

Alberta Conservation Association 2013/14 Project Summary Report

Project Name: Lake Aeration

Fisheries Program Manager: Peter Aku

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

Primary ACA staff on project:

Melissa Buskas, Kevin Fitzsimmons, Troy Furukawa, Brad Hurkett, Dave Jackson, Tyler Johns, Chad Judd, Jim Potter, Corey Rasmussen, Diana Rung, Mike Uchikura and Ken Wright

Partnerships

Access Pipelines
Alberta Environment and Sustainable Resource Development
Alberta Tourism, Parks and Recreation
Canadian Forest Products Ltd.
Clear Hills County
County of Parkland
Daishowa-Marubeni International Ltd.
Devon Canada Corporation
Edson Forest Products
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 2013/14, all aerated waterbodies successfully overwintered trout. However, a partial summerkill occurred on one lake (Swan Lake).
- To increase dissolved oxygen levels, upgraded air lines/diffusers and two aerators were installed at Hansen's Reservoir and Spring Lake, respectively.

Introduction

Alberta Conservation Association uses aeration as a management technique to provide Albertans with recreational angling opportunities in areas of the province where such 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 all year.

Methods

We used two methods of aeration: mechanical surface aeration in the winter and a point-release system for 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 by creating and maintaining open water around 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 ensure proper aerator function and to measure water temperature and DO profiles. In addition, we monitored temperature, DO, total phosphorus, total nitrogen, ammonia and chlorophyll-*a* throughout the summer at Coleman Fish and Game Pond and Boehlke's Pond, two waterbodies that may be prone to summerkill.

Results

In 2013/14, 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 for Hansen's Reservoir (windmill-operated subsurface aerators), which experienced low DO levels and likely experienced partial fish kills in the winters of 2012/13 and 2013/14. To increase DO levels, upgraded air lines and diffusers and two additional aerators were installed in fall 2013 at Hansen's Reservoir and Spring Lake, respectively. Summer water quality analyses conducted at Coleman Fish and Game Pond and Boehlke's Pond did not identify any water quality concerns; however, a partial summerkill was documented at Swan Lake around August 10, 2013. We continued to assess the suitability of aeration projects at Grovedale Pond, Radway Pond, unnamed ponds near Fox Creek, West Dollar Lake and Winchell Lake. We also continued to identify other future lake aerations projects and to establish and maintain partnerships to assist with the costs associated with developing and maintaining all aeration projects.

Table 1. Location and size of waterbodies aerated by Alberta Conservation Association in 2013/14.

Waterbody	Legal Location	Size (ha)	Winter Angling
Figure Eight Lake	NE-20-084-25-W5M	38.6	yes
Swan Lake	13-070-26-W5M, 18-070-25-W5M	139.9	yes
Sulphur Lake	NW-07-089-02-W6M	53.4	yes
East Dollar Lake	NW-08-073-21-W5M	5.6	yes
Spring Lake	SE-23-075-11-W6M	32.1	yes
Cecil Thompson Pond	SW-23-083-21-W5M	0.8	yes
Muir Lake	30, 31-053-27-W4M	29.0	no
Spring Lake (Stony Plain)	30-052-01-W5M	69.2	yes
Coleman Fish and Game Pond	SW-24-008-05-W5M	3.4	yes
Hansen's Reservoir	29-038-03-W5M	5.7	yes
Beaver Lake	E-16-035-06-W5M	31.0	no
Mitchell Lake	NE-25-037-08-W5M	18.0	yes
Ironside Pond	SW-07-038-07-W5M	3.3	no
Fiesta Lake	NE-12-035-06-W5M	7.1	no
Millers Lake	SW-08-053-19-W5M	35.6	yes
Birch Lake	18-035-06-W5M	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 stocked waterbodies. Several of the projects would not have been possible without partnership contributions. We continue to investigate and develop new aeration opportunities.

Communications

- Posted public service advertisements in local newspapers in November (ice-on period) and April (ice-off period) to notify the public about aeration activities and hazards related to these activities.
- Installed “thin ice” signage at winter-aerated waterbodies to warn the public about the dangers of thin ice conditions and open water associated with lake aeration.
- Delivered a presentation at a meeting of the Peace Country Flyfishers Association.
- Published article in the *Rocky Mountaineer* (November 26, 2013) describing local aeration projects.

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



Alberta Conservation Association staff member Melissa Buskas measuring dissolved oxygen at Swan Lake. Photo: Dave Jackson
[filename: Photo1_Aeration_2013-14_Dave Jackson.jpg]



Alberta Conservation Association staff member Melissa Buskas repairing an aerator at Swan Lake. Photo: Dave Jackson
[filename: Photo2_Aeration_2013-14_Dave Jackson.jpg]



Millers Lake aeration and thin ice sign. Photo: Chad Judd
[filename: Photo3_Aeration_2013-14_Chad Judd.jpg]