

## **Alberta Conservation Association 2015/16 Project Summary Report**

**Project Name:** Lake Aeration

**Fisheries Program Manager:** Peter Aku

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

**Theme Lead:** Kevin Fitzsimmons

### **Primary ACA staff on project:**

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### **Partnerships**

Access Pipelines  
Alberta Environment and Parks  
Alberta Culture and Tourism  
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 Fly Fishers  
Spring Lake Campground  
Trout Unlimited Canada – Yellowhead Chapter  
Village of Spring Lake

### **Key Findings**

- We typically use surface aeration to improve oxygen levels in waterbodies so that fish survive the winter.
- In July 2015, we became aware of a law in the Criminal Code that creates a significant level of risk for manslaughter charges to be brought against ACA if a member of the public drowns in a hole created in the ice as a result of our aeration project.
- In winter 2015/16, we changed our aeration approach from the usual surface aeration to a subsurface diffuser system enclosed by a dock and chain-link fence to contain open water created by aeration.

- Despite our best efforts, the subsurface diffuser systems did not produce the results we were hoping for.
- Containing the hole created in the ice within the dock system proved to be a difficult task and required changes that resulted in these systems being ineffective at maintaining adequate oxygen levels to successfully overwinter fish.
- Following further discussions with the provincial government, the potential criminal liabilities issues are now resolved and ACA will resume surface aeration during the winter of 2016/17.

## **Introduction**

Alberta Conservation Association (ACA) aerates 16 waterbodies throughout Alberta during the winter months to reduce the chance of winter fish kills and provide Albertans with recreational angling in areas of the province where such fishing opportunities are otherwise limited. With a levy increase in 2014, additional funds were allocated to the Fisheries Program to expand the aeration project. To this end, in July 2015 we invited a world-leading lake aeration expert from the British Columbia Institute of Technology to discuss emerging technologies and approaches to improve our aeration program. During these discussions, we became aware of a relatively obscure law under the federal Criminal Code that fundamentally changed our approach to winter lake aeration. Surface aeration, the primary technique we have used to date, creates an open water area in the ice that essentially allows a lake to “breathe.” Although the risk to the public posed by the small area of open water is low, we learned that our liability under Section 263 of the Criminal Code was unacceptably high. If an incident were to occur, manslaughter charges could be brought against ACA staff, management and the board of directors. Consequently, in winter 2015/16, we switched to a new approach using subsurface diffuser systems to aerate lakes; our efforts were supplemented by volunteer third parties that deployed the usual surface aerators on some lakes.

## **Methods**

During the 2015/16 winter, we deployed subsurface diffuser systems in place of the usual surface aerators on 10 lakes (Table 1). Diffusers were installed within floating dock structures covered with horizontal chain-link fence to help contain the open water created by aeration, in compliance with the new provincial aeration policy. Our original plan was to aerate only a select number of lakes to test the subsurface diffuser system; however, at the request of the Minister of Alberta Environment and Parks (AEP), we proceeded with the implementation of aeration systems at all the lakes we normally aerate. The usual surface aerators were deployed on five lakes by volunteer third parties and AEP (Table 1).

## **Results**

Despite our best efforts and a significant amount of time and energy put into installations by ACA staff, the subsurface diffuser aeration systems did not produce the results we were hoping for (Table 1). Diffuser systems were shut down on six lakes in consultation with AEP, either as a safeguard to reduce the risk of winterkill where dissolved oxygen (DO) levels suggest potential for the lake to naturally overwinter without intervention or because of difficulties in containing the open water created by diffusers within the dock structures. Containing the hole created in the

ice within the dock system proved to be difficult, particularly because of the warm winter conditions we experienced. As a result, in many instances we were forced to reduce the amount of air being pumped by the diffusers into the water column. While this change allowed for the hole to be contained, in most cases it appears that it reduced the amount of oxygen entering the water column such that aeration was ineffective at maintaining adequate DO levels (above 3 mg/L) to successfully overwinter fish in these lakes. In contrast, DO levels remained adequate throughout most of the water column at lakes aerated with the usual surface aerators by third parties, ensuring good potential for overwinter fish survival in these lakes (Table 1). We are currently working on a plan with AEP toward restoring surface aeration at all lakes in 2016/17.

Table 1. ACA aerated lakes and aeration methods used during the winter of 2015/16.

<b>Waterbody</b>	<b>Aeration system</b>	<b>Comments</b>
<b>Northwest Region</b>		
Swan Lake	MD of Greenview <sup>1</sup> : surface aerators	Good DO levels; good potential to overwinter fish
Cecil Thompson Pond	Northern Sunrise County <sup>1</sup> : surface aerators	Good DO levels; good potential to overwinter fish
Figure Eight Lake	AEP <sup>1</sup> : surface aerators	Good DO levels; good potential to overwinter fish
Sulphur Lake	AEP <sup>1</sup> : surface aerators	Good DO levels; good potential to overwinter fish
Spring Lake (Grande Prairie)	ACA: fall circulation aeration	Good DO levels; good potential to overwinter fish; normally aerated in the fall only
East Dollar Lake	ACA: subsurface diffuser	Low DO levels; limited potential for overwinter fish survival; dead trout observed
<b>Central Region</b>		
Birch Lake	No aeration; subsurface diffusers installed but not deployed	Good DO levels; good potential to overwinter fish
Mitchell Lake	ACA: subsurface diffuser. (shutdown January 18, 2016)	Good DO levels; good potential to overwinter fish
Beaver Lake	ACA: subsurface diffuser	Concerns with DO levels; potential for some fish loss
Ironside Lake	ACA: subsurface diffuser (shutdown February 5, 2016)	Concerns with DO levels; potential for some fish loss
Fiesta Lake	ACA: subsurface diffuser (shutdown January 28, 2016)	Low DO levels; limited potential for fish survival; dead minnows observed
Hansen's Reservoir	No aeration	Low DO levels before equipment installed, so aeration not initiated; limited potential for fish survival
<b>Northeast Region</b>		
Spring Lake (Stony Plain)	Private <sup>1</sup> : surface aerators	Good DO levels; good potential to overwinter fish
Muir Lake	ACA: subsurface diffuser	Concerns with DO levels; potential for some fish loss
Millers Lake	ACA: subsurface diffuser	Low DO levels; limited potential for overwinter fish survival; dead trout observed
<b>Southern Region</b>		
Coleman Fish and Game Pond	ACA: subsurface diffuser	Concerns with DO levels; potential for some fish loss

<sup>1</sup>Denotes lakes where volunteer third parties deployed the usual surface aerators.

## Conclusions

In response to criminal liability issues associated with Section 263 of the Criminal Code, we changed our aeration methods during the winter of 2015/16 from the usual surface aeration to a subsurface diffuser system enclosed by a dock and chain-link system to contain open water created by the aeration. However, despite our best efforts, the subsurface diffuser systems did not produce the results we were hoping for. Containing the hole created in the ice within the dock system proved to be difficult. In many instances, we were forced to reduce the amount of air pumped by the diffusers into the water column thereby reducing the amount of oxygen entering the water to the point that aeration was ineffective at maintaining adequate DO levels to successfully overwinter fish. We are currently working on a plan with AEP toward restoring surface aeration at all lakes in 2016/17.

## Communications

- 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 “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.

## Photos



Construction of Candock structure for containment of the subsurface diffuser aerator at Ironside Pond. Photo: Kevin Fitzsimmons



Construction of PolyDock structure for containment of the subsurface diffuser aerator at East Dollar Lake. Photo: Garret Mcken



Completed Candock structure with chain-link fencing for containment of the subsurface diffuser aerator at Fiesta Lake. Photo: Kevin Fitzsimmons





Alberta Conservation Association staff assembling diffuser array at East Dollar Lake. Photo: Dave Jackson



Thin ice warning signs and high visibility perimeter fencing installed around PolyDock structure at Muir Lake. Photo: Troy Furukawa