Alberta Conservation Association
2010/11 Project Summary Report

Project Name: *Lake Aeration*

Fisheries Program Manager: Peter Aku

Project Leader: Trevor Council and Kevin Fitzsimmons

Primary ACA staff on project:

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Partnerships

Alberta Fish and Game Association
Alberta Sustainable Resource Development, Fish and Wildlife Division
Alberta Tourism, Parks and Recreation
Canadian Forest Products Ltd.
Clearwater County
County of Stettler
Devon Energy
Daishowa-Marubeni International Ltd.
Fisheries Enhancement Society of Alberta
Northern Sunrise County
Shell Canada Tay River Environmental Enhancement Fund
Town of Fairview
Village of Spring Lake
Weyerhaeuser Canada Ltd.
TransAlta

Key Findings

- Aeration helped to maintain year-round dissolved oxygen levels above 3 mg/L that ensured survival of stocked fish, thereby creating angling opportunities that would not otherwise exist.
- No reports of winterkill or summerkill at any of our aerated waterbodies.
- Conducted summer and fall circulation at Beaver Lake, Boehlke's Pond, Hansen's Reservoir and Spring Lake.

Introduction

Alberta Conservation Association (ACA) uses aeration as a management technique to provide Albertans with recreational angling in areas of the province where such fishing opportunities

would not otherwise exist. 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 was 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. In 2010/11, we maintained aeration activities at 18 waterbodies throughout Alberta and continued to explore opportunities for new aeration sites.

Methods

The 18 waterbodies we aerated in 2010/11 are shown in Table 1. We used two methods of aeration: mechanical surface aeration in the winter and a point-release system for summer circulation and fall de-stratification. We used mechanical surface aerators 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 de-stratify 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 and chlorophyll-a throughout the summer at five waterbodies that may be prone to summerkill (Beaver, Fiesta, Swan, Figure Eight, and Dipping Vat lakes).

Results

All of our winter-aerated waterbodies successfully overwintered trout with no incidents of winterkill. Similarly, no summerkills were reported at any of our aerated waterbodies. Overall, DO levels remained above 3 mg/L throughout most of the water column in aerated waterbodies. However, DO levels dropped as low as 0.8 mg/L at Spring Lake (Stony Plain) on February 23, 2011, suggesting additional aerators may be required on this lake. Summer water quality analysis conducted on samples from the five waterbodies did not identify any water quality concerns.

Throughout the year, we continued with the development of aeration projects at West Dollar Lake and Dipping Vat Lake, as well as investigated opportunities for other lake aeration projects. We established and maintained partnerships to assist with costs associated with the development and maintenance of all aeration projects.

Conclusions

Aeration continues to create, maintain and enhance recreational angling opportunities for Albertans by ensuring year-round survival of trout in several stocked waterbodies. Several of the aeration 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 to notify the public of aeration activities and hazards related to these activities. We posted advertisements in November (ice-on period) and April (ice-off period). We also 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.
- Provided a presentation on lake aeration to the Polar Coachman Fly Fishers of Prince George, British Columbia. We provided our knowledge as it applies to their plans to aerate Shane 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 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. 64 pp.