

Alberta Conservation Association (ACA)

Date: 2014-2015

Project Name: Lake Aeration

Fisheries Program Manager: Peter Aku

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

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Partnerships

- Access Pipelines
- Alberta Culture and Tourism
- Alberta Environment and Sustainable Resource Development
- Clear Hills County
- County of Parkland
- Daishowa-Marubeni International Ltd.
- Edson Forest Products
- Fisheries and Oceans Canada
- Fisheries Enhancement Society of Alberta
- Municipal District of Greenview No. 16
- Northern Sunrise County
- Peace Country Flyfishers
- Spring Lake Campground
- Trout Unlimited Canada – Yellowhead Chapter
- Village of Spring Lake

Key Findings

- Aeration helped maintain year-round dissolved oxygen levels suitable for survival of stocked fish, thereby creating angling opportunities that would otherwise not exist.
- In 2014/15, all aerated waterbodies successfully overwintered trout through most of the winter. However, one lake (Fiesta Lake) experienced a winterkill in early spring 2014; we installed an additional aerator on Fiesta Lake to mitigate late-winter fish kills.
- We expanded our aeration project by adding a new waterbody (Radway Pond) on which we installed a subsurface diffuser aeration system.

Introduction

Alberta Conservation Association uses aeration as a management technique to provide Albertans with recreational angling in areas of the province where such fishing opportunities are otherwise limited. Aerated waterbodies are typically shallow, eutrophic, experience prolonged ice cover, and are prone to both summer and winter fish kills. Low winter hypolimnetic dissolved oxygen (DO) resulting from the interplay of shallow depths, low photosynthetic oxygen production and high biological oxygen demand lead to winterkills (Miller and Mackay 1996). Similarly, the interplay of high surface temperatures and low hypolimnetic DO during the summer results in summerkills (Aku et al. 1997). Our primary objective is to develop and maintain lake habitats that promote year-round survival of sport fish by maintaining DO concentrations at or above 3.0 mg/L.

Methods

We use two methods of aeration: 1) mechanical surface aeration in the winter, and 2) a point-release system for summer aeration, summer circulation and fall destratification. Mechanical surface aerators are used during periods of prolonged ice and snow cover (October to April). These aerators oxygenate by producing a fountain of water and through the open water created and maintained by the aerator. Point-release systems use a subsurface bubble diffuser connected to an onshore compressor or windmill to circulate and destratify the water column, thereby increasing DO levels and creating uniform thermal and oxygen gradients throughout the water column. We visited each waterbody monthly during the winter to confirm proper aerator function and to measure water temperature and DO profiles.

Results

In 2014/15, we aerated 16 waterbodies throughout Alberta (Table 1) and continued to explore opportunities for new aeration sites. Overall, DO levels remained above 3 mg/L throughout most of the water column in most aerated waterbodies, except at Hansen's Reservoir (windmill-operated subsurface aerators), which experienced low DO levels and likely a partial fish kill in winter 2014/15, and at Fiesta Lake, which experienced a winterkill in early spring 2014.

Low DO levels at Hansen's Reservoir occurred despite upgrades to the windmill-operated system (upgraded air lines and diffusers), suggesting that windmills may not be effective at preventing winterkills at this location. The cause of the winterkill at Fiesta Lake is unknown, but it was likely due to low DO resulting from a protracted winter with above-average snowfall. In fall 2014, we installed an additional aerator on Fiesta Lake to prevent future winterkills. In fall 2014, we installed a subsurface diffuser aeration system at Radway Pond. We will test and run this system in 2015/16. We continued to assess the suitability of aeration projects at Grovedale Pond, West Dollar Lake and Winchell Lake, and we are in renewed discussions with the Town of Fairview regarding aeration of Cummings Lake. We also continued to identify other future lake aerations projects, and we established and maintained partnerships to assist with costs associated with the development and maintenance of all aeration projects.

Table 1. Location and size of waterbodies aerated by Alberta Conservation Association in 2014/15.

Waterbody	Legal location	Size (ha)	Winter angling
Figure Eight Lake	NE-20-084-25-W5	38.6	yes
Swan Lake	13-070-26-W5, 18-070-25-W5	139.9	yes
Sulphur Lake	NW-07-089-02-W6	53.4	yes
East Dollar Lake	NW-08-073-21-W5	5.6	yes
Spring Lake	SE-23-075-11-W6	32.1	yes
Cecil Thompson Pond	SW-23-083-21-W5	0.8	yes
Muir Lake	30, 31-053-27-W4	29.0	no
Spring Lake (Stony Plain)	30-052-01-W5	69.2	yes
Coleman Fish and Game Pond	SW-24-008-05-W5	3.4	yes
Hansen's Reservoir	29-038-03-W5	5.7	yes
Beaver Lake	E-16-035-06-W5	31.0	no
Mitchell Lake	NE-25-037-08-W5	18.0	yes
Ironside Pond	SW-07-038-07-W5	3.3	no
Fiesta Lake	NE-12-035-06-W5	7.1	no
Millers Lake	SW-08-053-19-W5	35.6	yes
Birch Lake	18-035-06-W5	28.8	yes

Conclusions

We continue to use aeration to create, maintain and enhance recreational angling opportunities for Albertans by ensuring year-round survival of trout in several stocked waterbodies. Several of the projects would not have been possible without partnership contributions. We continue to investigate and develop new aeration opportunities.

Communications

- Delivered presentation to the Aquarium Club of Edmonton on ACA and our aeration program.
- Posted public service advertisements in local newspapers in November (ice-on period) and April (ice-off period) to notify the public of aeration activities and hazards related to these activities.
- Installed signage at winter-aerated waterbodies to warn the public about the dangers of thin ice conditions and open water associated with lake aeration.

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.

Photo Captions



Upgraded aeration capacity at Fiesta Lake by installing an additional aerator in 2014/15.
Photo: Chad Judd



Alberta Conservation Association staff member Troy Furukawa taking dissolved oxygen readings at Radway Pond. Photo: Britt Keeling