

**Alberta Conservation Association  
2009/10 Project Summary Report**

**Project Name:** *Summerkill Prevention Investigation in ACA Aerated Lakes*

**Fisheries Program Manager:** Peter Aku

**Project Leader:** Trevor Council

**Primary ACA staff on project:**

Trevor Council, Kelly Hooey, Dave Jackson, Chad Judd, Corey Rasmussen, Brad Taylor and Ken Wright

**Partnerships**

Alberta Sustainable Resource Development

**Key Findings**

- Onset of thermal and dissolved oxygen stratification ranged from late May in Beaver Lake to mid-July in Swan Lake.
- Anoxic conditions developed within 1 m of the lake bottom from mid-July to early September in Dipping Vat and Figure Eight lakes and within 2 – 3 m of the lake bottom from late May to mid-September in Beaver and Fiesta lakes; there was little evidence of anoxic conditions in Swan Lake.
- Maximum surface water temperature ranged from 21.9 to 23.3°C in all five lakes.

**Introduction**

The amount of oxygen a waterbody can hold is directly related to the water temperature. Generally, the colder the temperature the more oxygen the water is capable of holding. Many lakes summerkill as a result of thermal and dissolved oxygen (DO) stratification. Lakes may also contain high concentration of nutrients. Algae blooms are common in these lakes with higher water temperatures and higher eutrophication levels. The algae blooms can grow rapidly, die off, and decompose; a process which contributes to oxygen depletion. Lakes that undergo periods of oxygen depletion may be influenced to different degrees, ranging from a decline in ecosystem efficiency to partial or total fish kills. A number of the lakes Alberta Conservation Association (ACA) aerates in the winter months have experienced, to varying degrees, summerkill due to thermal and DO stratification. Summerkill events have occurred more frequently on these aerated lakes in recent years. In an effort to prevent future summerkill, we initiated summer water quality monitoring on these lakes.

## **Methods**

We collected temperature and oxygen profiles at 1.0-m intervals from the lake surface to the lake bottom at a minimum of three sampling stations in each of the following five lakes: Beaver, Dipping Vat, Fiesta, Figure Eight and Swan lakes. Sampling occurred weekly in July and August and bi-weekly in May, June and September. We measured temperature, DO, pH and conductivity profiles in situ with a hand-held YSI unit (model E528 Pro Series plus). We also collected monthly integrated water samples from each waterbody and had these analysed for concentrations of total phosphorus, total nitrogen, chlorophyll-a, nitrite and nitrate by a CAEAL accredited laboratory (Canadian Association for Environmental Analytical Laboratories). We present DO and temperature data only in this summary.

## **Results**

Thermal and dissolved oxygen stratification developed in late May in Beaver Lake, in mid-June in Dipping Vat, Fiesta and Figure Eight lakes, and in mid-July in Swan Lake. There was evidence of thermocline development 2 m below the surface in Dipping Vat, Figure Eight and Swan lakes and 4 m below the surface in Beaver and Fiesta lakes. We observed anoxic conditions within 1 m of the lake bottom from mid-July to early September in Dipping Vat and Figure Eight lakes. Anoxic conditions generally occurred within 2 to 3 m of the lake bottom from late May to mid-September in Beaver and Fiesta lakes; there was little evidence of anoxic conditions in Swan Lake. Maximum surface water temperature ranged from 21.9 to 23.3°C in all five lakes.

## **Conclusions**

Thermal and dissolved oxygen stratification occurred in all five surveyed lakes. Anoxic conditions developed within 1 m of the lake bottom from mid-July to early September in Dipping Vat and Figure Eight lakes and 2–3 m of the lake bottom from late May to mid-September in Beaver and Fiesta lakes; there was little evidence of anoxic conditions in Swan Lake. Maximum surface water temperature ranged from 21.9 to 23.3°C in all five lakes

## Communications

### Photos (1 to 4)



Alberta Conservation Association staff, Chad Judd recording water quality data from Beaver Lake. (Photo: Corey Rasmussen)

*No Image*

Alberta Conservation Association staff, Dave Jackson, collecting water samples from Swan Lake using a sampling tube. (Photo: Dave Jackson)



Algae bloom in Swan Lake during August 2009. (Photo: Dave Jackson)



Water quality sampling with YSI unit in Swan Lake. (Photo: Paul Hvenegaard)

