued aerating Police Outpost Lake because for several years we could not maintain the integrity of the safety fence around the polynya (open water) due to rapid ice melt from the warm chinook winds. We established three new financial and in-kind partnerships with 1) Northern Sunrise County at Cecil Thompson Pond, 2) County of Northern Lights at Figure Eight Lake, and 3) Trout Unlimited Canada – Northern Lights Fly Fishers Chapter at Hasse Lake.

Table 1. Location and size of waterbodies and aeration technique used in ACA's aeration project in 2020/21.

| Waterbody                      | Legal location        | Aeration technique | No. of aerators | Size (ha) | Max. depth (m) | Winter angling? | Whirling disease decontamination risk zone |
|--------------------------------|-----------------------|--------------------|-----------------|-----------|----------------|-----------------|--|
| <b>Northwest Region</b>        |                       |                    |                 |           |                |                 |  |
| Cecil Thompson Pond            | SW-23-083-21-W5       | Surface            | 1               | 1         | 4              | Yes             | 1 (white)                                  |
| West Dollar Lake               | SE-18/NW-08-073-21-W5 | Surface            | 3               | 13        | 4.5            | Yes             | 2 (Yellow)                                 |
| East Dollar Lake               | SE-18/NW-08-073-21-W5 | Surface            | 3               | 13        | 8              | Yes             | 2 (Yellow)                                 |
| Figure Eight Lake              | NE-20-084-25-W5       | Surface            | 3               | 39        | 6              | Yes             | 1 (White)                                  |
| Spring Lake (NW) <sup>1</sup>  | SE-23-075-11-W6       | Diffuser           | 1               | 32        | 22             | Yes             | 2 (Yellow)                                 |
| Sulphur Lake                   | NW-07-089-02-W6       | Surface            | 4               | 53        | 7.5            | Yes             | 1 (White)                                  |
| Swan Lake                      | SE-13-070-26-W5       | Surface            | 10              | 140       | 6              | Yes             | 2 (Yellow)                                 |
| <b>Northeast Region</b>        |                       |                    |                 |           |                |                 |  |
| Millers Lake                   | SW-08-053-19-W5       | Surface            | 2               | 36        | 7              | Yes             | 2 (Yellow)                                 |
| Muir Lake                      | NW-32-053-27-W4       | Surface            | 3               | 29        | 6              | No              | 2 (Yellow)                                 |
| Radway Pond <sup>2</sup>       | SE-31-058-20-W4       | Diffuser           | 3               | 1         | 6              | Yes             | 1 (white)                                  |
| Spring Lake (NE)               | SW-30-052-01-W5       | Surface            | 4               | 69        | 9              | Yes             | 2 (Yellow)                                 |
| Hasse Lake                     | NE-14-52-02-W5M       | Surface            | 7               | 90        | 9.5            | Yes             | 2 (Yellow)                                 |
| <b>Central Region</b>          |                       |                    |                 |           |                |                 |  |
| Beaver Lake                    | NE/SE-16-035-06-W5    | Surface            | 3               | 31        | 9.5            | No              | 3 (Red)                                    |
| Birch Lake                     | NW-18-035-06-W5       | Surface            | 2               | 29        | 9.5            | Yes             | 3 (Red)                                    |
| Fiesta Lake                    | NE-12-035-06-W5       | Surface            | 2               | 7         | 7              | No              | 3 (Red)                                    |
| Hansen's Reservoir             | SE-29-038-03-W5       | Surface            | 2               | 6         | 4              | Yes             | 2 (Yellow)                                 |
| Ironside Pond                  | SW-07-038-07-W5       | Surface            | 1               | 3         | 13             | No              | 3 (Red)                                    |
| Mitchell Lake                  | NE-25-037-08-W5       | Surface            | 2               | 18        | 7.5            | Yes             | 3 (Red)                                    |
| Winchell Lake                  | NW-02-029-05-W5       | Surface            | 2               | 5         |                | Yes             | 3 (Red)                                    |
| Kerbes Pond <sup>1 and 2</sup> | NE-19-036-20-W4       | Diffuser           | 4               | 3.5       | 4              | No              | 1 (White)                                  |
| <b>Southern Region</b>         |                       |                    |                 |           |                |                 |  |
| Coleman Fish & Game Pond       | SW-24-008-05-W5       | Surface            | 1               | 3         | 4.5            | Yes             | 3 (Red)                                    |

<sup>1</sup>Fall destratification

<sup>2</sup>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 maintained public safety at aerated sites through strict adherence to the provincial Winter Lake Aeration Public Warning and Protection Procedures Protocol. We expanded the aeration project with the addition of two new waterbodies, but discontinued aeration at one lake where we could not meet public safety liability requirements due to frequent extreme weather events. Several of our aeration projects would not be possible without partnership contributions. In 2020/21, we established three new financial partnerships.

## **Communications**

- Posted public service advertisements in local and regional newspapers, and [www.ab-conservation.com](http://www.ab-conservation.com) warning public about thin ice and open-water conditions during winter aeration operations (October – April).
- Attended Alberta Environment and Parks stakeholder meeting informing stakeholders about discontinuing aeration at Police Outpost Lake.

## 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



ACA staff installing safety fencing at Birch Lake. Photo: Andrew Clough



Winter aeration at Beaver Lake. Photo: Andrew Clough



Winter aeration at Hasse Lake. Photo: Kacey Barrett